



REPLY TO
ATTENTION OF

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

CEPOD-PDC

OCT 17 2007

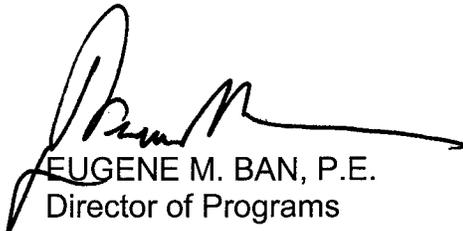
MEMORANDUM FOR COMMANDER, HONOLULU ENGINEER DISTRICT, ATTN:
CEPOH-PP-C

Subject: Review Plan Approval for the Wailupe Stream Flood Reduction Project, Island of Oahu, Hawaii Study

1. The enclosed Review Plan for the Wailupe Stream Flood Reduction Project, Island of Oahu, Hawaii study has been prepared in accordance with EC 1105-2-408 and the Director of Civil Works' "Peer Review Process" memorandum dated March 30, 2007.
2. The Review Plan is available for public comment, and the comments received will be incorporated into the Review Plan as appropriate. The Review Plan has been coordinated with the Flood Risk Management Planning Center of Expertise of the South Pacific Division, U.S. Army Corps of Engineers, which is the lead office to execute this Review Plan. The Review Plan does not include external peer review because the scope and technical complexity of the feasibility report and Environmental Assessment are not expected to be novel, controversial or precedent setting.
3. I hereby approve this Review Plan, which is subject to change as study circumstances require, consistent with study 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 Review Plan can be reached at (808) 438-0881.

FOR THE COMMANDER:

Encl


EUGENE M. BAN, P.E.
Director of Programs

**QUALITY CONTROL
AND
PEER REVIEW PLAN
FOR
WAILUPE STREAM
FLOOD DAMAGE REDUCTION PROJECT
ISLAND OF OAHU, STATE OF HAWAII
May 22, 2007
(revised October 15, 2007)**

For questions or comments regarding this Quality Control and Peer Review Plan, please forward your comments to:

Title	Telephone	Email
Project Manager	808 438 0881	cepoh-pp-wailupe@usace.army.mil

THE INFORMATION CONTAINED IN THIS QUALITY CONTROL AND PEER REVIEW PLAN IS DISTRIBUTED SOLELY FOR THE PURPOSE OF PREDISSEMINATION PEER REVIEW UNDER APPLICABLE INFORMATION QUALITY GUIDELINES. IT HAS NOT BEEN FORMALLY DISSEMINATED BY THE U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT. IT DOES NOT REPRESENT AND SHOULD NOT BE CONSTRUED TO REPRESENT ANY AGENCY DETERMINATION OR POLICY.

**QUALITY CONTROL
AND
PEER REVIEW PLAN
FOR
WAILUPE STREAM
FLOOD DAMAGE REDUCTION PROJECT
ISLAND OF OAHU, STATE OF HAWAII**

1. PURPOSE

The Quality Control Plan (QCP) for the Wailupe Stream Flood Damage Reduction Decision Document, Preconstruction, Engineering and Design (PED) Phase provides a technical peer review mechanism ensuring that quality products are developed during the course of the study by the Honolulu District (POH). All processes, quality control, quality assurance, and policy review will be done to complement each other producing a review process that identifies and resolves technical and policy issues during the course of the study and not during the final study stages.

The QCP was formulated to provide for a sound technical peer review process that focuses on several objectives. Primarily, quality technical products will be produced through an effective and comprehensive single level technical review process throughout product development while verifying that functional, legal, safety, health and environmental requirements are satisfied. This peer review process will ensure that a cost-effective solution, while maintaining product requirements, is developed. Technical review will also act as a mechanism to avoid redesign efforts, and will assure accountability for the technical quality of the product. Each technical review objective in the QCP will be satisfied through a peer review process performed by an Independent Technical Review (technical quality control), Pacific Ocean Division (POD) (quality assurance of technical products and review), and Headquarters (HQUSACE) (policy review).

