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

REPLY TO
ATTENTION OF

CEPOD-PDC

19 Nov 2012

MEMORANDUM FOR COMMANDER HONOLULU ENGINEER DISTRICT (CEPOH-PP-C/CINDY BARGER), BUILDING 230, FORT SHAFTER, HI 96858-5440

SUBJECT: Review Plan Approval for the Wailupe Stream Coastal Storm and Flood Risk Management Project General Reevaluation Report, Island of Oahu, Hawaii

1. References:

a. Engineering Circular 1165-2-209, Civil Works Review Policy, 31 January 2010, and Change 1, 31 January 2012.

b. Review Plan for the Wailupe Stream Coastal Storm and Flood Risk Management Project General Reevaluation Report, Honolulu District, U.S. Army Corps of Engineers.

2. IAW reference 1.a., the Review Plan (reference 1.b.) was coordinated with the Flood Risk Management Planning Center of Expertise (FRM-PCX) in the South Pacific Division, which is the lead office to execute this Review Plan. For further information, contact the FRM-PCX at 415-503-6852. This Review Plan includes Type I Independent External Peer Review.

3. I approve this Review Plan. It is subject to change as circumstances require, consistent with project development under the Project Management Business Process. Subsequent revisions to this Review Plan or its execution will require new written approval from this office.

4. The point of contact for this memorandum is Mr. Russell Iwamura, Senior Economist, Civil Works Integration Division, at 808-835-4625 or email Russell.K.Iwamura@usace.army.mil.

Encl

GREGORY J. GUNTER
Colonel, EN
Acting Commander

REVIEW PLAN

WAILUPE STREAM COASTAL STORM AND FLOOD RISK MANAGEMENT STUDY ISLAND OF O'AHU, HAWAI'I

General Reevaluation Report/Environmental Impact Statement

U.S. Army Corps of Engineers, Honolulu District

Mouth of Wailupe Stream (photo courtesy of Malama Maunalua)

MSC Approval Date: 19 November 2012
Last Revision Date: 27 October 2012

US Army Corps of Engineers ®

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REVIEW PLAN

WAILUPE STREAM COASTAL STORM AND FLOOD RISK MANAGEMENT STUDY ISLAND OF O'AHU, HAWAI'I

General Reevaluation Report/Environmental Impact Statement

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1. PURPOSE AND REQUIREMENTS

a. Purpose. This Review Plan defines the scope and level of peer review for the Wailupe Stream Coastal Storm and Flood Risk Management (FRM) Study, Island of O'ahu, Hawai'i General Reevaluation Report (GRR).

A review plan was originally developed and approved by U.S. Army Corps of Engineers (USACE) Pacific Ocean Division (POD) on 15 October 2007. This Review Plan updates the original review plan to be consistent with current USACE regulations and policies and incorporate the current project scope and schedule. This review plan was developed using the National Planning Center of Expertise (PCX) review plan template dated 15 June 2011.

b. References.

(1) Engineer Circular (EC) 1165-2-209, Civil Works Review Policy, 31 January 2012.

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

(3) Engineer Regulation (ER) 1110-1-12, Quality Management, 30 September 2006.

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

(5) Wailupe Coastal Storm/FRM Study Preconstruction Engineering and Design Phase Project Management Plan (PMP), October 2003 (update in progress).

(6) USACE POD Quality Management Plan, December 2010.

(7) USACE Honolulu District (POH) Civil Works Review Policy (ISO CEPOH-C_12203), 1 November 2010.

c. Requirements. This Review Plan was developed in accordance with EC 1165-2-209, which establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products by providing a seamless process for review of all Civil Works projects from initial planning through design; construction; and operation, maintenance, repair, replacement and rehabilitation (OMRR&R). The EC outlines four general levels of review: District Quality Control/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, certification (per EC 1165-2-209), and planning model certification/approval (per EC 1105-2-412) and the Value Management Plan requirements in the Project Management Business Process (PMBP) Reference 8023G and ER 11-1-321, Change 1.

2. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION

The RMO is responsible for managing the overall peer review effort described in this Review Plan. The RMO for decision documents is typically either a PCX or the Risk Management Center (RMC), depending on the primary purpose of the decision document. The RMO for the decision document peer review effort described in this Review Plan is the Flood Risk Management Planning Center of Expertise (FRM-PCX). Prior to the approval of the decision document, this review plan will be updated to address peer review of implementation products. Because Type II IEPR is anticipated, the RMC will serve as RMO for implementation. The FRM-PCX will coordinate closely with the RMC to ensure that review teams with appropriate expertise are assembled. .

The FRM-PCX will coordinate with the Cost Engineering Directory of Expertise (DX) to ensure the appropriate expertise is included on the review teams to assess the adequacy of cost estimates, construction schedules and contingencies. This project is currently a single-purpose FRM project. However, at the request of the non-Federal sponsors, the project is being re-scoped as a multipurpose FRM and an ecosystem restoration study. As a multipurpose project, the FRM-PCX will also coordinate with the Ecosystem Restoration (ECO) PCX for the review to ensure that review teams with appropriate expertise are assembled.

