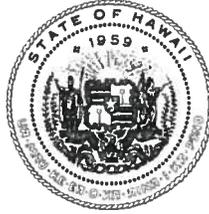


NEIL ABERCROMBIE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

ENGINEERING DIVISION
POST OFFICE BOX 373
HONOLULU, HAWAII 96809

SEP 30 2014

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

JESSE SOUKI
FIRST DEPUTY DIRECTOR

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DEPUTY DIRECTOR - WATER

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ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

Office of Environmental Quality Control
Department of Health, State of Hawai'i
235 S. Beretania Street, Room 702
Honolulu, Hawai'i 96813
Attn: Jessica Wooley

FILE COPY
OCT 23 2014

OFFICE OF ENVIRONMENTAL
QUALITY CONTROL

14 OCT -2 18:17

RECEIVED

**Environmental Impact Statement Preparation Notice (EISPN)
for the Proposed Ala Wai Canal Project; Honolulu District,
Island of Oahu; Multiple Tax Map Keys (TMK) in Zone 2,
Sections 3-9 and Zone 3, Sections 1-4**

Dear Ms. Wooley:

Pursuant to Hawaii Revised Statutes (HRS) Chapter 343, the Department of Land and Natural Resources (DLNR) has determined at the outset that an Environmental Impact Statement (EIS) is required for the Ala Wai Canal Project, located in the Honolulu District of the Island of Oahu (multiple tax map keys [TMKs] within Zone 2, Sections 3-9, and Zone 3, Sections 1-4). With this letter, DLNR hereby transmits an EIS Preparation Notice (EISPN) for the project. In addition to the EISPN (two hard copies and one electronic copy), a completed publication form and a summary of the proposed action is enclosed (with a copy of the same sent via electronic mail to oeqc@doh.hawaii.gov).

Consistent with the requirements of Section 11-200-3, Hawaii Administrative Rules, and Section 11-200-15, Hawaii Administrative Rules, we request that you publish the public notice of this statutory determination in the next available issue of *The Environmental Notice*, thereby initiating a thirty-day public comment period during which the public may submit comments to the DLNR.

If there are any questions, please contact Gayson Ching of my staff at 587-0232.

Sincerely,


CARTY S. CHANG
Chief Engineer

DI/GC:

Enclosures

c: Lisa Kettley, CH2M HILL w/ attachments (CD not included)
Athline Clark, U.S Army Corps of Engineers w/ attachments (CD not included)

**AGENCY ACTIONS
HAWAII REVISED STATUTES (HRS) §343-5(B)
PUBLICATION FORM**

Project Name: Ala Wai Canal Project

Island: Oahu

District: Honolulu

TMK: Various TMKs in Zone 2, Sections 3-9 and Zone 3, Sections 1-4

Permits: Clean Water Act §404 compliance; National Environmental Policy Act (NEPA) compliance; National Historic Preservation Act (NHPA) §106 compliance; Coastal Zone Management Act (CZMA) compliance; Fish and Wildlife Coordination Act (FWCA) compliance; Request for Use of State Lands; Hawaii Revised Statutes (HRS) §343 compliance; Department of Health §401 Water Quality Certification; National Pollutant Discharge Elimination System (NPDES) permit; Conservation District Use Permit, Stream Channel Alteration Permit; HRS §6E Historic Preservation review; Special Management Area (SMA) permit; Waikiki Special District permit; Community Noise Permit; Grading and Building Permits

Proposing Agency: State of Hawaii
Department of Land and Natural Resources, Engineering Division
P.O. Box 373
Honolulu, Hawaii 96809
Attn: Gayson Ching
gayson.y.ching@hawaii.gov
(808) 587-0232

Accepting Authority: Governor, State of Hawaii

Consultant: CH2M HILL
1132 Bishop Street, Suite 1100
Honolulu, Hawaii 96813
Attn: Lisa Kettley

Status (check one only):

__DEA-AFNSI Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of DEA, a completed OEQC publication form, along with an electronic word processing summary and a PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov); a 30-day comment period ensues upon publication in the periodic bulletin.