2. APPLICABILITY

This document provides the QCP for the decision document of the PED phase. It identifies quality control processes and peer review for all work to be conducted under this study authority, including in-house, sponsor and contract work.

3. REFERENCES

- EC 1105-2-408, "Peer Review of Decision Documents", dated May 31, 2005
- EC 1105-2-407, "Planning Models Improvement Program: Model Certification", dated May 31, 2005

- ER 1105-2-100, “Planning Guidance Notebook & Appendices D, F, G & H”
- CECW-CP Memorandum, “Peer Review Process”, dated March 30, 2007
- Honolulu District Quality Management Plan, “CEPOH-C.10102.0 Coastal, Hydraulics, Hydrology, Economics”
- CECW-EH, EM 1110-2-1619, “Risk-Based Analysis for Flood Damage Reduction Studies”, dated August 1, 1996

4. PROJECT BACKGROUND

The Wailupe Stream study area is located on the southeast of Honolulu on the island of Oahu. The 3.15 square mile Wailupe Stream drainage basin extends from the Koolau Range to Maunalua Bay and is bounded by Hawaii Loa and Wiliwilinui Ridges. The valley floor, especially the coastal lowland area, has been highly developed and contains the Aina Haina residential community. The project area encompasses the floodplains of Wailupe Stream from the existing debris basin down to the stream mouth, approximately 8,700 linear feet. The project also includes a portion of Kului Gulch, from the confluence with Wailupe Stream up a distance approximately 700 feet.

Problems in the Wailupe Stream drainage basin include the potential for flood damages to approximately 840 residences and commercial establishments within the estimated 100-year flood plain; potential damages and safety hazards due to debris flows; and, streambank erosion of residential properties along unlined portions of the stream.

The existing stream channel has overflowed twice in March 1958 and December 1967 and caused thousands of dollars in damages to residents and businesses along Wailupe Stream. Residents reported stream full flows near Kalanianaʻole Highway Bridge in lower Wailupe Stream during the recent March 2006 storm event. Based on 32 years of stream recorded data and hydrologic analyses, the estimated stream capacity and 100-year discharge is 2,200 and 5,020 cubic feet per second (cfs) at the lower reaches of Wailupe Stream.

The valley has a history of debris flow occurrences. The US Geological Survey (USGS) cites potential debris flow hazards as described by Campbell (1975) and by Ellen and Wieczorek (1988). Debris flows can cause damage either directly by colliding with bridges or indirectly by plugging the stream system so that flood waters are diverted out of the channels. Debris flows can also sever or cover roads, blocking access and egress to and from neighborhoods, thereby interfering with emergency operations and evacuations. Streambank erosion in Wailupe Stream is also a recurring problem which primarily occurs at or near the confluence of tributaries and drainage outlets, upstream and down stream of bridge abutments and at channel bends.

In addition to the residential and commercial structures within the study area, there are other infrastructures in the study area that are or could be susceptible to damages resulting from erosion and flooding. These include the major thoroughfare (Kalanianaʻole Highway), community roads, and utility lines and poles.

Opportunities exist to reduce property damage, economic losses and human suffering caused by flooding, debris flows, and streambank erosion. Additional opportunities include the preservation of environmental resources and the improvement of water quality. Finally, the current local annual expenditures associated with stream clearing and debris removal could be reduced significantly in the future by implementing appropriate measures.

Alternative plans that will be analyzed include structural and non-structural measures, and combination of both. Structural measures will include channelization using concrete or other hardened materials, concrete debris catchment basins, concrete floodwalls and bridge improvements. Non-structural alternative measures will include floodproofing measures such as elevating floodprone structures, buyouts and relocations. All of these measures are not considered novel or innovative designs.

The sponsors for this project are the City and County of Honolulu, Department of Design and Construction and the State of Hawaii, Department of Land and Natural Resources.

