



REPLY TO  
ATTENTION OF

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

CEPOD-PDC

MAR 22 2010

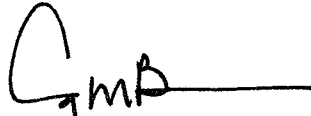
MEMORANDUM FOR COMMANDER, HONOLULU ENGINEER DISTRICT, ATTN:  
CEPOH-PP-C/CINDY BARGER

Subject: Review Plan approval for the Ala Wai Watershed Project (a.k.a. Ala Wai Canal Project) Island of Oahu, Hawaii Feasibility Study

1. The attached Review Plan for the Ala Wai Watershed Project (a.k.a. Ala Wai Canal Project) Island of Oahu, Hawaii feasibility study has been prepared in accordance with EC 1165-2-209.
2. The Review Plan has been coordinated with the Flood Risk Management Planning Center of Expertise (FRM-PCX) of the South Pacific Division, U.S. Army Corps of Engineers, which is the lead office to execute this Review Plan. For further information, contact Mr. Eric Thaut at the FRM-PCX at (415) 503-6852 or Mr. Forest Brooks the Pacific Ocean Division Regional Program Manager for the FRM-PCX at (907) 753-2627. The Review Plan includes independent external peer review.
3. I hereby approve this Review Plan, which is subject to change as 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.

FOR THE COMMANDER:

Encl

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

REVIEW PLAN  
For



ALA WAI WATERSHED PROJECT  
(a.k.a Ala Wai Canal Project)  
ISLAND OF O'AHU, HAWAII  
Feasibility Report  
General Investigation  
Section 209, Flood Control Act of 1962 (Public Law 87-874)

Prepared by  
U.S. Army Corps of Engineers, Honolulu District  
Civil and Public Works Branch

MSC Approval Date: 22 March 2010  
Last Revision Date: 25 June 2012

## REVIEW PLAN

### ALA WAI WATERSHED PROJECT (A.K.A ALA WAI CANAL PROJECT), ISLAND OF O'AHU, HAWAII FEASIBILITY REPORT

#### TABLE OF CONTENTS

_TOC323555241	
1.0 PURPOSE AND REQUIREMENTS.....	4
2.0 REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION .....	4
3.0 DISTRICT QUALITY CONTROL REVIEW (DQC).....	4
4.0 AGENCY TECHNICAL REVIEW (ATR).....	5
5.0 INDEPENDENT EXTERNAL PEER REVIEW (IEPR).....	5
6.0 POLICY COMPLIANCE AND LEGAL REVIEW.....	7
7.0 SAFETY ASSURANCE REVIEW .....	7
8.0 STUDY INFORMATION .....	7
8.1 DECISION DOCUMENT.....	7
8.2 PROJECT BACKGROUND .....	7
8.3 PROJECT GOAL AND OBJECTIVES: .....	8
8.4 PROJECT MANAGEMENT PLAN .....	10
9.0 PROJECT DELIVERY TEAM .....	11
10.0 PROJECT SCHEDULE .....	12
11.0 PROJECT COSTS.....	13
12.0 PROPOSED PROJECT METHODOLOGY/MODELS.....	15
13.0 FACTORS AFFECTING THE SCOPE AND LEVEL OF REVIEW .....	21
13.1 PROJECTS NOVEL METHODS AND COMPLEX CHALLENGES.....	22
13.2 INFLUENTIAL SCIENTIFIC INFORMATION/ASSESSMENTS.....	26
13.3 ENVIRONMENTAL IMPACT STATEMENT (EIS).....	27
13.4 HEALTH AND HUMAN SAFETY ASSURANCES.....	33
13.5 INTERAGENCY COORDINATION AND INTEREST .....	33
13.6 PROJECT CONTROVERSY .....	34
14.0 PROJECT PRELIMINARY RISK ASSESSMENT .....	34
15.0 PEER REVIEW STRATEGY AND MANAGEMENT .....	35
15.1 AGENCY TECHNICAL REVIEW (ATR) TEAM REQUIREMENTS .....	35
15.2 INDEPENDENT EXTERNAL PEER REVIEW (IEPR) TEAM REQUIREMENTS .....	36
15.3 REVIEW DOCUMENTATION AND DISSEMINATION .....	37
16.0 MODEL CERTIFICATION .....	37
17.0 COST ENGINEERING DIRECTORY OF EXPERTISE.....	38
18.0 STAKEHOLDER INVOLVEMENT PLAN/PUBLIC PARTICIPATION .....	38
REFERENCES .....	40

## COMMENTS ON THE PEER REVIEW PLAN

The public – including State Chapters of key scientific and professional societies – are welcomed and encouraged to provide comments on the peer review plan. Comments may be submitted to the Honolulu District Project Manager, the Pacific Ocean Division or the Flood Risk Management Planning Center of Expertise points of contact listed below.

Ms. Cindy S. Barger  
Watershed Program Manager  
U.S. Army Corps of Engineers, Honolulu District  
Bldg 230, CEPOH-PP-C  
Ft. Shafter, HI 96858  
Telephone: (808) 438-6940  
E-mail: [CINDY.S.BARGER@USACE.ARMY.MIL](mailto:CINDY.S.BARGER@USACE.ARMY.MIL)

Mr. Russell Iwamura  
U.S. Army Corps of Engineers, Pacific Ocean Division  
Building 525  
Ft. Shafter, HI 96858  
Telephone: (808) 438-8859  
E-mail: [RUSSELL.K.IWAMURA@USACE.ARMY.MIL](mailto:RUSSELL.K.IWAMURA@USACE.ARMY.MIL)

Mr. Eric Thaut  
Flood Risk Management Planning Center of Expertise  
U.S. Army Corps of Engineers, San Francisco Division  
1455 Market St., Room 2048B  
San Francisco, CA 94103-1398  
Telephone: (415) 503-6852  
E-mail: [ERIC.W.THAUT@USACE.ARMY.MIL](mailto:ERIC.W.THAUT@USACE.ARMY.MIL)

Mr. Forest Brooks  
Pacific Ocean Division Regional Program Manager  
For Flood Risk Management Planning Center of Expertise  
U.S. Army Corps of Engineers, Alaska District  
2204 3<sup>rd</sup> Street  
Elmendorf Air Force Base, AK 99506  
Telephone: (907) 753-2627  
E-mail: [FOREST.C.BROOKS@USACE.ARMY.MIL](mailto:FOREST.C.BROOKS@USACE.ARMY.MIL)

## **1.0 PURPOSE AND REQUIREMENTS<sup>1</sup>**

This Review Plan defines the scope and level of peer review for the Ala Wai Watershed Project (a.k.a. the Ala Wai Canal Project) Feasibility Report and Environmental Impact Statement (EIS) in accordance with Engineering Circular (EC) 1165-2-209 "Civil Works Review Policy", dated January 31, 2010. The plan defines the appropriate levels of review and sequence to support the key milestones in the feasibility planning process for the project. The overall purpose of the peer review process is to ensure the quality and credibility of Corps decision documents by adjusting and supplementing the current review process. The contents of this Peer Review Plan are incorporated into the Ala Wai Watershed Project Management Plan as an addendum.

Information contained in this quality control and peer review plan is distributed solely for the purpose of pre-dissemination peer review under applicable information quality guidelines. It has not been formally disseminated by the U.S. Army Corps of Engineers, Honolulu District (USACE). It does not represent and should not be construed to represent any agency determination or policy.

The USACE Peer Review process includes three levels of review – District Quality Control Review (DQC), Agency Technical Review (ATR), and Independent External Peer Review (IEPR). A general flowchart of this process is depicted in Figure 1.

## **2.0 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 PCX (FRM-PCX).

The RMO 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. Because this is a multi-purpose project, the RMO will also coordinate with the Ecosystem Restoration PCX (ECO-PCX) to ensure that review teams with appropriate expertise are assembled. Because life safety issues may be involved, the RMO will work with the Risk Management Center (RMC) to define their role in the review. As a flood risk management project, the RMO and the ATR Lead will work with the Hydraulic Engineering Center (HEC) to determine required involvement in the review during the feasibility phase.

## **3.0 DISTRICT QUALITY CONTROL REVIEW (DQC)**

The District Quality Control Review is the first level of review and is required for all decision documents developed for this project. As defined in EC 1165-2-209, the purpose of the DQC is the review of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). It will be managed by USACE Honolulu District. Basic quality control tools include a Quality Management Plan providing for seamless review, quality checks and reviews,

---

<sup>1</sup> The review plan was developed based on the March 2009 Flood Risk Management (FRM) review plan template (the current template at the time of the original publication of the review plan). The review plan has been updated to include pertinent sections from the EC 1165-2-209 and the 12 October 2010 review plan template.

supervisory reviews, Project Delivery Team (PDT) reviews, etc. Additionally, the PDT is responsible for a complete reading of the report to assure the overall integrity of the report, technical appendices and the recommendations are made before approval by the District Commander. The DQC will be managed in accordance with the Pacific Ocean Division's (the Major Subordinate Command (MSC) for USACE Honolulu District) and Honolulu District's quality management plans – which addressed the conduct and documentation of this fundamental level of review.

The DQC team cannot include members of the PDT. Because the Honolulu District Civil Works program is relatively small and most of the District subject matter experts are part of the PDT, the DQC team will be made up of subject matter experts within the Honolulu District and from Alaska District. The deliverables will also be reviewed by the non-federal sponsors – State of Hawai'i Department of Land and Natural Resources (DLNR) and City and County of Honolulu. The Natural Resources Conservation Service (NRCS), as a cooperating agency, is providing technical support and assisting in the quality control review of deliverables.

While the District, non-federal Sponsors and partners will be developing some of the sections of the feasibility study and Environmental Impact Statement (EIS) such as the hydraulic modeling by the District and the Ala Wai Golf Course management measures by the non-federal sponsor, the Consultant will be compiling all the information, including in-kind services submittals, into the main deliverables – Feasibility Scoping Meeting Package, Alternatives Formulation Briefing Report, and Draft and Final Feasibility Study and EIS. Because of the size and complexity of the project, the District is reviewing incremental deliverables for compliance such as the existing hydrology and hydraulics analysis, the cultural inventories, the environmental baseline inventories, etc.

#### **4.0 AGENCY TECHNICAL REVIEW (ATR)**

In accordance with EC 1165-2-209, the purpose of the ATR is an in-depth review, managed within USACE, and conducted by a qualified team outside of the home district that is not involved in the day-to-day production of a project/product. The purpose of this review is to ensure the proper application of clearly established criteria, regulations, laws, codes, principles and professional practices are completed. The ATR team will review the various work products and ensure that all the parts fit together in a coherent whole. ATR teams will be comprised of senior USACE personnel (Regional Technical Specialists, etc.), and may be supplemented by outside experts as appropriate. To ensure independence, the leader of the ATR team shall be from outside Pacific Ocean Division. The RMO has identified the ATR Team Leader, located in the USACE Sacramento District. Team members reside in Sacramento, Los Angeles, Jacksonville and Walla Walla Districts. Agency Technical Review will be conducted on the major project milestones – the Feasibility Scoping Meeting Package, the Alternatives Formulation Briefing Report, the Draft and Final Feasibility Study and EIS.

#### **5.0 INDEPENDENT EXTERNAL PEER REVIEW (IEPR)**

As defined in EC 1165-2-209, the purpose of the Independent External Peer Review (IEPR) panels is to provide the Chief of Engineers with an independent assessment of the project or work product, including the panel's assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, data, and analyses used, as well as the range of alternatives, and the adequacy of risk and uncertainty analyses. The Chief of Engineers will consider recommendations from the panel, prepare

a written response to those recommendations, and publish and disseminate that information, as required by law.

This 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. IEPR is managed by an outside eligible organization (OEO) that is described in Internal Revenue Code Section 501(c) (3), is exempt from Federal tax under section 501(a), of the Internal Revenue Code of 1986; is independent; is free from conflicts of interest; does not carry out or advocate for or against Federal water resources projects; and has experience in establishing and administering IEPR panels. The scope of review will address all the underlying planning, engineering, including safety assurance, economics, and environmental analyses performed, not just one aspect of the project. The IEPR will be coordinated by the Flood Risk Management Planning Center of Expertise. The Draft Feasibility Report and EIS will be reviewed by the IEPR team. The IEPR may be conducted prior to or concurrent with the public review and comment period of the Draft Feasibility Report and EIS. If conducted concurrently with the public review and comment period, the IEPR report must be completed within 60 days after the close of the public comment period. For the purposes of the Ala Wai Watershed Project review plan, the IEPR will be conducted concurrently with the public comment period. The PDT and the Planning Center may determine that the Alternatives Formulation Briefing Package will also be reviewed by the IEPR team.