3. STUDY INFORMATION

a. Authority. The Wailupe Stream Coastal Storm and FRM Study was authorized by Section 209 of the River and Harbor and Flood Control Act of 1962 (Public Law 87-874).

While authorized by Congress under the project name of "Wailupe Stream Coastal Storm and FRM Project", the project objective and public concerns have always focused on flood risk reduction.

b. Decision Document. The Wailupe Stream Coastal Storm and FRM Study is in the Preconstruction Engineering and Design (PED) phase. In 1999, a final feasibility study was issued for the Wailupe Stream Coastal Storm and FRM Project. At the time the study found that the benefit-cost ratio for the project did not meet the minimum requirements to show federal interest to proceed to construction. In fiscal year 2002 Energy and Water Development Appropriation, Congress included an appropriation that directed POH to initiate preconstruction, engineering and design activities for the Wailupe Stream coastal storm and FRM study. By memorandum dated 12 March 2012, the Office of the Assistant Secretary of the Army - Civil Works (ASA-CW) and Headquarters, USACE (HQUSACE) directed POH to prepare a GRR prior to initiating plans and specifications. The Chief of Engineers is the approval authority for the GRR and Environmental Impact Statement (EIS). If approved by the Chief of Engineers, Congressional authorization would be required to proceed to the construction phase.

c. Project Sponsor. The non-Federal co-sponsors for the project are the State of Hawai'i, Department of Land and Natural Resources (DLNR) and the City and County of Honolulu, Department of Design and Construction (DDC).

d. Study/Project Description. The Wailupe Stream study area is located on the southeast of Honolulu on the island of O'ahu. (Figure 1). The 3.15 square mile Wailupe Stream drainage basin extends from the Ko'olau Range to Maunalua Bay and is bounded by Hawai'i Loa and Wiliwilinui Ridges. The valley floor, especially the coastal lowland area, has been highly developed and contains the 'Āina Haina residential community. The project area encompasses the floodplains of Wailupe Stream from the existing debris basin down to the stream mouth. The project also includes a portion of Kulu'ī Gulch, from the confluence with Wailupe Stream up a distance approximately 700 feet.

A Design Agreement outlining all PED activities (GRR and Plans and Specifications) was executed between POH and the non-Federal co-sponsors, DLNR and DDC, on 30 December 2003.

A Feasibility Scoping Meeting (FSM) Report was completed on 27 October 2006 and an ATR on the report was done in September 2006. While the study is currently a single purpose FRM project, the non-Federal sponsors have requested that the study be expanded to include considerations for ecosystem restoration. The PMP is currently being updated and the project will be re-scoped under the new Specific, Measurable, Attainable, Risk Informed, and Timely (SMART) planning process through a planning charette, planned for the spring of 2013. The vertical team will be engaged in the study via the SMART planning charettes beginning with the rescoping charette.

Preliminary plans include providing flood protection from the 1% chance exceedance and 0.2% chance exceedance events (more commonly referred to as the 100-yr and 500-yr floods). Primary features include concrete channelization to increase the flood carrying capacity of the existing stream, two debris basins to prevent large debris flows from entering the developed areas, and bridge modifications to Kalaniana'ole Highway the major east-west thoroughfare for east Honolulu. Preliminary cost estimates for this project are approximately $40 million.

e. Factors Affecting the Scope and Level of Review. The primary review issues for the Wailupe Stream Coastal Storm/ FRM Project GRR/EIS is the potential for life safety issues related to FRM and the significant environmental impacts. POH is assuming that an IEPR will be required.

Consistent with EC 1165-2-209, Mr. Todd Barnes, POH Chief of Engineering and Construction, concurs with the assessment that there are potential life safety issues at this stage in plan formulation. During plan formulation, the study analyses will determine if the project requires redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design construction schedule to address life safety issues.

- The Wailupe Stream channel is only capable of handling an approximately 10-year flood event. Larger events present the potential for flood damages to approximately 930 residences and commercial establishments within the Federal Emergency Management Agency's (FEMA) designated 100-year flood plain.

- The Wailupe Stream also has a history of debris flow occurrences. Debris flows can cause damage either directly by colliding with man-made structures or indirectly by plugging drainage systems so that flood waters are diverted out of the channels. Debris flows can also sever or cover roads, blocking access to - or egress from - neighborhoods, thereby interfering with emergency operations and evacuations.

- The primary uncertainties in the study-level design revolve around the lack of precise geotechnical analysis for much of the study area –the calculation of dimensions and construction quantities for the structural alternatives.

- There is also concern over the proposed retention basin being placed in what is now a public park along the Kulu'ī tributary

- The project/study is likely to involve significant public dispute as to the size, nature, or effects of the project. Wailupe Stream is the last unlined stream on the southeast side of O'ahu and there is a significant segment of the public that would like to see it kept in a natural state. In addition, public dispute is likely to occur over the construction of potential flood walls along the bridge which spans the stream. The flood walls may interfere with residential view planes. With only one thoroughfare road to and from downtown Honolulu, residential and business traffic patterns in southeast O'ahu are likely to be significantly impaired on a temporary basis during the construction of the flood walls.