5. PEER REVIEW PLAN

The components of this Quality Control and Peer Review Plan were developed pursuant to the requirements of EC 1105-2-408 and CECW-CP memorandum referenced in paragraph 3.

The decision documents that have been identified for peer review are the Scoping Meeting, Alternative Formulation Briefing and Draft Decision / NEPA Documents for the Wailupe Stream Flood Damage Reduction Project.

The Scoping Meeting document identifies the problems and opportunities, planning objectives and constraints, future without project conditions, applicable management measures, preliminary plan formulation and evaluation, and preliminary public and agency coordination and involvement. The Scoping Meeting brings together the Corps' District, Division and Headquarters personnel, the non-Federal sponsor and resource agencies to reach agreement on the problems and solutions to be investigated during the study and the scope of analysis required.

The Alternative Formulation Briefing (AFB) document will be reviewed to ensure that the plan formulation and selection process, the tentatively selected plan and the definition of Federal and non-Federal responsibilities are consistent with applicable laws, statutes, Executive Orders, regulations and current policy guidance. The AFB meeting also brings together the Corps' District, Division and Headquarters personnel, the non-Federal sponsor and resource agencies to resolve any legal or policy concerns and allow the District to release the draft Decision Document to the public.

The Draft Decision / NEPA Document will describe the process and final selection of the recommended plan and the environmental and cultural resources compliance coordination. This document will be reviewed by the Independent Technical Review team and by interested public during the review period following the formal public meeting. The Final Decision Document will address public comments obtained at the public meeting and if approved, will allow the project to proceed into the development of Plans and Specifications.

A. GENERAL PEER REVIEW REQUIREMENTS

Initial Quality Control (QC) review will be handled within the Honolulu District's Civil Works Technical Section performing the work. Additional QC will be performed by the Project Delivery Team (PDT) during the course and prior to completing the Scoping Meeting and Alternative Formulation Briefing documents. The detailed checks of computations and methodology will be performed at the District level, and the processes for this level of review are well established as described in the District's quality management plan for hydrologic analysis, hydraulic designs and economic analysis, referenced in paragraph 3.

In accordance with Corps' Engineering Circular EC 1105-2-408, Independent Technical Review (ITR) is the minimum review requirements for all decision documents and projects requiring Congressional authorization. ITR is the part of the QC process which confirms the proper selection and application of clearly established criteria, regulations, laws, codes, principles and professional procedures to ensure a quality product. It also confirms the use of clearly justified and valid assumptions that are in accordance with Corps policy. Subject matter Corps experts outside of the performing District are selected to form an ITR team in coordination with the Corps' Planning Center of Expertise for Flood Damage Reduction at the Corps' South Pacific Division office located in San Francisco. The PCX for Flood Damage Reduction serves as the focal point for coordinating and ensuring that technical review of projects is performed in accordance with established Corps policy.

An External Peer Review (EPR) is required in special cases where the risk and magnitude of the proposed project are such that a critical examination by a qualified person or team outside of the Corps organization and not involved in the day-to-day production of a technical product is necessary. In addition, EPR is required for projects where information is based on novel methods, presents complex challenges for interpretation, contains precedent-setting methods or models, presents conclusions that are likely to change prevailing practices, or is likely to affect policy decisions that have a significant impact. If an EPR is determined to be required, members from the National Science Academy or other well-known scientific organization are selected to conduct the technical reviews.

B. PROJECT DELIVERY AND ITR TEAMS

The Project Delivery Team (PDT) is led by the Project Manager and consists of the sponsors and multi-disciplined technical and support representatives. The PDT develops and performs the baseline requirements of scope, schedule and cost in order to meet project execution goals. The technical functions includes various disciplines including but not limited to hydrologic, hydraulic, civil, geotechnical, and structural engineering; economics, real estate, cost estimating, plan formulation, and environmental and cultural resources. Support function representatives include regulatory, construction, value engineering, contracting, budgeting, legal review and GIS mapping.