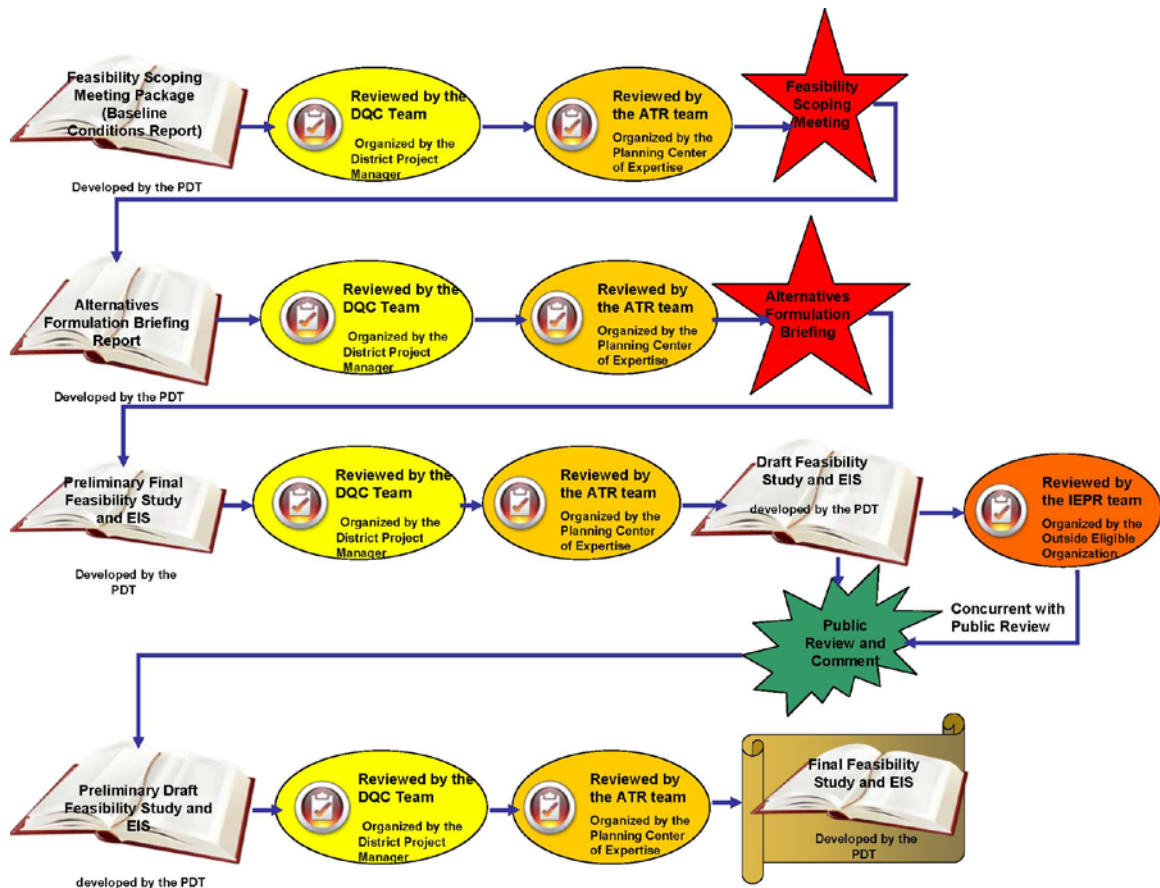


FIGURE F-1: PEER REVIEW PROCESS

## **6.0 POLICY COMPLIANCE AND LEGAL REVIEW**

In accordance with EC 1165-2-209, in addition to the technical reviews described above, decision documents will be reviewed throughout the study process for their compliance with law and policy. These reviews culminate in Washington-level 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 Chief of Engineers. The policy and legal compliance reviews will follow the guidance in the USACE Planning Guidance Notebook, Appendix H, ER 1105-2-100 including review by Honolulu District Counsel, Pacific Ocean Division and the Office of Water Project Review – coordinated by the Pacific Ocean Division Regional Integrated Team stationed at USACE Headquarters in Washington, D.C. The technical review efforts addressed in EC 1165-2-209 are to augment and complement the policy review processes by addressing compliance with published Army policies pertinent to planning products, particularly policies on analytical methods and the presentation of findings in decision documents. When policy and/or legal concerns arise during DQC or ATR that are not readily and mutually resolved by the PDT and the reviewers, USACE Honolulu District will seek issue resolution support from USACE Pacific Ocean Division and USACE Headquarters in accordance with the procedures outlined in the USACE Planning Guidance Notebook, Appendix H, ER 1105-2-100. IEPR teams are not expected to be knowledgeable of Army and administration policies, nor are they expected to address such concerns. The USACE Honolulu District Office of Counsel is responsible for the legal review of each decision document and signing a certification of legal sufficiency.

## **7.0 SAFETY ASSURANCE REVIEW**

In accordance with Section 2035 of Water Resources Development Act (WRDA) of 2007, EC 1165-2-209 requires that all projects addressing flooding or storm damage reduction undergo a safety assurance review of the design and construction activities prior to initiation of physical construction and periodically thereafter until construction activities are completed on a regular schedule sufficient to inform the Chief of Engineers on the adequacy, appropriateness, and acceptability of the design and construction activities for the purpose of assuring public health, safety, and welfare. The decision document phase for the feasibility report is in the initial design phase; therefore, EC 1165-2-209 requires that safety assurance factors be considered in all reviews for decision document phase studies.

## **8.0 STUDY INFORMATION**

### **8.1 DECISION DOCUMENT**

The Ala Wai Watershed Project is a specifically authorized multiple purpose project being investigated under Section 209 of the Flood Control Act of 1962 (Public Law 87-874). The project is currently in the feasibility phase, resulting in a feasibility report and the Environmental Impact Statement that will be signed by the Chief of Engineers. If the feasibility report results in a positive determination recommending implementation of a preferred alternative, Congressional authorization will be needed before the project may proceed to construction.

### **8.2 PROJECT BACKGROUND**

The Ala Wai watershed encompasses more than 19 square miles. The Ala Wai Canal within the watershed is a two-mile long man-made waterway constructed during the 1920's to create and protect the Waikīkī



area on the island of O'ahu (See Figure 2). The Ala Wai Canal, designed to drain Waikīkī, provides a 5- to 10-year level of flood protection<sup>2</sup>. During the November 1965 and December 1967 storms and passage of Hurricane Iniki in 1992, the Ala Wai Canal was overtopped causing flooding in the Waikīkī district. Additionally, the October 30, 2004 storm in Mānoa is estimated to have caused over \$85 million in damages to property and irreplaceable documents in the University of Hawai'i's library, causing the community and agencies to seek the expansion of the Ala Wai Canal project for flood mitigation measures in the upper stream areas. It is estimated that approximately 3,000 properties would be affected by a 100-year storm event in the Ala Wai watershed with total damages of \$311 million.

The Ala Wai Watershed supports important habitat for marine, estuarine and freshwater ecosystems. Endemic amphidromous species such as native gobies and shrimp that had once utilized the Ala Wai Watershed as a migratory pathway from the mountains to the sea have experienced significant losses in population due to loss of habitat. According to Hawai'i Division of Aquatic Resource Biologists, the Mānoa-Pālolo Drainage Canal is one of the only two known locations on O'ahu where hāpawai, a rare native gastropod, is found. The coral reef ecosystems in the Waikīkī Marine Life Conservation District is threatened by land based pollutants and other activities. The accumulation of silt and pollutants over the years has resulted in a steady decline in water quality and has affected water flow and circulation. The carrying capacity of the Canal has also been significantly reduced by accumulation of silt and debris from the Mānoa, Pālolo, and Makiki streams. The streams in the Ala Wai watershed support some of the highest levels of contaminants in the nation according to the U.S. Environmental Protection Agency (EPA) Section 303(d) listing under the Clean Water Act (CWA).

### 8.3 PROJECT GOAL AND OBJECTIVES:

The Feasibility Cost Sharing Agreement (FCSA) was originally executed in January 2001 between USACE and the State of Hawai'i as represented by the DLNR with an amendment executed on December 7, 2006 for a total estimated cost of \$5.1 million. The City and County of Honolulu, Environmental Services (ENV), through a Memorandum of Agreement (MOA) with DLNR has contributed funds to address water quality issues within the study area. NRCS has agreed to be a cooperating agency on the feasibility study and EIS by providing technical assistance for this study.

The goal of the Ala Wai Watershed Project is to improve the overall quality of the Ala Wai watershed, from the crest of the Ko'olau Mountains to the nearshore waters, with a focus on reducing flood hazards and restoring aquatic ecosystem function. The specific project objectives relate to the following purposes:

- Flood risk management:
- Ecosystem restoration:
- Water quality improvement:
- Maximized recreational opportunities; and,
- Water supply enhancement.

---

<sup>2</sup> "Ala Wai Flood Study, Island of O'ahu, Honolulu, Hawai'i – Planning Assistance to the State Study Report" by U.S. Army Corps of Engineers, Honolulu District, dated October 2001.

Of this, flood risk management and ecosystem restoration are considered to be the primary purposes, as they are two of the three priority missions of the USACE and can be comprehensively addressed by the project. The others are considered to be secondary purposes, meaning they will be addressed by the project where possible, either under the authority of the USACE or by another entity who is willing and able to pursue the purpose as part of the project. There is a recognized need for a comprehensive watershed "plan" that would more thoroughly address the secondary purposes. Development and implementation of this plan is not within the scope of the project, this effort will need to be carried out by another entity that has the authority to do so.

The PDT with input from the Technical Advisory Teams (TAT) and Stakeholders has developed detailed objectives and metrics to address these purposes that meet the guidelines from the Institute of Water Resources (IWR) Planning Manual. These are defined in detail in the Feasibility Scoping Meeting (FSM) pre-conference submittal. The objectives are:

- Specific,
- Flexible (accommodate different ways to achieve the objective),
- Measureable,
- Attainable (can be challenging, but also realistic),
- Congruent (attainment of one objective should not preclude the attainment of another), and
- Acceptable.

The objectives should avoid absolute targets and identifying solutions.

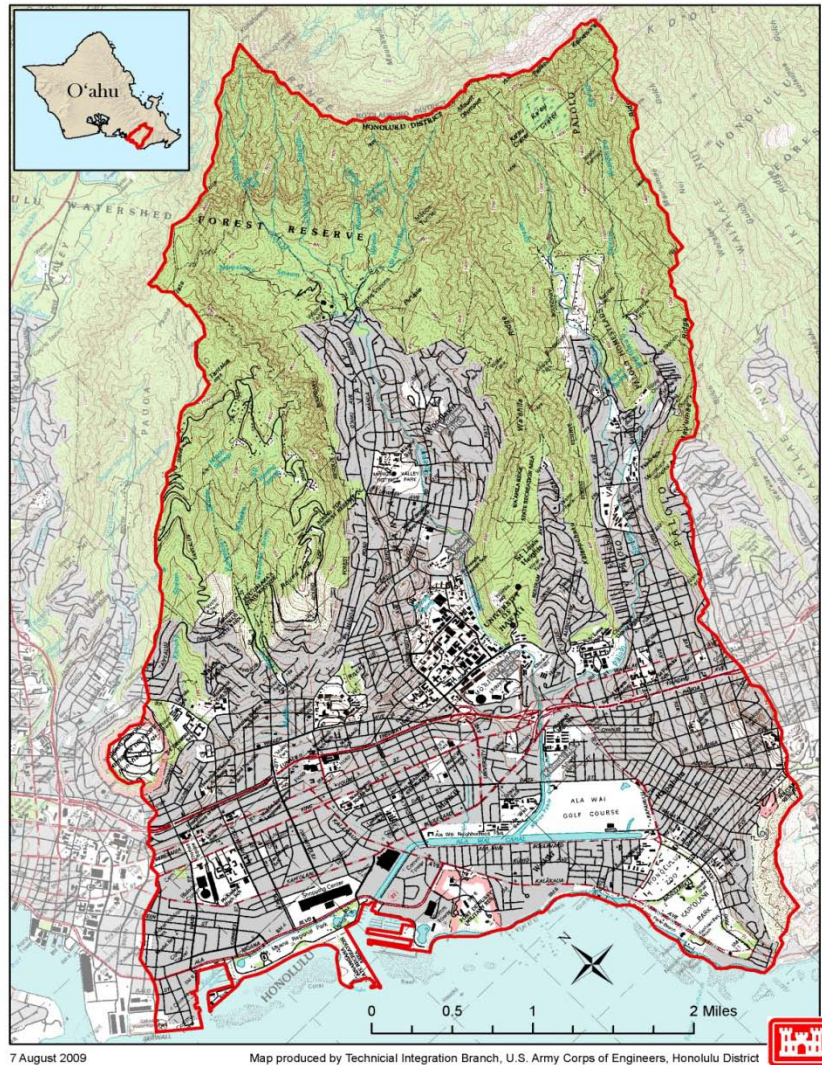


FIGURE F-2: ALA WAI WATERSHED STUDY AREA

The intent of the plan is to support a collaborative and integrated approach to watershed management of the Ala Wai. The plan will define the baseline conditions within the watershed, highlighting primary contributing sources to degradation in the Ala Wai. While the main focus will be on flood risk management and ecosystem restoration alternatives to be implemented by USACE and DLNR, the plan will include measures identified by partner agencies at the federal, state and local levels that can be implemented by their organizations and contribute to the improvement of the watershed.