- There may be significant public dispute over the level of desired flood protection and whether the associated stream alterations are worth the economic and environmental costs.

- The project area currently provides good quality habitat for the indigenous goby. The lifecycle of these freshwater fish includes amphidromous migrations, one downstream to the ocean as larvae and one upstream about six months later as during high flow events. Consequently, the project will need to be designed to allow for fish passage.

The study does not meet the other criteria for consideration for IEPR outlined in EC 1165-2-209.

- The estimated cost of construction is estimated at $40 million (less than $45 million).

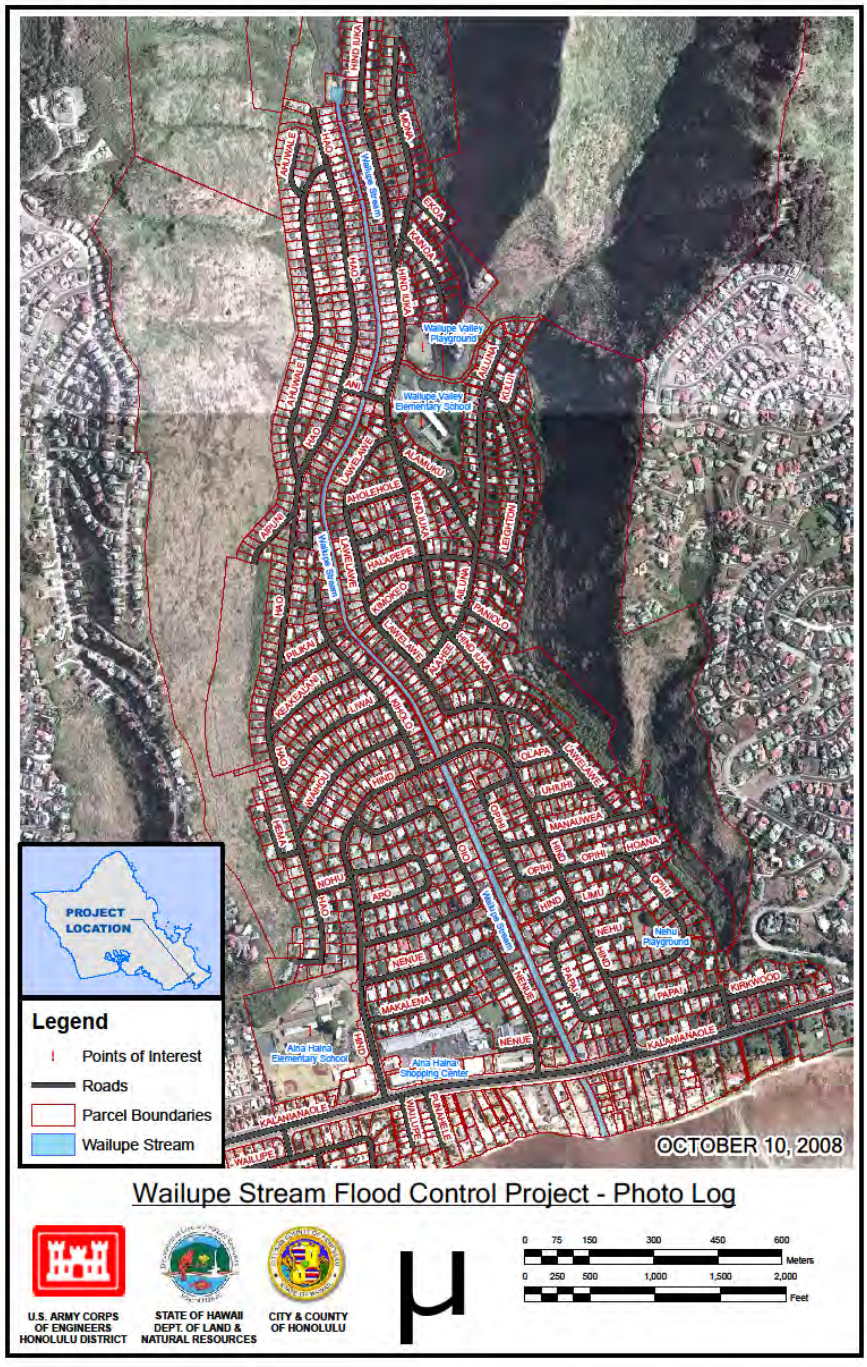
- There has been no request nor expected to have a request by the Governor of the State of Hawai'i for peer review by independent experts.

- The study is not likely to contain influential scientific information or be a highly influential scientific assessment.

- At this time, there has been no request by a head of a Federal or state agency for peer review by independent experts.

- The project is anticipated to have negligible adverse impacts on scarce or unique tribal, cultural or historic resources.