Due to confidentiality law requirements with posting documents on websites for public review, only the Project Manager is listed as the point of contact for any questions concerning this Peer Review Plan and qualifications of members of the PDT team:

Title	Telephone	Email
Project Manager	808 438 0881	cepoh-pp-wailupe@usace.army.mil

The ITR team is led by the ITR Team Leader and consists of technically knowledgeable and experienced personnel representing each of the technical disciplines of the PDT. Generally, ITR team personnel have more than 10 years of experience in their technical discipline. ITR team members are normally personnel outside of the performing Corps District and do not have any involvement with the day-to-day technical work that supports the decision document.

The expertise that should be provided by the review team includes, but is not limited to the following disciplines:

- 1) Hydraulic Engineer/Hydrologist - The reviewer(s) should have extensive knowledge of HEC-HMS and HEC-RAS modeling including the use of GIS (ARC-INFO) inputs to the model.
- 2) Economist - The reviewer should have a solid understanding of economic principles and models including HEC-FDA and other models and their application to flood risk management projects. The reviewer will also be well experienced with Corps policy and regulations concerning economic analyses.
- 3) Civil/Structural/Geotechnical Engineers – The reviewer should have a solid experience with civil, structural and geotechnical engineering designs and requirements of flood damage reduction and debris basin features.
- 4) Biologist/Environmental Specialist- The reviewer should have a solid background in native fish species, habitats and mitigation measures in addition to compliance with NEPA regulations.
- 5) Realty Specialist - The reviewer should have experience in reviewing Real Estate Appraisal reports for decision documents

- studies and is well experienced with Corps policy and requirements on real estate appraisals.
- 6) Cost Estimator – The reviewer should have experience with construction cost for the project locale.
 - 7) Plan Formulator - The reviewer should be well experienced in reviewing plan formulation processes and Corps policy and regulations for flood damage reduction projects.
 - 8) ITR Team Leader – The team leader should be well experienced with coordinating technical reviews among team members and producing ITR Certification memos.

The Corps' Los Angeles District was selected to fulfill the responsibilities of the ITR team because of their familiarity with debris flows and flood damage reduction projects. This selection was coordinated with the Corps' Planning Center of Expertise (PCX) for Flood Damage Reduction.

Due to confidentiality law requirements with posting documents on websites for public review, only the Project Manager is listed as the point of contact for any questions concerning qualifications of members of the ITR team. The Project Manager will coordinate responses with the ITR team leader for comments concerning the ITR team.

Title	Telephone	Email
Project Manager	808 438 0881	cepoh-pp-wailupe@usace.army.mil

C. MODEL CERTIFICATION

This study will use engineering models to develop flood risk and other hydrology and hydraulics information related to flood damage reduction in determining the potential alternative flood reduction measures. The engineering models that will be used include HEC-HMS and HEC-RAS; models currently in common use in Corps of Engineers studies. Engineering Circular 1105-2-407 does not cover engineering models used in planning studies. Engineering models will be certified under a separate process to be established under the Science and Engineering Technology initiative.

This study will use HEC-FDA, an economic planning analysis model using risk analysis methods for flood damage reduction studies as required by the Corps (EM 1110-2-1419). HEC-FDA is currently being certified by the Corps' Hydrologic Engineering Center since it is a corporate model. If any additional planning models are to be used in this study, the appropriate Planning Center of Expertise will be contacted to determine the need and to obtain model certification, as applicable.

D. INDEPENDENT TECHNICAL REVIEW PLAN

The ITR will be performed within the Corps' Los Angeles District, as the scope and technical complexity do not warrant an External Peer Review (EPR). It is anticipated

that while this study will be challenging and beneficial, it will not be novel, controversial or precedent setting nor have significant national importance or significant public safety risks.