#### 8.4 PROJECT MANAGEMENT PLAN

The PMP was initially completed in March 2001 with the latest revision in March 2012 to address cost increases associated with the FCSA Amendment II. The Review Plan is an appendix to the PMP.

## 9.0 PROJECT DELIVERY TEAM

A Project Delivery Team (PDT), led by the Project Manager, is responsible for coordinating and executing all tasks and related matters pertaining to the PMP including cost estimates, schedules, financial transactions, and recommendations to the Executive Committee for termination, suspension, major revisions to the milestone schedule, or amendments to the study. The PDT will also ensure that Corps policy, project sponsor objectives, and the framework provided by the PMP are followed. Table A-1 provides a list of the PDT members. Table A-2 provides a list of the DQC team members. Table A-3 provides a list of the ATR team members. The PM will coordinate with the respective Resource Managers to identify new PDT, DQC and ATR team members as needed based on turnover in staffing.

TABLE A-1: PROJECT DELIVERY TEAM

DISCIPLINE	TEAM MEMBER(S)
Project Manager	Ms. Cindy Barger, Honolulu District
Non-Federal Sponsor Representatives	Mr. Carty Chang, State of Hawai'i DLNR Mr. Dennis Imada, State of Hawai'i DLNR Mr. Gerald Takayesu, City and County of Honolulu, ENV Mr. Randall Wakumoto, City and County of Honolulu, ENV
NRCS (Cooperating Agency) Representative	Ms. Sharon Sawdey, Hydraulic Engineer
Plan Formulator	Ms. Cindy Barger, Honolulu District supported by Consultant (CH2M Hill) and Sub-consultant (AECOS)
Archaeologist	Mr. Kanalei Shun, Honolulu District supported by Sub-consultant (Cultural Surveys Hawai'i)
Cost Engineer	Ms. Tracy Kazunaga, Honolulu District
Ecologist	Ms. Cindy Barger, Honolulu District supported by Consultant (CH2M Hill)
Economist	Mr. Bob Finch/Mr. Lance Shiroma, Honolulu District
Environmental Coordinator	Ms. Athline Clark/Ms. Cindy Barger, Honolulu District
Geographer/GIS Specialist	Mr. Justin Pummell/Ms. Sarah Falzarano, Honolulu District supported by Consultant (CH2M Hill)
Geotechnical Engineer	Mr. Russell Leong/Mr. Ray Kong, Honolulu District supported by Sub-consultant (Pacific Geotechnical Engineers)
HTRW Specialist	Sub-consultant (Myounghee Noh, Inc.)
Hydrologic/Hydraulic Engineer	Mr. Michael Wong/Mr. Steven Stello, Honolulu District, Mr. Paul Murawski, Buffalo District. Existing Conditions analysis completed by Consultant (Oceanit).
Public Outreach and Involvement Coordinator	Sub-consultant (Townscape, Inc.)
Real Estate Specialist	Mr. Michael Sakai, Honolulu District
Recreational Specialist/Landscape Architect	Sub-consultant (Ky, Inc.)
Value Engineer	Mr. Elton Choy, Honolulu District
Water Quality Specialist	Consultant (CH2M Hill) with modeling by Michael Wong, Honolulu District
Engineering Services (Contract	Glenn Oshiro, Honolulu District

DISCIPLINE	TEAM MEMBER(S)
Support)	
Contracting	Mr. Roger David Williams, Chief, Honolulu District
Small Business	Ms. Catherine Yoza, Deputy, Honolulu District
Public Affairs	Mr. Joseph Bonfiglio, Chief, Honolulu District
Office of Counsel	Ms. Lindsey Kasperowicz

TABLE A-2: DISTRICT QUALITY CONTROL TEAM

DISCIPLINE	TEAM MEMBER(S)
DQC Team Leader Plan Formulation Ecosystem Restoration Environmental Compliance	To Be Determined - Alaska District, Pacific Ocean Division (POD) <ul style="list-style-type: none"> <li>Team lead was Ms. Lisa Rabbe who is currently at Kansas City District. The PM will coordinate with Alaska District prior to DQC of the reports to designate appropriate team lead.</li> </ul>
Economics	Mr. Arden Sansom, San Francisco District. South Pacific Division (SPD)
Hydraulic Engineering Hydrology	Ms. Deidre Giner, Alaska District, POD Mr. Merlin Peterson, Alaska District, POD
Civil Design	TBD
Cost Engineering	TBD
Geotechnical	TBD
Real Estate	TBD, Honolulu District, POD

TABLE A-3: AGENCY TECHNICAL REVIEW TEAM

DISCIPLINE	TEAM MEMBER(S)
FRM-PCX Regional Program Manager	Mr. Forest Brooks, Alaska District, Pacific Ocean Division (POD)
ATR Team Leader Plan Formulation Ecosystem Restoration	Mr. Scott Miner, Sacramento District, South Pacific Division (SPD)
Cultural Resources	Ms. Melissa Montag, Sacramento District, SPD
Economics	Mr. Michael Hallisy, Los Angeles District, SPD
Environmental Compliance	Mr. Matthew Davis, Sacramento District, SPD
Hydraulic Engineering	Mr. Ethan Thompson, Sacramento District, SPD
Hydrology	Mr. E. Timothy Gysan, Jacksonville District, South Atlantic Division (SAD)
Civil Design	TBD
Cost Engineering/Risk Analysis	TBD, Walla Walla District, Northwest Division (NWD)
Geotechnical	TBD
Real Estate	TBD

## 10.0 PROJECT SCHEDULE

The following is a contemporary schedule of activities reflecting current situations. This schedule takes the project from preparation of the integrated Feasibility report/EIS to preparation of the design agreement.

TABLE B-1: PROJECT DEVELOPMENT AND REVIEW SCHEDULE

MILESTONE	ANTICIPATED COMPLETION DATE
FCSA Executed	March 2001 (Completed)
EIS Scoping Meeting	June 2004 (Completed)
FCSA Amendment I Executed	December 2006 (Completed)
EIS Scoping Meeting for expanded project scope	October 2008 (Completed)
<b><i>DQC Review - Feasibility Scoping Meeting Package</i></b>	<b><i>August 2010 (Completed)</i></b>
<b><i>ATR Review - Feasibility Scoping Meeting Package</i></b>	<b><i>February 2011 (Completed)</i></b>
Feasibility Scoping Meeting	June 2011(Completed)
FCSA Amendment II Executed	<b>August 2012**</b>
<b>Re-scoping Charette</b>	<b>September 2012</b>
State of Hawai'i EIS Prep Notice and Public Meeting	November 2012
Submittal of Ecosystem Output Model Package for Certification	November 2012
Alternatives Formulation, Evaluation, and Comparison (including cost engineering & risk analysis)	April 2013
Value Engineering Workshop	May 2013
<b><i>DQC Review - Alternatives Formulation Briefing Package</i></b>	<b><i>July 2013</i></b>
<b><i>ATR Review - Alternatives Formulation Briefing Package</i></b>	<b><i>August 2013</i></b>
Alternatives Formulation Briefing	September 2013
<b><i>DQC Review - Preliminary Draft Feasibility Study/EIS</i></b>	<b><i>April 2014</i></b>
<b><i>ATR Review - Preliminary Draft Feasibility Study/EIS</i></b>	<b><i>May 2014</i></b>
Draft Feasibility Study/EIS Notice of Availability	June 2014
OEQC Notice/Federal Register Notice of Public Review	June 2014
<b><i>IEPR Review - Preliminary Draft Feasibility Study/EIS</i></b>	<b><i>June – August 2014</i></b>
Public Review	June – July 2014
EIS Public Hearing	June 2014
<b><i>DQC Review - Preliminary Final Feasibility Study/EIS</i></b>	<b><i>December 2014</i></b>
<b><i>ATR Review - Preliminary Final Feasibility Study/EIS</i></b>	<b><i>January 2015</i></b>
Final Feasibility Study/EIS to MSC	March 2015
Washington Level Review	April 2015
<b>USACE HQ Civil Works Review Board</b>	<b>May 2015</b>
State & Agency Review (30 days)	June 2015
<b>Chief's Report</b>	<b>August 2015</b>
After Action Review Conference	September 2015
Initiate Preparation of the Design Agreement	October 2015

\*\*All actions following the FCSA Amendment II Execution will be adjusted as appropriate after execution.

\*\*ATR Review includes concurrent review by Cost Engineering Directory of Expertise – USACE Walla Walla District.

## 11.0 PROJECT COSTS

The following is a current resource allocation plan:

TABLE C-1: ALA WAI CANAL PROJECT FEASIBILITY STUDY COST ESTIMATE

TASK	ESTIMATED COST
Project Management	\$725,000
Program Support	\$268,000
Contract Management	\$104,000
Stream Gauging	\$168,000
Fish and Wildlife Coordination Act (FWCA) 2(b) Analysis	\$46,000
Public Involvement	\$70,000
Feasibility Scoping Meeting Pre-Conference Package/Report Step 1: Identification of Problems and Opportunities Step 2: Inventory and Forecasting of Watershed Conditions (Existing and Future Without Project Conditions including Economic, Environmental & Hydrology/Hydraulic Analysis) Step 3: (Initial) Preliminary Alternatives Formulation	\$3,328,000
Alternatives Formulation Briefing Pre-Conference Package/Report Step 3: Formulation of Alternatives Step 4: Evaluation of Alternatives Step 5: Comparison of Alternatives Step 6: (Initial) Tentatively Selected Plan (TSP) Includes identification of NED/NER Plan, Environmental Consequences, Cultural Impact Assessment, Hydraulic Analysis of With and Future With Project Conditions, 35% Conceptual Design of TSP, conceptual Operations & Maintenance Plan, Cost Engineering, and Real Estate LERRDS Analysis.	\$793,000
Draft and Final Integrated Feasibility Report/EIS Step 5 Selected Plan Final Operations and Maintenance Plan Public Review and Comments	\$370,000
USACE Required Reviews Value Engineering Workshop Model Certification District Quality Control Reviews Agency Technical Reviews Cost Engineering Directory of Expertise Reviews Coordination of Independent External Peer Review	\$567,000
DLNR/City and County Work-In-Kind Services (See Appendix E)	\$2,593,000
Civil Works Review Board Approval	\$74,000
Independent External Peer Review (100% Federally Funded)	\$153,000
<b>TOTAL</b>	<b>\$9,259,000</b>

The estimated design/construction costs are listed below.

ESTIMATED DESIGN/CONSTRUCTION COSTS

Estimated Federal Design Costs \$3,000,000

Estimated Non-Federal Design Costs \$1,000,000

<u>Total Estimated Design Costs</u>	<u>\$4,000,000</u>
Estimated Federal Construction Costs	\$29,900,000
Estimated Non-Federal Construction Costs	\$16,100,000
<u>Total Estimated Construction Costs</u>	<u>\$46,000,000</u>
<b><i>Total Estimated Design/Construction Costs</i></b>	<b><i>\$50,000,000</i></b>

#### IN-KIND CONTRIBUTIONS

Appendix E of the PMP includes the Integral Determination of Work-In-Kind Services as proposed by the non-Federal sponsor. All in-kind contributions will be incorporated as part of the USACE documents either as sections of the documents or as appendices. The in-kind contributions will be subject to the same level of review of the USACE developed products (i.e. DQC, ATR and IEPR).

#### REVIEW FUNDING AND COSTS

The DQC and ATR will be funded through cost-share with the non-federal sponsor, State of Hawai'i DLNR. The State of Hawai'i DLNR, in the FCSA, has agreed to apply in-kind service credit for the DQC review that will be conducted by their technical subject matter experts and for assisting in the response to comments from the DQC, the ATR and the IEPR. Cash contributions will be used to fund the ATR and the coordination by the Flood Risk Management Planning Center of Expertise to set up the IEPR. In-kind contributions will be provided by the State of Hawai'i DLNR and City and County of Honolulu to participate in the DQC review to ensure the documents meet State and County requirements. In-kind contributions will also be provided during the ATR and IEPR for State and County staff to assist in responding to comments submitted by the ATR and IEPR. The contract to conduct the IEPR by the Outside Eligible Organization will be 100% federally funded.