Figure 1: Wailupe Stream Location Map



- There is ample experience within USACE and industry to treat the activity as being routine.

- The study is not likely to contain influential scientific information or be a highly influential scientific assessment.

- The project is not likely to have significant interagency interest.

- The project is not expected to incorporate challenging technical solutions.

- The information in the decision document or anticipated project design is not likely to be 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 practice.

f. In-Kind Contributions. Products and analyses provided by non-Federal co-sponsors as work-in-kind services are subject to DQC, ATR, and IEPR. There are no in-kind products or analyses proposed by the non-Federal co-sponsors.

4. DISTRICT QUALITY CONTROL (DQC)

All decision documents (including supporting data, analyses, environmental compliance documents, etc.) shall undergo DQC. DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the PMP. POH shall manage DQC. Documentation of DQC activities is required and should be in accordance with the Quality Manuals of the POH and POD.

a. Documentation of DQC. Consistent with the POH Quality Manual, DQC will be documented using the POH DQC review table. When all comments have been addressed and back checked, the DQC lead will sign a DQC certification in compliance with the POH Quality Manual. The DQC comments and responses will be provided for the ATR team at each review.

b. Products to Undergo DQC. The following products will be subject to DQC:

- Draft and Final GRR/EIS report.

- All supporting technical information and analyses.

- Draft and final Record of Decision.

c. Required DQC Expertise. The following expertise is needed for DQC.

Tab1e 1: DQC Expertise

DQC Team Members/Disciplines	Expertise Required
DQC Lead	The DQC lead should be a senior professional with extensive experience in preparing Civil Works decision documents and conducting DQC. In this case the DQC lead will likely be from the USACE Alaska District (POA).
Planning	The Planning reviewer should be a senior water resources planner with experience in the development of GRR documents and expertise in FRM planning.
Economics	The economics reviewer should have experience/credentials in FRM in small state or island economies. The reviewer should also be experienced in economic analysis in combined NER/NED evaluations.
Environmental Resources	The environmental reviewer should have environmental regulatory expertise in National Environmental Policy Act (NEPA), Clean Water Act (CWA), Fish and Wildlife Coordination Act (FWCA), and Endangered Species Act (ESA). In addition, the environmental expert should be familiar with tropical stream ecology and changes in stream function and processes due to implementation of FRM structures.
Hydrology and Hydraulic Engineering	The hydrology and hydraulics engineering reviewer will be an expert in the field of hydraulics and have experience with flash-flood systems in urbanized watersheds. 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.
Geotechnical Engineering	The geotechnical engineering reviewer should have an extensive experience in geotechnical evaluation of FRM structures such as static and dynamic slope stability evaluation, evaluation of the seepage through the foundation of the FRM structures, including debris basins, floodwalls, in settlement evaluation of the structures, and design and analysis of shallow and deep foundations of structures, including major highway bridges.

DQC Team Members/Disciplines	Expertise Required
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 major highway bridges.
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.
Ecosystem Restoration/Biologist	Reviewer must be experience in Habitat Equivalency Protocol (HEP) site specific ecosystem restoration model to be used to determine requirements (if any) for compensatory mitigation and to evaluate benefits from proposed ecosystem restoration measures.

5. AGENCY TECHNICAL REVIEW (ATR)

ATR is mandatory for all decision documents (including supporting data, analyses, environmental compliance documents, etc.). The objective of ATR is to ensure consistency with established criteria, guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct and comply with published USACE guidance, and ensure that the document explains the analyses and results in a reasonably clear manner for the public and decision makers. ATR is managed within USACE by the FRM-PCX and is conducted by a qualified team from outside POH that is not involved in the day-to-day production of the project/product. ATR teams will be comprised of senior USACE personnel and may be supplemented by outside experts as appropriate. The ATR team lead will be from outside POD.

a. Products to Undergo ATR. An ATR was already completed for the Feasibility Scoping Meeting (FSM) report. The following additional products will be subject to ATR:

- Draft and Final GRR/EIS report.
- All supporting technical information and analyses.
- Draft and final Record of Decision.

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

Table 2: ATR Required Expertise

ATR Team Members/Disciplines	Expertise Required
ATR Lead	The ATR lead should be a senior professional with extensive experience in preparing Civil Works decision documents and conducting ATR. The lead should also have the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead may also serve as a reviewer for a specific discipline such as planning.
Planning	The Planning reviewer should be a senior water resources planner with experience in the development of GRR documents and expertise in FRM planning.
Economics	The economics reviewer should have experience/credentials in FRM in small state or island economies. The reviewer should also be experienced in economic analysis in combined NER/NED evaluations.
Environmental Resources	The environmental reviewer should have environmental regulatory expertise in NEPA, CWA, FWCA, and ESA. In addition, the environmental expert should be familiar with tropical stream ecology and changes in stream function and processes due to implementation of FRM structures.
Hydrology and Hydraulic Engineering	The hydrology and hydraulics engineering reviewer will be an expert in the field of hydraulics and have experience with flash-flood systems in urbanized watersheds. 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.
Geotechnical Engineering	The geotechnical engineering reviewer should have extensive experience in geotechnical evaluation of FRM structures such as static and dynamic slope stability evaluation, evaluation of the seepage through the foundation of the FRM structures, including debris basins, floodwalls, in settlement evaluation of the structures, and design and analysis of shallow and deep foundations of structures, including major highway bridges.
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 major highway bridges.
Cost Engineering	Reviewer must be experienced in design requirements for