In general, the ITR will focus on:

- Reviewing the technical procedures and assumptions applied in completing alternative designs, economic analyses, and real estate appraisals for the Scoping Meeting, Alternative Formulation Briefing and Draft Decision documents.
- Ensuring compliance with National Environmental Policy Act (NEPA) requirements.
- Ensuring that plan formulation of preliminary designs is complete, effective, efficient and acceptable in addressing project problems and opportunities.
- Ensuring that required documents are complete in accordance with the Planning Guidance Notebook, reference above.

i. ITR Review Process

The ITR Team Review Process will initially review technical methodology and models to be used in the analysis. As alternative plans are formulated, and required documents are prepared, the Review Process will focus on data, assumptions and engineering, scientific, economic, social and environmental analysis processes. Review comments will be posted by the ITR team member using the computer software DrChecks by the required suspense date. Responses to the ITR comments will be addressed by the responsible District PDT member. Backcheck comments will then be posted by the ITR team member identifying that the specific comment is closed or open. Open comments will require further discussions between the ITR reviewer and the performing PDT member for resolution. Once all comments have been closed and resolved, the Project Manager will print a final DrChecks report to be included with the decision document along with ITR Certification by the ITR Team Leader.

ii. ITR Review Cost

The estimated cost of the ITR for the Scoping Meeting, Alternative Formulation Briefing and Draft Decision documents is \$120,000.

iii. ITR Review Schedule

The projected schedule of ITR efforts is listed below:

TASK	START	FINISH
1. ITR - Scoping Meeting document	Feb 06	Nov 06
2. ITR – Alternative Formulation Briefing document	July 07	Sept 07
3. ITR – Draft Decision / NEPA document	Nov 07	Jan 08

E. EXTERNAL PEER REVIEW PLAN

An External Peer Review (EPR) for this project is not being recommended at this time for the following reasons:

i. Novel Scientific Information and Precedent Setting Methods and Models

Based upon review of the Urban Flood Control Study, Honolulu, Hawaii, Final Reconnaissance Report, May 1992 and the Wailupe Stream Flood Control Study, Oahu, Hawaii, Final Feasibility Report, December 1998, it is unlikely that this Decision Document will contain any influential scientific information or methodology. The same standard hydrologic, hydraulic, geotechnical and economic methodologies and numerical models that were used in the Reconnaissance and Feasibility reports will also be applied for this Decision Document. The technical analyses and numerical models (HEC-HMS, HEC-RAS, and HEC-FDA) conform to procedures identified in Corps Engineering Manuals.

Updated scientific data will be collected from reliable federal, state and local government agencies and licensed surveying companies. These data will be used in the technical analysis and reflects the latest and best available information. Scientific data used in this study includes rainfall, stream flow, topographic, debris flow reports and economic information.

Uncertainty is inherent in all science and engineering assessments. Risk and uncertainty analysis are performed in accordance with Corps established procedures described in references listed in paragraph 3.

This project will use standard scientific information, methodologies and numerical models.

ii. Conclusions Likely to Change Prevailing Practices

Alternative plans that will be analyzed include structural and non-structural measures, and combination of both. Structural measures will include channelization using concrete or other hardened materials, concrete debris catchment basins, concrete reinforced floodwalls where needed, and bridge improvements. Non-structural alternative measures will include floodproofing measures such as elevating floodprone structures, buyouts and relocations. These measures were discussed in varying detail in the Reconnaissance and Feasibility reports. All of these measures are not considered novel or innovative designs and have been designed and constructed at various locations throughout the State of Hawaii.

The alternatives currently being considered are not regarded as being novel or innovative and will not change prevailing flood damage reduction practices.

iii. Complex and Controversial Challenges for Interpretation

This project has strong community, local and State government and Congressional support. The local community association has supported continued efforts to solve flood problems of Wailupe Stream and has provided written support to the Corps and Congressional delegation. The City and County of Honolulu and the State of Hawaii are

joint co-sponsors for this phase of the project and have provided 100% of their share of funding. The Congressional delegation has supported this project by providing annual funding for this currently un-budgetable project.