__FEA-FONSI Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and a PDF copy (send both summary and PDF to oeqchawaii@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.

__FEA-EISPN Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov); a 30-day consultation period ensues upon publication in the periodic bulletin.

x Act 172-12 EISPN Submit the proposing agency notice of determination on agency letterhead, an OEQC publication form, and an electronic word processing summary (you may send the summary to oeqchawaii@doh.hawaii.gov). NO environmental assessment is required and a 30-day consultation period upon publication in the periodic bulletin.

__DEIS

The proposing agency simultaneously transmits to both the OEQC and the accepting authority, a hard copy of the DEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the DEIS (you may send both the summary and PDF to oeqchawaii@doh.hawaii.gov); a 45-day comment period ensues upon publication in the periodic bulletin.

__FEIS

The proposing agency simultaneously transmits to both the OEQC and the accepting authority, a hard copy of the FEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the FEIS (you may send both the summary and PDF to oeqchawaii@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.

__ Section 11-200-23
Determination

The accepting authority simultaneously transmits its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS to both OEQC and the proposing agency. No comment period ensues upon publication in the periodic bulletin.

__Section 11-200-27
Determination

The accepting authority simultaneously transmits its notice to both the proposing agency and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that a supplemental EIS is not required. No EA is required and no comment period ensues upon publication in the periodic bulletin.

__Withdrawal (explain)

Summary (Provide proposed action and purpose/need in less than 200 words. Please keep the summary brief and on this one page):

The State of Hawaii Department of Land and Natural Resources (DLNR) and the U.S. Army Corps of Engineers (USACE) are conducting a feasibility study to address flood risk associated with the Ala Wai Canal and its contributing watershed, including Makiki, Manoa and Palolo Streams. The Ala Wai watershed is the most densely populated watershed in Hawaii; in addition to residential, commercial, and institutional development, the watershed also includes the Waikiki District, a prime tourist destination and economic engine of the State. It is estimated that the Canal has the capacity to contain about a 20- to 10-percent chance (5- to 10-year) flood before overtopping the banks; overtopping of the Canal has previously caused flooding in Waikiki multiple times. Upstream areas are also at risk of flooding, as demonstrated by an October 2004 storm in Manoa, which caused an estimated \$85 million in damages. Initial modeling efforts indicate that the 1-percent chance (100-year) flood would result in damages to more than 3,000 structures throughout the watershed, with property damages exceeding \$311 million (based on 2009 price levels).

The objective of the project is to reduce riverine flood hazards to property and life safety in the Ala Wai watershed. In response to identified flood-related problems and opportunities, a variety of measures were identified. These measures were combined into a range of alternatives, which were evaluated through an iterative screening and reformulation process, resulting in identification of a Tentatively Selected Plan (TSP). The TSP involves construction of (1) a series of in-stream detention basins in the upper reaches of Makiki, Manoa and Palolo streams, (2) additional detention basins adjacent to the Ala Wai Canal, (3) debris catchment in portions of the developed watershed, (4) floodwalls along the Ala Wai Canal and (5) various non-structural measures (e.g., floodproofing). Given the scope and scale of the measures being considered, it is expected that implementation of the TSP will result in unavoidable adverse impacts. As such, it has been determined that an Environmental Impact Statement (EIS) will be required. The EIS will describe the TSP (proposed action) and the range of reasonable alternatives, and will address the potential for direct, indirect, and cumulative effects on the human, natural, and cultural environment; mitigation measures that avoid or minimize the potential adverse effects will also be identified. Pursuant to Hawaii Revised Statutes (HRS) Chapter 343, an EIS Preparation Notice (EISPN) has been prepared to inform interested parties of the project, and to seek input on issues or resources of concern that should be addressed in the EIS.