ATR Team Members/Disciplines	Expertise Required
	standard FRM measures.
Real Estate	Reviewer must be experienced in civil works real estate laws, policies and guidance and experience working with sponsor real estate issues.
Ecosystem Restoration Expert/Biologist	Reviewer must be experience in HEP ecosystem restoration model to be used to determine requirements (if any) for compensatory mitigation and to evaluate benefits from proposed ecosystem restoration measures.
Risk Analysis	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.
Construction and Operations	Construction reviewer will have expertise in flood risk management structures.

c. Documentation of ATR. DrChecks[sm] 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:

- The review concern – identify the product's information deficiency or incorrect application of policy, guidance, or procedures;

- The basis for the concern – cite the appropriate law, policy, guidance, or procedure that has not been properly followed;

- 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

- 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 where information is incomplete or unclear, comments may seek clarification in order to then assess whether further specific concerns may exist.

The ATR documentation in DrChecks[sm] will include the text of each ATR concern, the Project Delivery Team (PDT) response, a brief summary of the pertinent points in any discussion, including any vertical team coordination (the vertical team includes POH, FRM-PCX, POD, and HQUSACE), and the agreed upon resolution. If an ATR concern cannot be satisfactorily resolved between the ATR team and the PDT, it will be elevated to the vertical team for further

resolution in accordance with the policy issue resolution process described in either ER 1110-1-12 or ER 1105-2-100, Appendix H, as appropriate. Unresolved concerns can be closed in DrChecks[sm] with a notation that the concern has been elevated to the vertical team for resolution.

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

- Identify the document(s) reviewed and the purpose of the review;
- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions;
- Identify and summarize each unresolved issue (if any); and
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

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

6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

IEPR may be required for decision documents under certain circumstances. IEPR is the most independent level of review, and is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside of USACE is warranted. A risk-informed decision, as described in EC 1165-2-209, is made to assess whether an IEPR is appropriate. IEPR panels will consist of independent, recognized experts from outside of the USACE in the appropriate disciplines. The IEPR panel will represent a balance of areas of expertise suitable for the review being conducted. There are two types of IEPR:

- Type I IEPR. Type I IEPR reviews are managed outside the USACE by Outside Eligible Organization (OEO) and are conducted on project studies. Type I IEPR panels assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, economic analysis, environmental analyses, engineering analyses,

formulation of alternative plans, methods for integrating risk and uncertainty, models used in the evaluation of environmental impacts of proposed projects, and biological opinions of the project study. Type I IEPR will cover the entire decision document or action and will address all underlying engineering, economics, and environmental work, not just one aspect of the study. For decision documents where a Type II IEPR, or Safety Assurance Review (SAR), is anticipated during project implementation, safety assurance shall also be addressed during the Type I IEPR per EC 1165-2-209.

- Type II IEPR. Type II IEPR, or SAR, is managed by the RMC and is conducted on design and construction activities for hurricane, storm, and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. Type II IEPR panels will conduct reviews of the design and construction activities prior to initiation of physical construction and, until construction activities are completed, periodically thereafter on a regular schedule. The reviews shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health, safety and welfare.

a. Decision on IEPR. Both Type I and Type II IEPRs are required.

This project meets the mandatory triggers for Type I IEPR described in Paragraph 11.d.(1) and Appendix D of EC 1165-2-209. A Type II IEPR is required for the design and follow-on project implementation. Safety Assurance will also be addressed during the Type I IEPR per Paragraph 2.c.(3) of Appendix D of EC 1165-2-209.

b. Products to Undergo Type I IEPR. Draft GRR/EIS Report.

c. Required Type I IEPR Panel Expertise. The following IEPR expertise is required for this project. Where possible IEPR panel members will address multiple disciplines and emphasis. The FRM-PCX, as the RMO, will identify the final make-up of the IEPR team in coordination with the PM, vertical team, and other appropriate centers of expertise. The panel will include the necessary expertise to assess the engineering, environmental, and economic adequacy of the decision document as required by EC 1165-2-209, Appendix D. The IEPR panel members for this study and a brief description of their credentials will be included in Attachment 1 once they are identified.

Table 3: IEPR Required Expertise

IEPR Panel Members/Disciplines	Expertise Required
Economics	The economics panel member should have experience/credentials in FRM in small island economies. Also experience in economic analysis in combined NER/NED evaluations.