Wailupe Stream is a man-made, unlined, straightened stream that was built in the early 50's during residential development. The stream is the last in the highly urbanized eastern Honolulu that does not provide any flood protection measures to the residents other than existing stream capacity, an existing, undersized, debris basin and annual stream maintenance performed by the City and County of Honolulu. All adjacent stream basins have flood control measures.

The alternatives currently being considered are not complex, controversial or precedent setting.

iv. Interagency Interest

The U.S. Fish and Wildlife Service (USFWS) provided project comments listed in their draft 2(b), Fish and Wildlife Coordination Act report contained in the Feasibility study. In summary, the USFWS recognizes that Wailupe Stream is a highly disturbed and channelized stream but continues to serve as a habitat for several indigenous goby species. USFWS has recommended that low flow channels and small ponds be constructed as part of any concrete channelization alternative to serve as a migratory corridor for juvenile and adult gobies. The USFWS recommendation was accepted and is supported by the Honolulu District and will be incorporated with the channelization alternative for environmental mitigation. The USFWS will be funded to complete the 2(b) report once a recommended plan has been determined.

The National Marine Fishery Service was contacted during the Feasibility study and stated by letter that Section 7 consultation must be reinitiated if new species are listed that may be affected or if the activities affect listed species or critical habitat in a manner not previously considered.

The alternatives currently being considered do not have any significant interagency interests.

v. Economic, Environmental and Other Social Effects

This project will create positive economic and social effects by the reduction of potential flood damage losses, traffic delays and income loss within the community. Environmental mitigation measures, such as the incorporation of a low flow channel and resting ponds for native goby species are being incorporated as part of the channelization alternative. In addition to flood damage reduction, debris retention structures will help reduce sediment and debris loading into the ocean and will improve the water quality and marine ecosystem near the mouth of Wailupe Stream.

The Decision Document supporting this project will address the economic, environmental and other social effects related to flood damage reduction projects, however considering the localized area of protection, the magnitude of risk and size of the project relative to the many other flood damage reduction projects nationwide, an EPR is not considered necessary.

vi. Public Safety Risk

The potential for significant damages from flooding and debris flows for the community surrounding Wailupe Stream is evidenced by the 1987 – 1988 New Year’s flood which caused an estimated \$35 million in damages to suburban areas of eastern Oahu near the study site. This study will investigate structural and non-structural alternative measures that will reduce damages for various intensities of flooding and debris flows. The use of dams to contain floodwaters was investigated in the Feasibility study but was deleted from further investigation due to the potential for public safety risk and land requirements.

The channelization alternative consists of lining the stream bed and side slopes with concrete or other hardened material and will require the use of concrete floodwalls at the lower reaches of Wailupe Stream to temporarily contain the floodwaters for large flood events and allow it to pass safely under the Kalanianaʻole Highway Bridge. These floodwalls will be an integral part of the stream channelization and will be designed to prevent overtopping and failure for the design stream discharge.

The project will address public safety risks due to flooding of the area which are considered significant, however the magnitude of the project and level of risk considering the size and scope of the project relative to the many other flood damage reduction projects nationwide does not seem sufficient to warrant an EPR.

F. ADDITIONAL REVIEW CONSIDERATIONS

i. Public and Agency Comment and Dissemination

Public involvement is anticipated throughout the preparation of the Decision Document. Several public information and agency scoping meetings have been conducted and future meetings are scheduled. Public information meetings are usually conducted at the community’s public school facility to inform the general public, other federal and state agencies and interested stakeholders of the status of the project and alternatives being considered. In addition, there will also be a public meeting during the public review period of the draft Environmental Assessment (EA) before the publication of the final EA and Finding of No Significant Impact, if appropriate.

The Public Involvement program is expected to occur as follows:

MEETING	SCHEDULED DATE	COMPLETED
Agency Scoping Meeting	March 2005	Yes
Public Information Meeting	October 2005	Yes
Public Information Meeting	October 2006	Yes
Public Information Meeting	October 2007	Yes
Formal Public Meeting (Draft Decision / NEPA Document)	February 2008	

It is anticipated that minutes of all public involvement meetings will be disseminated to the ITR Team following the meetings.