The total ATR and IEPR peer review costs will be developed in consultation with the Flood Risk Management Planning Center of Expertise. It is estimated that the total cost for all USACE required reviews and review coordination, excluding the 100% federally funded IEPR, is \$568,000. The IEPR is estimated at \$153,000.

## 12.0 PROPOSED PROJECT METHODOLOGY/MODELS

Because of the complexity of this project and the novelty of it for the State of Hawai'i, a discussion of the project development methodology and proposed models is included to provide context and more complete information for the public and the review teams to assist in the consideration of appropriate individuals to recommend or select for the review teams and assist in the development of charge questions to guide reviewers.

#### COORDINATION PROCESS

As a standard methodology for the overall project development, the following teams have been set up to support the project development:



- Project Delivery Team (PDT). The PDT consists of the USACE team members, the Consultants, the project sponsors (DLNR & ENV), and the cooperating agency (NRCS). The objective of the PDT is the project development, specifically the development of the feasibility study and EIS. The PDT develops the goals, objectives and metrics for the study with input from the teams/meetings listed below.
- Technical Advisory Team (TAT). The objective of the TAT is to provide a working group discussion of technical issues surrounding various topics. The TAT provides recommendations and comments on the study objective and metrics, the study strategy and methodology, the proposed management measures, and the proposed modeling and analysis of alternatives. The TAT provides recommendation on partnering organizations to consider. The TAT consists of Subject Matter Experts/Technical Experts from the PDT, other Federal, State, and local agencies, academia, community organizations and consultants. Members of the public and any organization are welcome to join the TAT as long as these members understand the TAT is a working group and products developed in the TAT are recommendations and/or working drafts not available for public distribution. The PDT determines the purpose/topic of the TATs and when they need to be formed and by what topic as well as when a TAT has completed its function and can be dissolved or absorbed into a new TAT. At the date of this document, TATs have been formed for Hydrology & Hydraulics, Ecosystem Restoration, Water Quality and Stakeholder Involvement. The TATs are chaired by the technical lead for that subject in the PDT.
- Sponsor Meetings. The objectives of the Sponsor meetings are to provide detailed discussion of project development and seek necessary input/decisions specifically from the Sponsors' perspective where decision levels can occur below the Executive Committee level. Sponsor meetings are expanded beyond the specific departments represented on the PDT (DLNR Engineering Services and City and County of Honolulu ENV) to include other departments at the State and City and County levels that are critical to review and approval of the feasibility study and alternatives.
- Executive Committee. The Executive Committee consists of the USACE Honolulu District Deputy District Engineer for Programs and Project Management, the Director of the State of Hawai'i DLNR, and the Managing Director of the City and County of Honolulu. The objective of the Executive Committee meetings is to provide regular updates on the Project development and seek decisions or resolution of key issues for project development.
- Stakeholder Meetings. Representatives from the PDT, including non-federal sponsors (DLNR & ENV) and cooperating agency (NRCS), partnering federal, state and local agencies, academia, non-governmental organizations, community groups, representatives of State and City and County legislature, and the general public attend the stakeholder meetings. The objectives of the stakeholder meetings are to inform stakeholders about the project, provide updates on the project development, coordinate activities within the watershed among partnering agencies and organizations, and glean information from partnering agencies and organizations to meet the intent of a collaborative and integrated plan.

The PDT determines when it is appropriate to call a meeting at any of the levels discussed above.

The USACE planning process requires flood risk management studies to be conducted using a risk-based analytical framework. The risk framework captures and quantifies the extent of the risk and uncertainty and enables quantified tradeoffs between risk and cost. Decision making considers explicitly what is gained and what is lost. This process is done through development of a hydrologic and hydraulic model that is calibrated to the study area and is used to model the existing without project conditions, the future without project conditions (50 years out for the purpose of this study) and the future with project conditions. Projects are analyzed and described in terms of their ability to reduce flood damage, not in terms of levels of protection. Contingencies are acknowledged and residual risk is not routinely reduced by overbuilding or by inclusions of freeboard. The economic analysis evaluates the benefits of the alternatives in reducing flood damage from existing and future conditions in relation to the cost of construction, operation and maintenance of the alternative. The methodology for the hydrology and hydraulic analysis chosen by the PDT is described below.

- Hydrology – Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) was used to model a range of potential storms in the Ala Wai Watershed. The purpose of the modeling study was to estimate peak flow discharges at particular drainage junctions in the Ala Wai Watershed corresponding to the following storm return periods: 2-, 5-, 10-, 20-, 50-, 100-, 200-, and 500-year. These storm return periods correlate to storm chance exceedance probabilities of 50, 20, 10, 5, 2, 1, 0.5, and 0.2 percent, respectively.

Data collection for hydrologic analysis included rainfall gage data, stream flow gage data, records of historical storms, maps of storm drainage systems, geospatial data, and field surveys observations. Storms that occurred on December 17–18, 1967; October 30, 2004; and March 31, 2006 were used to calibrate the HEC-HMS model. The City and County of Honolulu drainage maps and University of Hawai'i's utility maps were used to determine the existing storm drainage system. Geospatial information, including Light Detection and Ranging (LiDAR) data and aerial photography established terrain roughness characteristics and stream channel cross sections. Rainfall data was extrapolated to be converted into intensity-duration frequency (IDF) curves, illustrating rainfall intensities according to their duration.

- Hydraulics - Existing without project conditions: The Hydrologic Engineering Center River Analysis System (HEC-RAS) steady flow models were conducted for the Makiki, Mānoa, and Pālolo valleys, Ala Wai Canal and Mānoa-Pālolo Canal. Manning's  $n$  values for each stream, bridge/culvert data, peak discharges, and watershed topography were developed. Ineffective flow limits to the Makiki and Pālolo valley models were established. The purpose of the existing hydraulics study is to estimate peak water surface elevations and evaluate sensitivity to stage-discharge relationships in the Ala Wai Watershed corresponding to the following storm return periods: 2-, 5-, 10-, 20-, 50-, 100-, 200-, and 500-year. These storm return periods correlate to storm chance exceedance probabilities of 50, 20, 10, 5, 2, 1, 0.5, and 0.2 percent, respectively. Floodplain exhibits were prepared for the 2-, 20-, 100-, and 500-year events. Stage-discharge relationships and the standard deviation describing the uncertainty in stage were provided at key index locations corresponding to the hydrologic concentration points.
- Hydraulics – Future With-out Project Conditions. The PDT will use a multi-scenario approach for identifying the potential climate change scenarios as outlined in EC 1165-2-211 (July 2009). The PDT will define three scenarios - "low," "intermediate," and "high" rates of future sea-level and climate change. The historic rate of sea-level change will be used as the "low" rate. Base sea level will be

used as the “intermediate” and “high” rates will be based on USACE policy guidance and input from scientific literature and local and regional experts in climate change. Based on the existing without project HEC-RAS hydraulics model, an investigation shall perform all engineering efforts required to determine the “best” estimate of the 50-, 20-, 10-, 4-, 2-, 1-, 0.5-, and 0.2-percent floods at critical conditions and apply these flows to develop inundation maps. The investigation shall include at a minimum an analysis of the existing without project HEC-HMS hydrology model, an analysis of historic rainfall amounts within the project area, projected future forecast trend of rainfall amounts and climate change, projected future forecast trend of sea level rise and ocean storms such as hurricanes, tsunamis, and storm surges, and projected future forecast of redevelopment and population growth in the study area. These future flows will be applied to the HEC-RAS model without project conditions with little to no change in the topography as the watershed is considered fully “built-out”. There is a trend in the watershed of significant redevelopment and “building-up”, especially in Waikīkī. This will be incorporated into the model as applicable.

- Hydraulics – Alternatives Development and Analysis. It is proposed that the hydraulic modeling for this study will use a one-dimensional, unsteady state model, but may also use two-dimensional unsteady state models for verification processes. The study will perform an unsteady flow analysis for storage and detention modeling using the HEC-RAS computer program to determine the identified flood risk management with project alternatives flood elevations within the study limits, for the 50-, 20-, 10-, 4-, 2-, 1-, 0.5-, and 0.2-percent floods. The modeling will incorporate debris blockages as appropriate at constriction points, culverts and bridges, incorporate sedimentation analysis as appropriate based on historical and theoretical data, and plot the profile of the stream bottom and water surface profiles for the required stream discharges. The water surface elevation data from the HEC-RAS model will be compared using the two-dimensional FLO-2D and Gridded Surface Subsurface Hydrologic Analysis (GSSHA) models to build further confidence in the HEC-RAS modeling and to document further uncertainties. Flood outlines and elevations will be plotted for the analyzed flood risk management alternatives on best available topographic maps of the study area.

The project will also identify risk from other non-riverine flooding events such as sheet-flow from the hillsides, risk and potential frequency of ocean storms including hurricanes, and risk and potential frequency of high wave surges/wave occurrence. The project will identify the potential probability of ocean storm events occurring with riverine flooding. Based on the probability of these events occurring at the same time, the PDT – including the non-federal Sponsor – will determine if objectives for flood risk management need to be revised to include addressing flooding from ocean storm events or if this is better addressed through a separate project.

#### ECOSYSTEM RESTORATION METHODOLOGY

The USACE planning process requires that ecosystem restoration alternatives be evaluated through an ecosystem output model. The models take the metrics associated with the objectives to develop “habitat units” to provide a comparison of the effectiveness of each alternative to meet the ecosystem restoration objective. Examples of possible metrics include acres of increased spawning habitat for amphidromous fish, stream miles restored to provide fish habitat, increases in number of breeding birds, increases in target species and diversity indices as well as monetary gains (e.g., flood risk management or hydropower) associated with the restoration project. In addition to an ecosystem output model, USACE must also conduct a Cost Effectiveness/Incremental Cost Analyses of the alternatives. This methodology is discussed under the Economic Analysis section.

The PDT will use a Quality Habitat Evaluation Index (QHEI) based on the Hawai'i Stream Bioassessment Protocol (HSBP) with revisions to appropriately reflect the sub-objectives, metrics, and constraints of the project. The identification of this model was done through input from the Ecosystem Restoration TAT. There has not been an ecosystem output model applied for a USACE sponsored ecosystem restoration project in Hawai'i. Any model developed will need to be certified/approved by the USACE Modeling Center of Expertise. The model certification will be initiated prior to the AFB consistent with USACE regulations and policies. The model was identified based on ability to address the objectives and metrics, cost-effectiveness, and meeting long-term study needs as well as potential future uses in Hawai'i for other State or USACE projects.

#### WATER QUALITY METHODOLOGY

Water quality is being addressed based on a request from the non-Federal sponsor. The streams in the watershed have been listed on the CWA 303(d) list for sediments and pesticides including Chlordane and Dieldrin. ENV is implementing a National Pollutant Discharge Elimination Systems (NPDES) permit issued by the State of Hawai'i Department of Health (DOH). ENV entered into an MOA with DLNR to fund water quality evaluations in the Ala Wai Watershed Plan to provide documentation on the effectiveness of ENV's efforts at meeting their NPDES permit requirements and better understand the contributing sources of contaminants in the watershed. The issues to be studied as identified in the MOA include, identify the primary sources of sediment and pesticides, specifically Chlordane and Dieldrin, develop a computer-based model to document sediment sources in the Ala Wai watershed and the effectiveness of the ENV efforts to meet NPDES permit requirements, and identify additional measures for ENV to implement to improve water quality and meet permit requirements. Total Maximum Daily Loads (TMDLs) were established for Nitrogen and Phosphorus in June 2002 for the Ala Wai canal, but have not been set for sediment and pesticides in the streams within the Ala Wai Watershed. In an effort to be proactive, ENV seeks the computer-based model to help provide documentation in the event that TMDLs for sediment are listed for the Ala Wai watershed.

ENV, with technical assistance from USACE, identified Watershed Analysis Risk Management Framework (WARMf) as the model that would best meet the objectives and constraints of ENV. ENV is in the process of setting the WARMf model as the standard model for all water quality evaluations throughout the island of O'ahu under ENV's authority. WARMf will be used as the water quality model for the Ala Wai Watershed Project.

With ENV's objectives, the decision to use WARMf, and the considerations of water quality needs that will be identified for ecosystem restoration objectives and metrics, the PDT is developing sub-objectives and metrics in consultation with the Water Quality TAT. The PDT, led by the Consultant (CH2M Hill), is developing a water quality sampling strategy and plan to identify sources of sediment and termiticides in the watershed to meet City and County needs. The USACE hydraulic engineer will conduct the WARMf modeling. The sampling and the WARMf modeling will be used to help guide City and County in the identification of management measures to improve water quality.