IEPR Panel Members/Disciplines	Expertise Required
Environmental–NEPA Compliance Expert and Tropical Stream Ecology	The environmental panel member should have environmental regulatory expertise in NEPA, CWA, FWCA, and ESA. In addition, the environmental expert should be familiar with tropical stream ecology and changes in stream function and processes due to implementation of FRM structures.
Engineering - Hydraulic Engineer AND Geotechnical/Structural/Civil Engineer	The hydraulic engineering reviewer should have expertise in FRM in flash-flood urbanized systems (preferably tropical systems). The geotechnical engineering reviewer should have an extensive experience in geotechnical evaluation of FRM structures such as static and dynamic slope stability evaluation, evaluation of the seepage through the foundation of the FRM structures, including debris basins, floodwalls, and in settlement evaluation of the structures. The civil/structural reviewer should have extensive experience in reinforced concrete design /construction/evaluation of flood risk management structures (i.e. Concrete channels, floodwalls, levee embankments, etc) and major highway bridges The engineering reviewer will also address Type II IEPR/SAR related charge questions during the Type I IEPR review.

d. Documentation of Type I IEPR. The IEPR panel will be selected and managed by an 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 5.c above. The OEO will prepare a final Review Report that will accompany the publication of the final decision document and shall:

- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;

- Include the charge to the reviewers;

- Describe the nature of their review and their findings and conclusions; and

- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

The final Review Report will be submitted by the OEO no later than 60 days following the close of the public comment period for the draft decision document. USACE shall consider all recommendations contained in the Review Report and prepare a written response for all recommendations adopted or not adopted. The final decision document will summarize the Review Report and USACE response. The Review Report and USACE response will be made available to the public, including by posting on the internet.

e. Documentation for Type II IEPR. The Type II IEPR or SAR panel will be selected and managed by the RMC per EC 1165-2-209, Appendix E. The RMC will define the required competencies for each of the panel members insuring a balance of perspectives and may specific a particular expertise as the team lead. The review team will prepare a Review Report. All review panel comments shall be entered as team comments that represent the group and be non-attributable to individuals. The team lead is to seek consensus, but where there is a lack of consensus, note the non-concurrence and why. A suggested report outline is an introduction, the composition of the review team, a summary of the review during design, a summary of the review during construction, any lessons learned in both the process and/or design and construction, and appendices for conflict of disclosure forms, for comments to include any appendices for supporting analyses and assessments of the adequacy and acceptability of the methods, models, and analyses used. All comments in the report will be finalized by the panel prior to their release to USACE for each review plan milestone.

The POH Chief of Engineering and Construction is responsible for coordinating with the RMC, for attending review meetings with the SAR review panel, communicating with the agency or contractor selecting the panel members, and for coordinating the approval of the final report with the POD Chief of Business Technical Division.

7. 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 by the POD Commander. DQC and ATR augment and complement the policy review processes by addressing compliance with pertinent published Army policies, particularly policies on analytical methods and the presentation of findings in decision documents.

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

All decision documents shall be coordinated with the Cost Engineering DX, located in the Walla

Walla District. The DX will assist in determining the expertise needed on the ATR team and Type I IEPR team (if required) and in the development of the review charge(s). The DX will also provide the Cost Engineering DX certification. The FRM-PCX is responsible for coordination with the Cost Engineering DX.

9. MODEL CERTIFICATION AND APPROVAL

a. Planning Models. EC 1105-2-412 mandates the use of certified or approved models for all planning activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. Planning models, for the purposes of the EC, are defined as any models and analytical tools that planners use to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate potential effects of alternatives and to support decision making. The use of a certified/approved planning model does not constitute technical review of the planning product. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR (if required).

In accordance with EC 1105-2-412 Paragraph 5.c, models that are single-use or study-specific require approval that the model is a technically and theoretically sound and functional tool that can be applied during the planning process by knowledgeable and trained staff for purposes consistent with the model's purpose and limitations. For this project, the PM will coordinate with the FRM-PCX and ECO-PCX in determining the appropriate level of review for model approval. At this time, an additional ATR reviewer has been added to specifically approve models for site specific use.

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

Table 4: Planning Models

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Certification / Approval Status
HEC-FDA 1.2.5 (Flood Damage Analysis)	The Hydrologic Engineering Center's Flood Damage Reduction Analysis (HEC-FDA) program provides the capability for integrated hydrologic engineering and economic analysis for formulating and evaluating flood risk management plans using risk-based analysis methods. The program will be used to evaluate and compare the future without- and with-project plans along the Wailupe Stream to aid in the selection of a recommended plan to manage flood risk.	Certified
Institute of Water Resources (IWR)	This model assists with formulating plans, cost-effectiveness, and incremental cost analysis (CE/ICA),	Certified