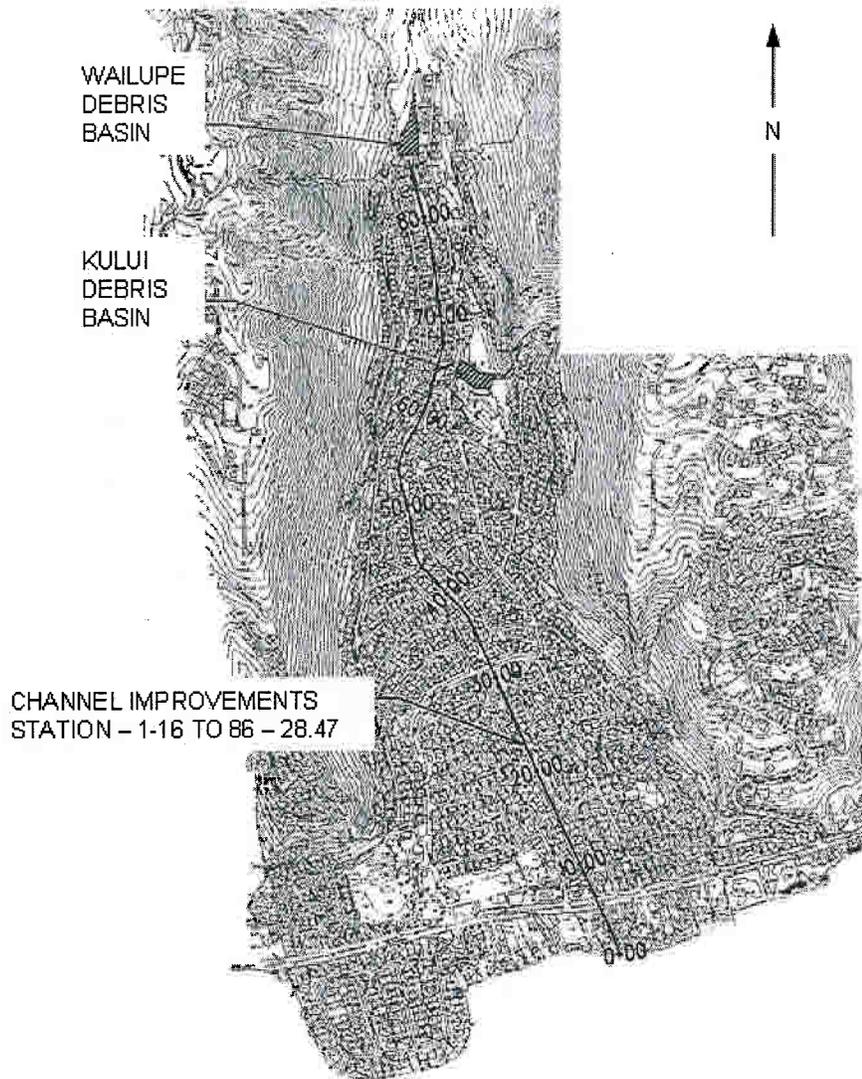
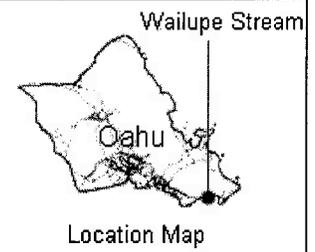
ii. Public Peer Review

No formal Public Peer Review will be conducted. However, all input and comments received at the public information meetings and formal public meeting will be considered and applicable comments will be incorporated into the final Decision Document.

**Wailupe Stream Flood Damage Reduction
Oahu, Hawaii**

LOCATION MAP

U.S. ARMY ENGINEER DISTRICT
HONOLULU



Location Map - Not to Scale