#### ECONOMIC ANALYSIS METHODOLOGY

As mentioned above, the USACE planning process requires an economic analysis for flood risk management and ecosystem restoration. The analysis process for each of these has a different focus but is combined as a final National Economic Development (NED)/National Ecosystem Restoration (NER) plan.<sup>3</sup>

For flood risk management projects, USACE must identify the NED plan. The economic analysis must evaluate the damages likely to occur without any action for both existing conditions and in the future, evaluate the benefits from any given alternative in reducing these damages, and work with the cost engineering to evaluate the cost of the project. The NED plan is then determined by the alternative that provides the greatest net benefit and is not necessarily the plan with the best benefit-to-cost ratio.

Benefits related to flood risk management measures will be evaluated using the USACE certified model the Hydrologic Engineering Center's Flood Damage Analysis (HEC-FDA) computer program. To run HEC-FDA, an inventory or database of all the structures in the watershed flood plain is required. This database, the methodology, and the running and interpretation of the HEC-FDA model will be incorporated into an Economic Appendix to the Feasibility Study. After annualized expected annual benefits and costs, benefit-cost ratios will be developed for several alternatives and the NED Plan will be determined.

Also included in the Economic Appendix will be baseline and future anticipated conditions concerning recreation and socioeconomic changes. Whether recreation impacts of proposed measures prove to be either NED or incidental benefits or losses, an analysis is required. Similarly, short and/or long term socioeconomic impacts might result from some proposed alternatives and must be analyzed as well.

For ecosystem restoration, USACE identifies the NER plan. Like the NED plan, this identifies the alternative that provides the greatest net benefits to the ecosystem based on the study objectives. There is not a benefit-to-cost ratio analysis in this process. The process evaluates the cost effectiveness of the alternatives and conducts an incremental cost analysis between alternatives. Cost effectiveness analysis is used to identify the least cost solution for each level of environmental output being considered. Incremental cost analysis compares the additional costs to the additional outputs of an alternative. It is a tool that can assist in the plan formulation and evaluation process, rather than a dictum that drives that process. Incremental analysis helps to identify and display variations in costs among different increments of restoration measures and alternative plans. Thus, it helps decision makers determine the most desirable level of output relative to costs and other decision criteria. These analyses must be performed at an appropriate level of detail for each study to identify the most cost effective plan within the identified constraints.

#### ALTERNATIVES SCREENING METHODOLOGY

With the complexities of a multi-purpose project adds a significant degree of complexity in how to formulate, evaluate, compare and select alternatives. The PDT proposes a screening process for the Alternatives Evaluation. The modeling and methodologies described above will be applied at varying degrees throughout the alternatives evaluation process. A general flowchart of this process is shown in Figure 3. The correlating steps in the USACE Planning Process are shown along the bottom of the flow chart.

---

<sup>3</sup> In accordance with EC 1105-2-409 – Planning in a Collaborative Environment.

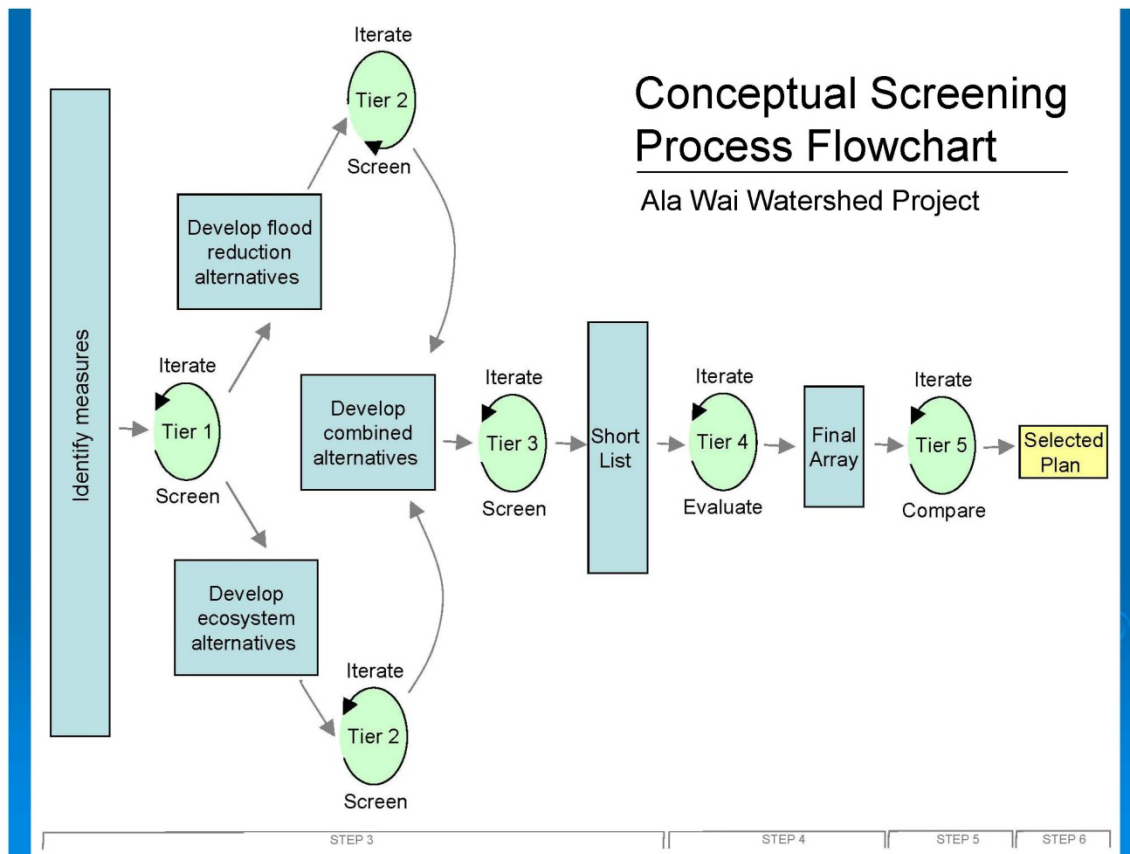


FIGURE F-3: ALTERNATIVES SCREENING PROCESS FOR ALA WAI WATERSHED PROJECT

Tiers 1 to 3 will screen the measures, the single objective alternatives and the combined multi-objective alternatives against the formulation criteria as defined in the “Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies” (a.k.a. Principles and Guidelines) (42 U.S.C. 1962a). These criteria are categorized as the completeness, effectiveness, efficiency, and acceptability of the measure/alternative. Those alternatives that pass the Principles and Guidelines formulation criteria will then be screened against the Principle and Guidelines accounts: National Economic Development (NED)/National Ecosystem Restoration (NER); Environmental Quality; Regional Economic Development; and Other Social Effects. The PDT worked with the resource agencies, partner agencies, and stakeholders to define the categories for consideration under these four accounts. These are defined in the Feasibility Scoping Meeting Package. The final screening to select the preferred plan will be a weighted screening of all the criteria that considered under the four accounts of the Principles and Guidelines and using the IWR Planning Suite. The PDT will develop the weighting in consultation with the TAT members, the Stakeholders and resource agencies.

### 13.0 FACTORS AFFECTING THE SCOPE AND LEVEL OF REVIEW

In accordance with EC 1165-2-209, the project will require Independent External Peer Review (IEPR) for the following factors: the estimated construction costs for the project is \$100 million – over the \$45 million

threshold; the feasibility report is likely to address novel methods and complex challenges for the region; the project is likely to contain influential scientific information for the region; the project will require an EIS; the project is likely to have significant economic, environmental and social affects for the nation (beneficial and adverse); the project involves a threat to human life and requires safety assurances; and the project has significant interagency interest.

### 13.1 PROJECTS NOVEL METHODS AND COMPLEX CHALLENGES

As stated above, the feasibility report for this project will address complex challenges and apply novel methods for the region. In this section, a summary of the challenges the project faces is provided.

Overall, the biggest project development challenge is that the Ala Wai Watershed Project is the first watershed study to be completed by Honolulu District, it is the first multi-purpose plan to be developed by Honolulu District, and is the first multi-objective and collaborative plan to be implemented in Hawai'i. The native Hawaiian culture managed their lands through a multi-objective holistic approach referred to as 'ahupua'a. Within the State of Hawai'i there is a revival supported by State regulations and policies to implement the 'ahupua'a concepts in a modern context. The goal of the Ala Wai Watershed Project supports initial steps to help shift towards a modern 'ahupua'a that will be both novel for the region and the Nation.

Additionally, in the City and County of Honolulu, residents adjacent to the stream own to the center-line of the stream and are required to maintain their section of the stream channel. There are over 1,000 landowners of the stream channels within the study area. Working with this huge array of land owners to address any of the objectives will be a challenge.

Lastly, as a multi-objective watershed plan, it will be a challenge to ensure often incongruent objectives such as flood risk management and ecosystem restoration are both adequately addressed with the alternatives.

#### FLOOD RISK MANAGEMENT CHALLENGES

Key challenges to meeting the flood risk management objective of the project are:

- **Urban Development in Floodplains.** The floodplain has been fully developed and, in most cases, residences and structures are built directly next to the stream channel (See Figure 4). Challenges occur in identifying measures that minimize the need to remove existing structures from the floodplain.
- **Retention/Detention.** Waikīkī historically was a large coastal wetland area. The Ala Wai Canal was constructed to drain Waikīkī and support it for development. As a former wetland, Waikīkī and Ala Wai Districts are very flat. Reducing flooding in this highly developed area is dependent upon retaining and detaining as much flood water as possible in the sub watersheds of Makiki, Mānoa and Pālolo. With these sub watersheds being developed, public parks and athletic fields at schools must be considered as potential retention/detention areas. Challenges occur in identifying multi-purpose measures that meet flood risk management measures while not impairing the health and safety of the public that utilizes these areas (See Figure 5).



FIGURE F-4: DEVELOPMENT ADJACENT TO STREAMS (MĀNOA STREAM, UPSTREAM OF LOWRY BRIDGE).

- **Stream Ownership.** In Hawai'i, adjacent property owners own property to the center line of the stream. It is the responsibility of the adjacent property owners to maintain their portions of the stream. It is estimated that there are over 1,000 property owners for Makiki, Mānoa, and Pālolo Streams. Challenges occur in educating property owners on their responsibilities, seeking systematic/holistic approaches to stream management with so many owners, and in seeking rights-of-way and access with the implementation of any management measure or alternative.





FIGURE F-5: CONCEPTUAL DRAWING OF MULTI-PURPOSE RETENTION AT MĀNOA DISTRICT PARK.



FIGURE F-6: MAUNALUA BAY EAST OF ALA WAI WATERSHED (TOP LEFT). EXAMPLES OF TRAPEZOIDAL CONCRETE CHANNELS DURING HIGH FLOW EVENTS (TOP RIGHT, MIDDLE RIGHT). CORAL REEF IMPAIRED BY SEDIMENT IN MAUNALUA BAY (BOTTOM RIGHT).

- Environmental Considerations. In Hawai'i, traditional theories in flood risk management (moving the water off the land and out to sea as quickly as possible) have significant impacts on important habitat for native species and designated special aquatic sites such as coral reefs and riffle/pool complexes. Especially for coral reefs, traditional flood risk management measures, such as trapezoidal concrete channels, have been directly tied to the increased sediments and contaminants in the nearshore waters (See Figure 6). Increased freshwater significantly impairs coral recruitment. Coral Reefs contribute

over \$800 million a year in gross annual revenue to the State. Within streams, the native species utilize riffle/pool and step/pool complexes for foraging, refuge, and spawning. They are dependent upon minimum base flow conditions with low flow channels. Traditional trapezoidal channels change the frequency and duration of the base flow conditions and remove important habitat for native species. Challenges occur in balancing environmental needs with flood risk management as trapezoidal channels are often the most effective solution given the space constraints within Hawai'i.