Environmental Impact Statement Preparation Notice (EISPN)

Ala Wai Canal Project

Honolulu, Hawaii

This document has been prepared pursuant to Hawaii Revised Statutes (HRS) Chapter 343 and
Hawaii Administrative Rules (HAR) Title 11 Chapter 200

Submitted by:

State of Hawaii
Department of Land and Natural Resources
Engineering Division

Prepared by:

CH2M HILL
1132 Bishop Street, Suite 1100
Honolulu, Hawaii

September 2014

Project Summary

Project Name	Ala Wai Canal Project; Honolulu, Hawaii
Study Authority	Section 209 of the Flood Control Act of 1962 (Public Law 87-874)
Project Sponsors	U.S. Army Corps of Engineers State of Hawaii Department of Land and Natural Resources (DLNR), Engineering Division
Actions Triggering Environmental Review Under HRS Chapter 343	Use of State and/or County lands or funds; Use of land within conservation district; Use within historic site as designated in the National Register or Hawaii Register; Use within the Waikiki Special District
Type of Document	Environmental Impact Statement Preparation Notice (EISPN)
Proposing Agency ¹	State of Hawaii DLNR, Engineering Division
Accepting Authority	Governor, State of Hawaii
Proposed Action	Implementation of various flood reduction measures within the Ala Wai watershed
Tax Map Key	Various TMKs in Zone 2, Sections 3-9 and Zone 3, Sections 1-4
Project Summary	<p>The Ala Wai watershed is the most densely populated watershed in Hawaii; in addition to various residential, commercial, and institutional development, the watershed also includes the Waikiki District, a prime tourist destination and economic engine of the State. It is estimated that the Ala Wai Canal has the capacity to contain about a 20- to 10-percent chance (5- to 10-year) flood before overtopping the banks; overtopping of the Canal has previously caused flooding in Waikiki multiple times. Upstream areas are also at risk of flooding, as demonstrated by an October 2004 storm in Manoa, which caused an estimated \$85 million in damages to property. Initial modeling efforts indicate that the 1-percent chance (100-year) flood would result in damages to more than 3,000 structures throughout the watershed, with property damages exceeding \$311 million (based on 2009 price levels).</p> <p>The objective of the project is to reduce riverine flood hazards to property and life safety in the Ala Wai watershed. In response to identified flood-related problems and opportunities, a variety of measures were identified. These measures were combined into a range of alternatives, which were evaluated through an iterative screening and reformulation process, resulting in identification of a Tentatively Selected Plan (TSP). The TSP involves construction of (1) a series of in-stream detention basins in the upper reaches of Makiki, Manoa and Palolo streams, (2) off-stream detention basins in the middle and lower portions of the watershed, (3) debris catchment features, (4) floodwalls along the Ala Wai Canal and (5) non-structural measures (e.g., floodproofing).</p>
Determination	Given the scope and scale of the measures being considered for implementation, it is expected that the project will result in significant impacts to the natural and human environment. Pursuant to HRS §343-5, it has been determined at the outset that an Environmental Impact Statement (EIS) is required for the project. The EIS will also jointly serve to comply with requirements of the National Environmental Policy Act (NEPA).
Anticipated Permit Requirements	Clean Water Act §404 compliance; National Environmental Policy Act (NEPA) compliance; National Historic Preservation Act (NHPA) §106 compliance; Coastal Zone Management Act (CZMA) compliance; Fish and Wildlife Coordination Act (FWCA) compliance; Request for Use of State Lands; Hawaii Revised Statutes (HRS) §343 compliance; Department of Health §401 Water Quality Certification; National Pollutant Discharge Elimination System (NPDES) permit; Conservation District Use Permit, Stream Channel Alteration Permit; HRS §6E Historic Preservation review; Special Management Area (SMA) permit; Waikiki Special District permit; Community Noise Permit; Building and Grading Permits

NOTES:

¹ DLNR (Engineering Division) is the proposing agency for the purposes of compliance with HRS Chapter 343.