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Certification / Approval Status
Planning Suite	which are required for ecosystem restoration projects. An "annualizer" module has been included to allow for easy calculations of equivalent annual average values, total net values, and annualizing non-monetary benefits and calculating costs.	
Wailupe Site Specific Ecosystem Output and Mitigation Model	A site specific model will be developed for this project. In the absence of any regionalized ecosystem output model that quantifies habitat benefits for stream habitats in Hawai'i, a customized spreadsheet model will be developed specifically for use on the Wailupe Coastal Storm and FRM Project. This is considered an appropriate approach. A spreadsheet model can be 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 can serve as a key dataset for quantification of habitat impacts and benefits in the spreadsheet model. In addition, elements of the HEP approach will be used, as the State of Hawai'i 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 Wailupe Stream.	Approval review to be coordinated with ECO-PCX.

b. Engineering Models. EC 1105-2-412 does not cover engineering models used in planning. The responsible use of well-known and proven USACE developed and commercial engineering software will continue and the professional practice of documenting the application of the software and modeling results will be followed. As part of the USACE Scientific and Engineering Technology initiative, many engineering models have been identified as preferred or acceptable for use on USACE studies and these models should be used whenever appropriate. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR (if required).

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

Table 5: Engineering Models

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Approval Status
HEC-RAS 4.0 (River Analysis	The Hydrologic Engineering Center's River Analysis System (HEC-RAS) program provides the capability to	HH&C CoP Preferred

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Approval Status
System)	perform one-dimensional steady and unsteady flow river hydraulics calculations. The program will be used for steady flow analysis to evaluate the future without- and with-project conditions along the Wailupe Stream and its tributaries.	Model
HEC-HMS 3.5 (Hydrologic Modeling System)	The HEC Hydrologic Modeling System (HMS) program provides the capability to simulate the precipitation-runoff processes of dendritic watershed systems. It is designed to be applicable in a wide range of geographic areas for solving the widest possible range of problems. This includes large river basin water supply and flood hydrology, and small urban or natural watershed runoff. The program will be used to evaluate different storms in the Wailupe Stream watershed to produce hydrographs which will then be used in the HEC-RAS models.	Approved
HEC-SSP 2.0 (Statistical Software Package)	The HEC Statistical Software Package (SSP) program allows you to perform statistical analyses of hydrologic data. The program will be used to perform flood flow frequency analysis based on Bulletin 17B, "Guidelines for Determining Flood Flow Frequency" (1982) for the Wailupe Stream.	Approved
Microcomputer Aided Cost Engineering System (MCACES) 2nd Generation (MII)	The MCACES MII construction cost estimating software, developed by Building Systems Design, Inc., is a tool used by cost engineers to develop and prepare all USACE Civil Works cost estimates. Using the features in this system, cost estimates are prepared uniformly allowing cost engineering throughout USACE to function as one virtual cost engineering team.	Cost Engineering MCX Required Model

10. REVIEW SCHEDULES AND COSTS

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

- Draft GRR/EIS report review – 8 months after Design Agreement Amendment is executed (tentatively April 2014).

- Final GRR/EIS report review – 18 months after Design Amendment is executed (tentative March 2015).

- Estimated cost: $60,800.

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

- Draft GRR/EIS report review – 10 months after Design Agreement Amendment is executed (tentatively July-September 2014).

- Estimated Contract Cost: $100,000.

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

- Estimated cost for POH and FRM-PCX Coordination of the IEPR: $40,000.

This estimate was developed using the Type I IEPR Standard Operating Procedure table provided by the PCXs. This amount is cost-shared between USACE and the non-Federal co-Sponsors.

c. Type II IEPR Schedule and Cost. The Type II IEPR/SAR for this study will be accomplished in accordance with the cost and schedule in the PMP. The Type II IEPR will occur during implementation, following approval of the GRR/EIS. The preliminary estimated cost for Type II IEPR is $75,000.

d. Model Certification/Approval Schedule and Cost. The Wailupe Stream site specific ecosystem output model will be used on a one-time basis. Consistent with EC 1105-2-412, the model will require approval for use. The approval review of the single use site specific model will be coordinated with the ECO-PCX to determine if approval during ATR is acceptable. In the event that the ECO-PCX requires a separate or regional approval, schedule and costs will be adjusted accordingly.

11. PUBLIC PARTICIPATION

As part of the Stakeholder Involvement Plan, public participation will be solicited throughout the planning process. A Public Involvement Plan will be developed for the feasibility study to guide the public participation process. To date there have been held two public scoping meetings on this project, one held in with the community and stakeholders on 6 December 2006 and one held during the development of the Feasibility Study Report on 6 July 2005. Small group meetings will be conducted to collect specific information relevant to study goals and objectives and provide information to key stakeholders and interest groups relevant to the study goals and objectives. Critical milestones for the public participation are:

- The EIS Public Scoping Meeting

- The State EIS Preparation Notice – Under state law, the non-Federal sponsors are required to issue an EIS Preparation Notice. This document will be developed to meet the State requirements and support public involvement objectives for the study.

- Public Information/State EIS Preparation Notice Public Scoping Meeting – As part of the public involvement process, a public meeting will be held after the final array of alternatives have been identified to gain public input on the alternativers formulation and to meet public scoping requirements for the non-Federal co-sponsors in accordance with Chapter 343 of the Hawai'i Revised Statutes (HRS). Additional smaller group meetings will occur consistent with the Public Involvement Plan.