#### ECOSYSTEM RESTORATION CHALLENGES

Key challenges in meeting the ecosystem restoration objectives include:

- Because of funding constraints, ecosystem restoration in Hawai'i has been more opportunistic than strategically planned. There are limited examples of strategically planned ecosystem restoration projects where a process through planned adaptive management (well defined success criteria, monitoring protocol and pre-defined contingency plans) has been implemented to support a sustainable restoration project. Most restoration examples include an extensive long-term operation and maintenance strategy.
- There are limited reference sites for stream and estuarine habitats that would be suitable for leeward watersheds or urbanized areas on the island of O'ahu.
- Because the study area has been heavily manipulated by urbanization and the Ala Wai Canal is an artificial estuary (constructed to drain the wetlands that are now Waikīkī), restoration will not be restoring the system to a previous point in time but focusing on restoring the lost functions within the overall system.
- There is very limited information available on the life history and habitat threshold requirements for the native aquatic species. For example, the native gobies (o'opu) are an amphidromous fish. There is information available on the general habitat needs for the species while in the stream, but there are many data gaps on understanding how the gobies interact in the ocean and how they return to freshwater systems (e.g. Do they return to any stream in the Main Hawaiian Islands? Do they return to only the island or watershed (multiple streams) in which they were born? Or, do they return to only to the specific streams in which they were born? ).
- Because of the significant alteration to the native landscape, information on native riparian vegetation assemblages and their requirements are limited. In addition, adjacent development will constrain opportunities for restoration of the riparian corridors in the middle and lower watershed.
- The Ala Wai Watershed has an extensive problem with invasive floral and faunal species in both the aquatic and terrestrial environments. Eradicating non-native species is unlikely within the constraints of USACE authorities. For example, aquatic non-natives are often introduced by residents dumping their aquarium fish into the stream – causing non-natives to occur throughout the stream corridor. Determining how to improve habitat for native species while discouraging habitat for non-native species will be a challenge.

- As an urbanized watershed, there are a variety of factors influencing the health of the aquatic ecosystem, many outside USACE authorities. Identifying the primary sources of ecosystem degradation will be a challenge. Working closely with partnering agencies and organizations that have the ability to address areas outside USACE authorities – i.e. terrestrial areas in the upper watershed or education and implementation of best management practices for residents – is critical to the overall success of the project.

#### WATER QUALITY CHALLENGES

Key challenges in meeting the water quality objectives include:

- Because of the urbanization of the watershed and the significant alterations over time (forest practices in the upper watershed, agricultural practices in the past), understanding the primary sources of water quality impairments in the watershed is a challenge.
- Relic contaminants such as termiticides are showing up in water quality testing. It is believed that these termiticides are being reintroduced from redevelopment activities in the watershed. Understanding the source of these relic contaminants and identifying measures to address them will be a challenge.
- As with ecosystem restoration, there are a variety of contributing sources to water quality impairments. The City and County of Honolulu ENV only has the ability to address water quality impairments on City and County land. Partnering with other land owners will be critical to addressing water quality issues.

#### ECONOMIC ANALYSIS CHALLENGES

Key challenges in addressing the economic analysis include:

- As a multi-objective study, any given management measure may address several objectives, for example a flood risk management measure of widening a channel may incorporate ecosystem restoration measures of in-stream habitat features and water quality objectives of vegetated swales along the upper stream bank. Balancing the NED and NER plans will be a challenge throughout this process.

### 13.2 INFLUENTIAL SCIENTIFIC INFORMATION/ASSESSMENTS

On a national scale, this project is not expected to result in influential scientific information or assessments. However, on a regional scale – the information will be influential. This will be one of the first, if not the first, collaborative watershed plan that addresses multiple objectives (flood risk management, ecosystem restoration and water quality) in Hawai'i. It will be the first project in Hawai'i involving large-scale urban restoration. It will also be one of the first planning documents in Hawai'i to consider climate change and sea level rise within the alternatives evaluation and design. As such, there will be significant attention paid to the results of this project from a variety of disciplines and interest groups.

### 13.3 ENVIRONMENTAL IMPACT STATEMENT (EIS)

The Ala Wai watershed is the most urbanized area in the State of Hawai'i, supporting a population of approximately 143,000 people over an area of 12,000 acres. Waikīkī, the State's main economic engine, is located in the watershed. Waikīkī averages 72,000 visitors a day. The revenue from Waikīkī contributes 8% of the Gross State Product or approximately \$3.6 billion, 12% of the state and city tax revenue, and provides 11% of the civilian jobs in the state. In 2000, Waikīkī supported approximately 1,600 businesses. There are 21 public schools, 5 private schools and 2 Universities in the study area. Approximately 2,200 properties are currently located in the 100 year floodplain. A designated marine preservation area is located in the nearshore waters on the eastern boundary of Waikīkī. The streams and canals in the watershed are listed as "impaired" by EPA for trash, pesticides, metals, nutrients, suspended solids, and bacteria. With this dense use within the study area, the diversity within the population and the variety of concerns for the community, any activity is likely to affect part of the population. Because of this complexity, USACE determined that an Environmental Impact Statement was warranted for this project. The proposed project will follow the USACE regulations and policies for complying with the National Environmental Policy Act (NEPA) as outlined in Engineering Regulations (ER) 1105-2-100 and ER 200-2-2. The proposed project will also incorporate all documentation requirements, as applicable, of the State of Hawai'i Environmental Policy Act as defined in the Hawai'i Revised Statutes Chapter 343 and implemented by State of Hawai'i, Office of Environmental Quality Control (OEQC).

A Scoping Meeting was held in June 2004 based on the original purpose of flood reduction for Waikīkī and ecosystem restoration for the entire watershed. Another scoping meeting was held in October 2008 to address the expanded current multi-objective scope for the entire watershed.

#### PURPOSE AND NEED

In accordance with NEPA, the alternatives analysis and impact evaluations are framed based on the purpose and need of the project. The purpose of this project is to reduce overall flood risk, increase ecosystem restoration in a watershed context consistent with the project goals and objectives and within the authorities of the USACE Civil Works program. The State of Hawai'i, City and County of Honolulu and the residents of the Ala Wai Watershed have all requested assistance from USACE to address the need for improved flood risk management and ecosystem health. As discussed under the Project Background section above, the existing structures, canal and bridges are estimated to manage the flood risk on average, for a 10-year event. Approximately 2,200 properties are at risk for flooding in a 100-year event (1% annual chance of flooding). The aquatic ecosystem is significantly impaired and urbanization has impaired access for native aquatic species to up-stream habitats. The water quality of the Ala Wai and its tributaries is impaired - supporting some of the highest levels of contaminants in the nation.

#### LIKELY SIGNIFICANT IMPACTS

The degree of severity of impacts will vary based on the alternatives identified. Based on the initial review and comments at the scoping meetings, the following potentially significant impacts were identified:

- Aesthetics/Visual Resources. Traditional flood risk management measures such as concrete channels or levees may likely have significant impacts on the visual view sheds of the study area.

- Archaeological/Historical Resources. The Ala Wai Canal is an historic structure. There are several bridges in the study area that are historic structures and may likely be significantly affected by potential measures. In addition, it is not unusual in urbanized areas of O`ahu to find intact archaeological resources and or human remains. In the last 10 years, native Hawaiian burials have been inadvertently uncovered at two locations during redevelopment (previously under parking lots) within the study area.
- Cumulative impacts. Because of the urbanized nature of the watershed, the population density and the expansiveness of the project, the cumulative impacts of the project are likely to be significant.
- Existing Facilities and Utilities. Because the area is heavily urbanized, there is likely to be significant impacts to existing facilities and utilities during construction.
- Flood Hazard. Because the study area is already significantly impacted by the potential of flood and storm hazards, this issue is likely to continue to be a significant concern even with the objective being to reduce flood damage.
- Hazardous/Toxic Waste. Because of the urbanized nature of the watershed, there is a potential to inadvertently come across significant hazardous and toxic waste sites within the study area. Extensive identification of known or potential sites is underway and every effort practicable will be made to avoid these sites.
- Infrastructure and Maintenance. The public raised concerns that infrastructure and maintenance issues are currently a significant concern and may likely remain a significant concern for any proposed revisions to the streams.
- Land use/Land Ownership. With the private ownership of the majority of the streams, there is the potential for likely significant impacts associated with the potential acquisition or easements to property. Potential multi-purpose facilities – flood detention and public parks – may likely have significant impacts on land use.
- Protection of Children. Because of the number of schools and parks in the study area and potential measures to utilize open spaces at schools and parks, protection of children will likely be a significant concern for this project.
- Public Health and Safety. Because of the urbanized nature of the watershed, significant impacts to public safety through construction activities in residential areas are likely. Potential measures such as multipurpose detention facilities at public parks could have a significant impact to public safety.
- Recreation. Some of the management measures include consideration of multi-purpose use of existing open spaces and public parks. There could be significant impacts in the short and long-term recreational activities through the use of these areas. Where practicable, recreational opportunities will be incorporated into management measures to enhance activities and/or off-set adverse impacts.
- Socio-economic. Because of the urbanized nature of the watershed and the economic importance to the State, short term significant impacts could occur during construction. Long-term beneficial impacts are expected for the entire watershed. Special attention will be given to evaluate if any long-term adverse impacts are likely, especially to specific communities where management measures could displace activities.
- Traffic. Because of the urbanized nature of the watershed, significant impacts to traffic are likely during construction.
- Water Quality. Because water quality is already impaired, this resource is likely to continue to be a significant issue, although there is an objective to improve surface water quality within the watershed.

## CLEAN WATER ACT (CWA) REQUIREMENTS

### SECTION 404 ALTERNATIVES ANALYSIS.

The proposed activities will include work in waters of the U.S. through placement of dredge or fill in streams or the Ala Wai Canal. These activities are regulated under Section 404 of the Clean Water Act. Two special aquatic sites, as defined under Section 404(b)(1), occur in the study area – riffle/pool complexes in segments of Makiki, Mānoa and Pālolo streams and coral reefs in the nearshore waters of Waikīkī and Ala Moana. In accordance with Section 404(b)(1) of the Clean Water Act, the recommended plan by USACE, must meet the alternatives analysis requirement in being the least environmentally damaging practicable alternative to meet the purpose and need of the project. Any impacts to Waters of the U.S. will comply with the mitigation sequencing of Section 404(b)(1), avoiding impacts to the fullest extent practicable, minimizing any unavoidable impacts, and then mitigating for any impacts that could not be avoided or further minimized.

In accordance with USACE Planning and Guidance Notebook (ER 1105-2-100), USACE Civil Works projects do not obtain a Department of the Army permit for Section 404 actions. USACE will include a Clean Water Act Section 404(b)(1) alternatives analysis with the EIS. As per regulations and clarifications under Water Resources Development Act (WRDA) 2007, the alternatives analysis will be consistent with the regulations and policies of the USACE Regulatory Program.

### SECTION 401 WATER QUALITY CERTIFICATION & SECTION 402 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

The Clean Water Act Section 401 Water Quality Certification (WQC) and Section 402 NPDES permit are administered by the State of Hawai'i Department of Health (DOH). As the proposed work is regulated under Section 404 of the Clean Water Act, it is subject to Section 401 and Section 402 of the Clean Water Act. DOH is participating as a stakeholder in the planning process to assist USACE in addressing water quality issues as early as possible and avoiding and minimizing potential impacts to water quality. USACE will apply for a conditional WQC and NPDES as part of the Final Feasibility Study and obtain an approved WQC and NPDES prior to construction, if approved by Congress.

### CORAL REEF REQUIREMENTS

Coral Reefs are protected under Section 404 of the Clean Water Act as special aquatic sites, as designated Essential Fish Habitat under the Magnuson Stevens Act and provided additional coordination requirements under Executive Order 13089. For Hawai'i, coral reef habitat is documented to provide \$800 million a year in Gross Annual Revenue. In Hawai'i, primary threats to coral reef habitat include land based pollution, recreational activities, fishing, climate change and disease, and invasive species. The proposed project does not propose any direct activities to improve coral reef habitat in the study area but anticipate by improving water quality and reducing sediment to address ecosystem restoration within the Ala Wai Canal and the streams, there will be a reduction in land based pollutants to the nearshore waters.

### ENDANGERED SPECIES ACT (ESA) REQUIREMENTS

Based on a species list received from U.S. Fish and Wildlife Service (USFWS) on May 16, 2008 and National Marine Fisheries Service (NMFS) on April 25, 2008, there are federally listed species in the study

area. Most of the species managed by USFWS occur in the upper-watershed with the NMFS managed species occurring in the marine environments.

Because of the ecosystem restoration objective of the project, it is anticipated that the project will not adversely affect any listed species. Potential impacts to these species by the alternatives will be evaluated during the EIS and consultation with USFWS and NMFS will be conducted in accordance with Section 7 of the ESA and in accordance with the Marine Mammal Protection Act (MMPA). A full list of the species protected under the ESA or the MMPA in the study area is included in the FSM Pre-conference Package.

#### FISH AND WILDLIFE COORDINATION ACT (FWCA)

Consultation under the Fish and Wildlife Coordination Act was initiated with USFWS and NMFS on September 15, 2008. Representatives of USFWS and NMFS are actively participating in the technical advisory teams to provide input on project development. Both agencies will be actively involved in the alternatives formulation process to ensure that the NED/NER plans are consistent with USFWS and NMFS recommendations and considerations.

#### MARINE PROTECTED AREAS

The National Hawaiian Humpback Whale Marine Sanctuary occurs throughout the Main Hawaiian Islands. Designated Sanctuary waters begin at the eastern boundary of the study area at Diamondhead and extend further eastward away from the study area. The humpback whales utilize the Sanctuary for winter breeding grounds from November through April. It is unlikely that any activities associated with the project will interfere with the Sanctuary Management Plan. (See Figure 7)

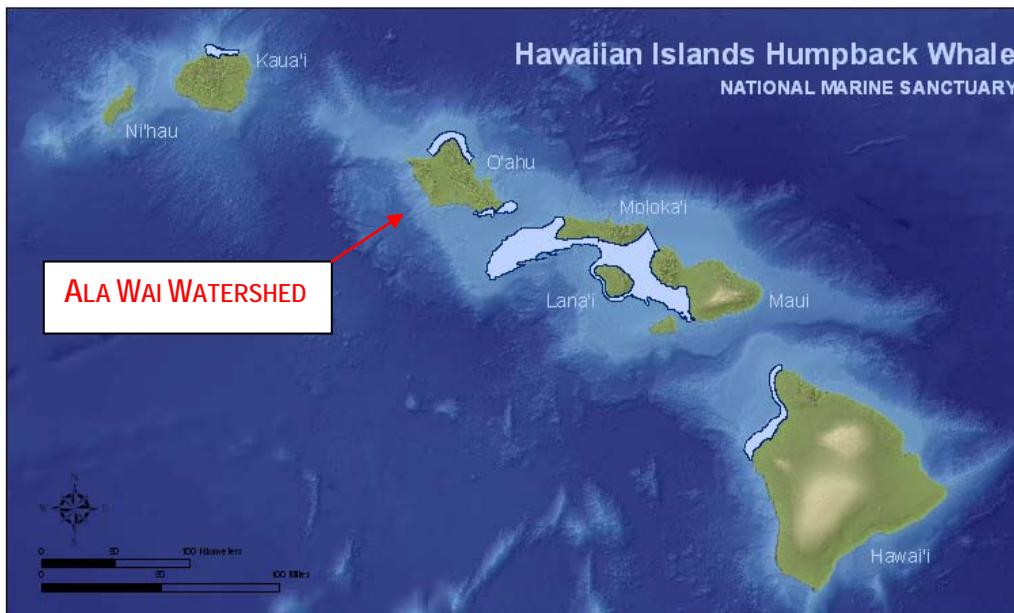


FIGURE F-7: MAP OF HAWAIIAN ISLAND HUMPBACK WHALE MARINE SANCTUARY BOUNDARY

The State of Hawai'i Waikīkī Marine Life Conservation District (MLCD) occurs at the eastern edge of Waikīkī – extending from the groin at the end of Kapahulu Avenue to the ewa (west) wall of the Natatorium, from the high-water mark seaward a distance of 500 yards or to the edge of the fringing reef – whichever is greater. This MLCD is designed for marine species protection. No fishing, taking or injuring of any type of marine life (including eggs) or shells is permitted. Potential measures for ecosystem restoration within Kapi'olani Park to restore wetland functions may affect the MLCD through improvements to water quality or changes to freshwater introduction. It is unlikely that any activities associated with the project will interfere with the MLCD Management Plan.

The State of Hawai'i has also designated a Fisheries Management Area (FMA) in the project study area the Waikīkī-Diamond Head Shoreline FMA. The FMA extends from the ewa (west) wall of the Waikīkī Natatorium to the Diamond Head Lighthouse, from the high water mark out to the minimum seaward distance of 500 yards, or to the seaward edge of the fringing reef if one occurs beyond 500 yards. (See Figure 8) The following prohibitions apply: to fish for, take or injure any marine life (including eggs), or to possess in the water any fishing gear during the "closed to fishing" period; and, to use any spear between the hours of 6:00 pm to 6:00 am, or have or possess in the water any trap or net except throw net or hand net to land hooked fish during the "open to fishing" period.

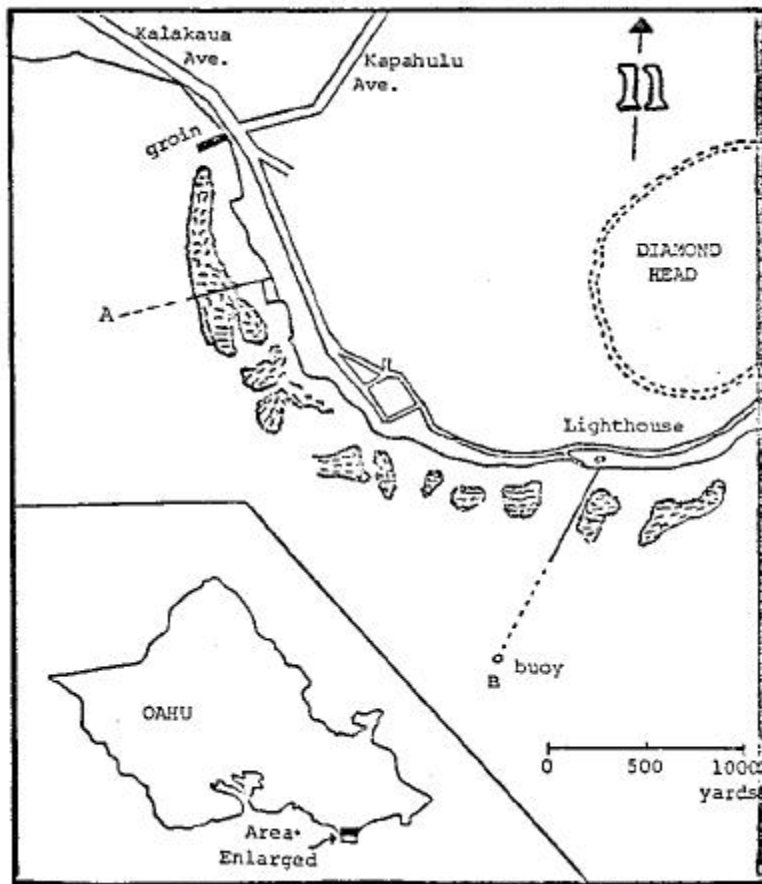


FIGURE F-8: WAIKĪKĪ - DIAMOND HEAD SHORELINE FMA LOCATION



## FEDERAL COASTAL ZONE MANAGEMENT ACT

The State of Hawai'i Coastal Zone Management program is administered by the Department of Business, Economic Development and Tourism, Office of Planning. The State recently issued an updated Hawai'i Ocean Resource Management Plan (ORMP). The ORMP defines policy guidelines for the Coastal Zone Management Program. Watershed management and holistic approaches is a major focus of the ORMP. The Office of Planning is actively participating in the Stakeholder meetings to provide input and advice to ensure the project is consistent with the State's coastal zone management program. During the EIS, USACE will request a coastal zone management consistency determination from the State.

## FLOOD PLAIN MANAGEMENT

Executive Order 11988 "*Floodplain Management*" is designed to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. In accordance with USACE planning regulations for flood risk management and the guidelines of the Executive Order, USACE will evaluate the potential effects of any actions it may take in a floodplain to ensure that its planning programs and budget requests reflect consideration of flood hazards and floodplain management.

## ENVIRONMENTAL JUSTICE REQUIREMENTS

Executive Order 12898 "*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*" is designed to focus federal attention on the environmental and human health conditions in minority communities and low-income communities with the goal of achieving environmental justice. The Order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment. In addition, it places emphasis on providing minority communities and low-income communities' access to public information on, and an opportunity for public participation in, matters relating to human health or the environment. In compliance with this Executive Order, USACE will identify low-income, minority and at-risk populations in the study area including those in Pālolo Valley and Ala Moana neighborhoods, identify strategies within the stakeholder involvement plan to inform these communities and provide opportunities for participation. USACE will also identify measures within the objectives that can provide benefits to these communities.

## NATIONAL HISTORIC PRESERVATION ACT REQUIREMENTS

Initial surveys were conducted in 2003 to identify the presence of potential archaeological sites in the study area listed or eligible for listing as historic properties under the National Historic Preservation Act. Surveys are being conducted to identify potential sensitive areas for historic structures and traditional cultural properties eligible for listing as historic properties. These sensitivity areas will be used to help in the initial screening of alternatives to avoid impacts where possible. Once alternatives have been formulated, detailed assessments of potential impacts to historic properties will be conducted. A cultural impact assessment consistent with State law will also be conducted. USACE will consult with the State Historic Preservation Office, Native Hawaiian and other interested parties in accordance with Section 106 of the National Historic Preservation Act.

### 13.4 HEALTH AND HUMAN SAFETY ASSURANCES

Because the community is currently at risk from large flood events, health and human safety is a critical concern for this project. As all potential alternatives will occur in an urbanized watershed, there is a potential risk to health and human safety during the construction of the alternatives and these risks will need to be addressed and appropriate mitigation defined within the EIS. Some management measures being considered include the potential multi-purpose use of open spaces including parks and University and school activity fields as flood detention for large events. In considering the viability and acceptability of these measures, addressing health and human safety will be critical to the evaluation.

In addition, the poor water quality currently in the Ala Wai and its tributaries poses a risk to human health and safety. Some of the water quality concerns will be reduced by the potential project alternatives through the implementation of ecosystem restoration measures and incorporation of water quality improvement features. Some water quality concerns, such as leptosporiosis and staphylococcus and other bacteria pathogens, will not be able to be addressed within the authorities of the study but their issue for residents will be highlighted within the EIS discussion and within a watershed context. Some measures may indirectly reduce the conduits for these pathogens, such as flooding and stagnant water, but addressing them is not an objective of the study.

For the Ala Wai Watershed Project, the study area is heavily urbanized area poses a threat to health and human safety by the sheer proximity and number of people present. There are likely to be management measures and/or alternatives identified where the failure of the project would pose a significant threat to human life (i.e. multi-purpose flood retention facilities). The PDT will critically evaluate, consider and incorporate safety assurance factors in the alternatives formulation briefing evaluation. As stated above, management measures being identified are not novel methods from a national perspective but will be novel methods for implementation in Hawai'i. The PDT will critically evaluate these measures and incorporate safety assurance factors to address specific regional and local considerations in applying these measures. The PDT will incorporate redundancy measures to the full extent practicable, given the constrained space available in the urbanized environment – redundancies such as increased floodplains – may be limited. Robustness and resiliency factors will be incorporated into the design features. A special effort is being taken to define the risk of ocean storm events in addition to riverine flooding and impacts of climate change to build in resiliency into the measures to address flood risk management and ecosystem restoration.

### 13.5 INTERAGENCY COORDINATION AND INTEREST

USACE is coordinating with other federal, state and local agencies and seeking their input and interest in the project through the Quarterly Stakeholder Meetings, Sponsor Meetings and Technical Advisory Teams. In order to ensure that all appropriate agencies have been consulted, USACE is conducting a stakeholder assessment to identify any potential agencies or other stakeholders that may not be engaged in the project but has an interest or could be impacted by the project. Overall, federal, state and local agencies have shown a high interest in this project for as it will be the first multi-purpose collaborative watershed plan addressing both flood risk management and large-scale urban ecosystem restoration in Hawai'i. Agencies are looking to this plan and being involved in the process as a potential template for future collaborative watershed plans.

### 13.6 PROJECT CONTROVERSY

This project is not deemed highly controversial. It is a high profile project that is of great interest to the State, the City and County of Honolulu, the community and other interested parties because of the collaboration and multi-purpose nature of the watershed project. As mentioned before, being that this is the first watershed study done by USACE Honolulu District under the Civil Works program (other watershed studies have been done through Planning Assistance to the States to meet City and County guidelines), there is a great deal of attention to it. There has not been any significant opposition raised by the public or other agencies. It is acknowledged that once the alternatives have been formulated, there may be concerns raised on a management measure basis that will need to be adequately addressed within the study and EIS and through the public involvement process.

### 14.0 PROJECT PRELIMINARY RISK ASSESSMENT

Table 2 below identifies the categories of consideration in the preliminary project risk assessment. Overall, the project is considered a “medium” risk. The rationale is that while several aspects of the project have been successfully completed on a national level – these aspects will be implemented for the first time within Hawai`i and/or by the Honolulu District.