- Draft GRR/EIS Public Hearing – A public hearing and comment period will be held to seek public input on the Draft GRR and EIS.

During the peer review process, significant public comments will be provided to the reviewers at the DQC, ATR, and IEPR levels before they conduct their reviews.

A summary of significant and relevant public comments will be provided to reviewers before they conduct their review. The final decision document, associated review reports, and USACE responses to IEPR comments (if applicable) will be made available to the public on the POH website.

12. REVIEW PLAN APPROVAL AND UPDATES

The POD Commander is responsible for approving this Review Plan. The POD Commander's approval reflects vertical team input (involving POH, POD, FRM-PCX, 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. POH is responsible for keeping the Review Plan up to date. Minor changes to the Review Plan since the last POD Commander approval are documented in Attachment 3. Significant changes to the Review Plan (such as changes to the scope and/or level of review) will be re-approved by the POD Commander, following the process used for initially approving the plan. The latest version of the Review Plan, along with the POD Commander's approval memorandum, will be posted on POH's webpage. The latest Review Plan will also be provided to the FRM-PCX and POD.

13. REVIEW PLAN POINTS OF CONTACT

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

Honolulu District
Ms. Athline Clark
Project Manager
Civil and Public Works Branch, Programs and Project Management Division
U.S. Army Corps of Engineers, Honolulu District
Bldg 230, Room 307
Ft. Shafter, HI 96858-5440
Telephone: (808) 835-4032

Pacific Ocean Division
Mr. Russell Iwamura
U.S. Army Corps of Engineers, Pacific Ocean Division
Building 525
Ft. Shafter, HI 96858-5440
Telephone: (808) 835-4625

Review Management Organization
Mr. Eric Thaut
Flood Risk Management Planning Center of Expertise
U.S. Army Corps of Engineers, South Pacific Division
1455 Market St., Room 2048B
San Francisco, CA 94103-1398
Telephone: (415) 503-6852

ATTACHMENT 2: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR DECSION DOCUMENTS

COMPLETION OF AGENCY TECHNICAL REVIEW

The ATR has been completed for the *<type of product>* for the Wailupe Stream Coastal Storm and FRM Study, Island of O'ahu, Hawai'i. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-209. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing USACE policy. The ATR also assessed the 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 DrChecks[sm].

SIGNATURE _____ _____

Name Date
ATR Team Leader
Office Symbol/Company

SIGNATURE _____ _____

Name Date
Project Manager
Office Symbol

SIGNATURE _____ _____

Name Date
Architect Engineer Project Manager[1]
Company, location

SIGNATURE _____ _____

Name Date
Review Management Office Representative
Office Symbol

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 Date
Chief, Engineering Division
Office Symbol

SIGNATURE _____ _____

Name Date
Chief, Planning Division
Office Symbol

[1] Only needed if some portion of the ATR was contracted.

ATTACHMENT 3: REVIEW PLAN REVISIONS

Table 9: Review Plan Revisions

Revision Date	Description of Change	Page / Paragraph Number

ATTACHMENT 4: ACRONYMS AND ABBREVIATIONS

Table 10: Standard Acronyms and Abbreviations

Term	Definition	Term	Definition
AFB	Alternative Formulation Briefing	NER	National Ecosystem Restoration
ASA(CW)	Assistant Secretary of the Army for Civil Works	NEPA	National Environmental Policy Act
ATR	Agency Technical Review	NHPA	National Historic Preservation Act
CSDR	Coastal Storm Damage Reduction	O&M	Operation and maintenance
CWA	Clean Water Act	OMB	Office and Management and Budget
DPR	Detailed Project Report	OMRR&R	Operation, Maintenance, Repair, Replacement, and Rehabilitation
DQC	District Quality Control/Quality Assurance	OEO	Outside Eligible Organization
DX	Directory of Expertise	OSE	Other Social Effects
EA	Environmental Assessment	PCX	Planning Center of Expertise
EC	Engineer Circular	PDT	Project Delivery Team
EIS	Environmental Impact Statement	PAC	Post Authorization Change
EO	Executive Order	PMP	Project Management Plan
ER	Engineer Regulation	PL	Public Law
FDR	Flood Damage Reduction	POH	U.S. Army Corps of Engineers, Honolulu District
FEMA	Federal Emergency Management Agency	POD	U.S. Army Corps of Engineers, Pacific Ocean Division
FRM	Flood Risk Management	QMP	Quality Management Plan
FSM	Feasibility Scoping Meeting	QA	Quality Assurance
GRR	General Reevaluation Report	QC	Quality Control
HEP	Habitat Equivalency Protocol	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
IWR	Institute of Water Resources	SAR	Safety Assurance Review
MSC	Major Subordinate Command	USACE	U.S. Army Corps of Engineers
NED	National Economic Development	WRDA	Water Resources Development Act