TABLE F-2: PRELIMINARY PROJECT RISK ASSESSMENT

PROJECT ASPECT	RISK LEVEL	REMARKS
Cost Increases	Medium	Because of project complexity and original application in Hawai`i, there is potential need for cost increases.
Engineering Difficulty	Low	Engineering techniques are known nationally but need to be regionalized to Hawai`i.
Environmental Sensitivity	Medium	As an urbanized environment, any activity at this scale will result in a significant impact to part of the community
Legal Compliance	Medium	Legal requirements are known with no identified risk in meeting compliance requirements. The size and complexity of the project raise the level or risk.
Lack of Community Involvement	Low	Community involvement and support of the project is high.
Plan Formulation Complexity	Medium	Because of the size, multi-purpose and uniqueness of this project for Hawai`i, formulation process is complex.
Political Support	Medium	The size of the project and goal reaching across agency responsibilities will require a

PROJECT ASPECT	RISK LEVEL	REMARKS
Sponsorship/Financing	Medium	strong political support. To date political support has been consistent. The sponsors are in support of this project and have been consistently providing funds. The recession impacts on State and City and County funding and the size of the project increase risk.

A formal risk analysis will be conducted as part of the Feasibility study. The formal risk analysis will evaluate the proposed cost estimates, design and construction schedules, and engineering considerations of the proposed preferred alternative to determine project contingency requirements. This risk report will be included as an appendix to the feasibility study and will be subject to the peer review process.

### 15.0 PEER REVIEW STRATEGY AND MANAGEMENT

Per the guidelines set forth in EC 1165-2-209, this project will be reviewed on all three levels – DQC, ATR and IEPR. The IEPR is justified because:

- The construction costs for the project are estimated to be over \$45 million;
- An EIS is required;
- The project is likely to contain influential scientific information and assessments on a regional level;
- The project is likely to have significant impacts on the environment;
- There is significant interagency interest in the project;
- Safety assurance factors will play a key role in the evaluation based on the application of novel methods for the region; and
- Information in the decision document is likely to be based on novel methods for the region.

As discussed above, the DQC is managed by Honolulu District. The ATR is conducted and managed by the Planning Centers of Expertise in Flood Risk Management and Ecosystem Restoration. These Planning Centers of Expertise will coordinate with the PDT to determine which center is best suited to act as lead for this review. The IEPR will be managed by an Outside Eligible Organization, external to the U.S. Army Corps of Engineers and coordinated by the lead Planning Center of Expertise.

### 15.1 AGENCY TECHNICAL REVIEW (ATR) TEAM REQUIREMENTS

As stated above, the ATR team members must be from outside Honolulu District and the ATR team lead must be from outside Pacific Ocean Division. The number of reviewers for the ATR will be coordinated with the FRM-PCX at each stage of review. The FRM-PCX identified the Sacramento District as the ATR team. The PDT recommended consideration of team members from USACE South Pacific Division, located in San Francisco, CA, based on their experience with large collaborative watershed plans, multi-purpose projects, urban ecosystem restoration, and flash flood systems.

Critical disciplines needed for the review include the following expertise:

- Plan Formulator – expertise in:
  - Expertise in USACE Civil Works Plan Formulation for Watershed plans; and
  - Integrated multi-purpose flood risk management and ecosystem restoration projects.
- Hydraulic and Civil Engineer(s) – expertise in:
  - Multi-purpose public open space and flood risk management detention areas;
  - Flood risk management in flash-flood urbanized systems (preferably tropical systems), and
  - Safety Assurance for flood risk management projects in urbanized areas.
  - Integrated multi-purpose flood risk management and ecosystem restoration projects.
- Ecologist/Environmental Specialist(s)– expertise in:
  - Urban ecosystem restoration – special focus in stream restoration,
  - Environmental regulatory expertise in NEPA, CWA, FWCA and ESA
  - USACE requirements for HTRW assessments, and
  - Water Quality analysis, regulations, and management measures.
- Economist – expertise in:
  - Economic analysis in combined NER/NED evaluations,
- Geotechnical Engineer
- Cost Engineer
- Real Estate Specialist
- Archaeologist/Cultural Resources Specialist

An ATR will be conducted on the Feasibility Scoping Meeting Package and the Alternatives Formulation Briefing Package, Draft Feasibility Study and EIS and Final Feasibility Study and EIS. The anticipated review schedules are shown under the Project Schedule above.

## 15.2 INDEPENDENT EXTERNAL PEER REVIEW (IEPR) TEAM REQUIREMENTS

As stated above, the IEPR team members will be selected and managed by an Outside Eligible Organization. In ensuring no conflict of interest in the IEPR selection process, the PDT, USACE and the general public do not nominate candidates for the IEPR team. Comments on the critical disciplines and expertise needed for the review team are welcome and encouraged. The IEPR team will review the underlying planning, safety assurance, engineering, economic, and environmental analysis for the project.

Critical disciplines needed for the review include the following expertise:

- Plan Formulator – expertise in:
  - Expertise in USACE Civil Works Plan Formulation for Watershed plans; and
  - Integrated multi-purpose flood risk management and ecosystem restoration projects.
- Hydraulic/Civil Engineer – expertise in:
  - Multi-purpose public open space and flood risk management detention areas;
  - Flood risk management in flash-flood urbanized systems (preferably tropical systems), and
  - Safety Assurance for flood risk management projects in urbanized areas.
  - Integrated multi-purpose flood risk management and ecosystem restoration projects.
- Ecologist/Environmental Specialist – expertise in:
  - Urban ecosystem restoration – special focus in stream restoration, and
  - Environmental regulatory expertise in NEPA, CWA, FWCA and ESA.
- Economist – expertise in:
  - Economic analysis in combined NER/NED evaluations,

- Cultural Resources Specialist

An understanding of the Hawaiian 'ahupua'a management concepts would be a beneficial asset to the review team.

The IEPR is planned to be conducted on the Draft Feasibility Study and EIS. Based on the ATR comments, the PDT and the Planning Center of Expertise may decide that the Alternatives Formulation Briefing package warrants review by the IEPR. Based on the public and agency comments received on the Draft Feasibility Study and EIS, the PDT and the Planning Center of Expertise may decide that a review of the Final Feasibility Study and EIS is warranted. The anticipated review schedules are shown on the Project Schedule above.

### **15.3 REVIEW DOCUMENTATION AND DISSEMINATION**

The PDT will utilize an excel table format to track the DQC comments consistent with the Honolulu District Civil Works Review Policy (ISO CEPOH-C\_12203\_0, dated November 2010). The PDT will utilize DrChecks for tracking and managing responses for the ATR and the IEPR. In the review report, the PDT will summarize the comments received from the ATR and the IEPR and the responses to the comments. The DrChecks comment, response and backcheck will be utilized as an Appendix to the review report. For backcheck, the documents will be provided in "track change" mode to ease the reviewers' confirmation that the documents were adequately revised in accordance with responses.

Upon completion of the review report, the PDT will make the review reports, comments and responses available to the public via posting on the project website and notification to the mailing list.

### **16.0 MODEL CERTIFICATION**

The models requiring model certification consistent with USACE policies and regulations are identified below. The documentation required for model certification (EC 1105-2-407). The model documentation is scheduled to be submitted for review and certification to the ECO-PCX after the completion of the Feasibility Scoping Meeting but prior to the Alternatives Formulation Briefing package.

#### **FLOOD RISK MANAGEMENT**

The models being utilized for the flood risk management (HEC-HMS, HEC-RAS, FLO-2D, GSSHA) are engineering models and do not require certification by USACE as a planning model.

#### **ECOSYSTEM RESTORATION**

As stated above, the ecosystem output model will be a QHEI methodology based on the State of Hawai'i Stream Habitat Assessment Protocol (HSBP) and adjusted to meet the objectives of the study. Because no ecosystem restoration modeling has been done by USACE in Hawai'i, any model chosen will need to be certified/approved by the USACE Modeling Center of Expertise. The regionalization will require approval by the Modeling Center of Expertise.

## **WATER QUALITY**

As stated in the methodology, WARMf is a decision support system that will be used to evaluate water quality objectives and metrics to be implemented by the non-Federal Sponsor (ENV). WARMf is an U.S. Environmental Protection Agency (EPA) approved model. The PDT is seeking concurrence from HQ during the FSM that this model does not require USACE certification or approval. .

## **ECONOMIC ANALYSIS**

The models being utilized for the economic analysis, HEC-FDA 1.2.4 and Institute for Water Resources (IWR) Planning Suite 1.0.9.0 for the Incremental Cost Assessment (ICA) for the ecosystem restoration measures, have been certified by USACE Modeling Center of Expertise.

### **17.0 COST ENGINEERING DIRECTORY OF EXPERTISE**

The Ala Wai project, as a specifically authorized project, will require Congressional authorization of the decision document. The PDT cost engineer will work closely with the Cost Engineering Directory of Expertise at USACE Walla Walla District during the development of the feasibility study consistent with USACE regulations, policies and guidance. The PDT cost engineer will coordinate with the Directory of Expertise to initiate and prepare the cost and schedule risk analysis. The Ala Wai PDT shall jointly develop the information needed on the Ala Wai Watershed Project risk register as outlined on <HTTP://WWW.NWW.USACE.ARMY.MIL/HTML/OFFICES/ED/C/CSRA.ASP#ABBREV> . The Planning Centers of Expertise will also coordinate with the Cost Engineering Directory of Expertise for the ATR of cost estimates, construction schedules and contingencies of the decision document.

### **18.0 STAKEHOLDER INVOLVEMENT PLAN/PUBLIC PARTICIPATION**

In an effort to better engage the stakeholders and the public in the plan formulation for this project, a stakeholder involvement plan has been developed. USACE is currently conducting a stakeholder assessment to ensure that all appropriate stakeholders are represented through the public involvement process. The goal of the stakeholder involvement plan was to aim towards a collaborative public involvement strategy but due to funding constraints, the strategy is focusing on informing and involving the public in the process. The stakeholder involvement process is described in detail in the FSM Pre-Conference Package. A primary tool to inform the public is the project website – <WWW.ALAWAIWATERSHED.COM>. At the completion of the study, the website will be turned over to the non-federal sponsor – DLNR – to manage for the long term implementation of planning objectives. All documents developed for the project including the peer review plan and the feasibility scoping meeting package will be available for the public through the project website.

As part of the Stakeholder Involvement Plan, public participation will be solicited throughout the planning process. Critical milestones for the public participation are:

- The EIS Public Scoping Meeting (held in October 2008)
- The Peer Review Plan - This Peer Review Plan will be provided to the public via the project website, the Honolulu District website and via an e-mail notification to stakeholders, agencies, and interested

parties. Comments from the public will be welcome. The plan will be adjusted to address those comments, where applicable.

- The Feasibility Scoping Meeting Package and State EIS Prep Notice – the State of Hawai`i requires the issuance of an EIS Prep Notice. This is more akin to an environmental assessment than to the NEPA required Notice of Intent. After consulting with the State of Hawai`i OEQC, the Feasibility Scoping Meeting Package fulfills most of the requirements of the EIS Prep Notice. The Feasibility Scoping Meeting Package will be adjusted to meet the State EIS Prep Notice requirements and provided to the public for review and comment.
- State EIS Prep Notice Public Scoping Meeting/Alternative Formulation Meeting– a second Public Scoping Meeting to solicit comments on the State EIS Prep Notice will be held in accordance with Chapter 343 of the Hawai`i Revised Statutes (HRS). This meeting will also seek public input on the alternatives formulation process. Additional smaller group meetings will occur consistent with the Stakeholder Involvement Plan.
- Draft Feasibility/EIS Public Hearing – Consistent with NEPA a public hearing and comment period will be held to seek public input on the Draft Feasibility Study and EIS.

When the OEO begins the selection process for the IEPR panel, the public, including scientific or professional societies will be asked to nominate potential peer reviewers. The responsibility for final selection of all IEPR panel members resides solely with the OEO. 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.



## REFERENCES

Economic and Environmental Principles for Water and Related Land Resources Implementation Studies, (42 U.S.C. 1962a-2 and d-1), March 10, 1983

Engineering Circular (EC) 1105-2-407, Planning Models Improvement Program: Model Certification, 31 May 2005

Engineering Circular (EC) 1165-2-209, Civil Works Review Policy, 31 December 2009

Engineering Regulation (ER) 1105-2-100, Planning Guidance Notebook, 22 April 2000

Engineering Regulation (ER) 1110-2-12, Quality Management, 30 Sep 2006

U.S. Army Corps of Engineers, Honolulu District, *Ala Wai Flood Study, Island of O'ahu, Honolulu, Hawai'i – Planning Assistance to the State Study Report*", dated October 2001.

U.S. Army Corps of Engineers, Honolulu District, *Ala Wai Canal Project Management Plan*, March 2001 with addendum dated October 2006.

U.S. Army Corps of Engineers, Honolulu District, *Civil Works Review Policy*, November 2010.

U.S. Army Corps of Engineers, Pacific Ocean Division, *Quality Management Plan*, December 2008 (update in progress).

Water Resources Development Act of 2007