This Environmental Impact Statement Preparation Notice (EISPN) has been prepared in accordance with Hawaii Revised Statutes (HRS) Chapter 343 and Title 11, Chapter 200 of the Hawaii Administrative Rules (HAR). Act 172, enacted by the Governor on June 27, 2012, allows an agency to determine that an environmental impact statement (EIS) is required, thereby choosing to not prepare an environmental assessment (EA) and instead proceed directly to preparation of an EIS, beginning with an EIS Preparation Notice (EISPN) as provided by the rules. HAR 11-200-11.2 states that if the proposing agency determines that a proposed action may have a significant effect, it shall issue a notice of determination, which shall be an EISPN; the notice of determination shall indicate in a concise manner: (1) identification of applicant or proposing agency; (2) identification of accepting authority; (3) brief description of proposed action; (4) determination; (5) reasons supporting determination; and (6) name, address, and phone number of contact person for further information.

An EISPN was previously issued for this project in 2004. Given the amount of time that has elapsed and changes in the project scope, an updated EISPN is being issued. The intent of this EISPN is to inform interested parties of the project, and to seek agency and public input on issues or resources of concern. Input received as a result of the EISPN, in combination with other input received to date, will be considered as part of the development of the EIS. The EIS will present the proposed action (and the range of reasonable alternatives) and will address the potential for direct, indirect, and cumulative effects on the natural and human environment; mitigation measures that avoid or minimize the potential adverse effects of the project will also be identified. In addition to fulfilling requirements for compliance with HRS Chapter 343, the Draft EIS will also jointly serve to comply with the National Environmental Policy Act (NEPA).¹

Comments on this EISPN may be submitted during a 30-day comment period (October 23, 2014 – November 24, 2014); comments must be postmarked by November 24, 2014 in order to be considered as part of preparation of the Draft EIS. Please submit comments to the following addresses:

State of Hawaii, Department of Land and Natural Resources
Engineering Division
P.O. Box 373
Honolulu, Hawaii 96809
Attention: Gayson Ching
gayson.y.ching@hawaii.gov

CH2M HILL
1132 Bishop Street, Suite 1100
Honolulu, Hawaii 96813
Attention: Lisa Kettley
lisa.kettley@ch2m.com

For further information on the project, please contact Athline Clark at the U.S. Army Corps of Engineers (USACE), (808) 835-4032 or Athline.M.Clark@usace.army.mil.

¹ A Notice of Intent (NOI) for the project was published in the Federal Register on June 14, 2004 (FR 69:113(32996-320997) with a supplemental NOI published on October 2, 2008 [FR 73:192 (57339-57340)] to address changes in scope. Additional changes in scope will be addressed through an updated NOI, as necessary.

Introduction

At the request of the State of Hawaii Department of Land and Natural Resources (DLNR), the U.S. Army Corps of Engineers (USACE) is conducting a feasibility study for the Ala Wai Canal Project² (hereafter referred to as “the project”). The project is being investigated under the authority of Section 209 of the Flood Control Act of 1962 (Public Law 87-874). Section 209 is a general authority that authorizes surveys in harbors and rivers in Hawaii “with a view to determining the advisability of improvements in the interest of navigation, flood control, hydroelectric power development, water supply, and other beneficial water uses, and related land resources.”

Study Purpose

The Ala Wai watershed is comprised of approximately 19 square miles (12,064 acres) on the southeastern side of the island of Oahu in the State of Hawaii (Figure 1).³ It includes Makiki, Manoa, and Palolo streams, all of which drain to the Ala Wai Canal, a 2-mile-long, man-made waterway constructed during the 1920s to drain extensive coastal wetlands. This construction and subsequent draining allowed the development of the Waikiki District.

The study area, which contains more than 160,000 residents, is the most densely populated watershed in Hawaii. The upper portion of the watershed (approximately 7.5 square miles or 40% of the watershed) is zoned as Conservation District, which is intended to protect natural and cultural resources including the island’s aquifer. The remaining approximately 11 square miles of the middle and lower watershed is heavily urbanized, supporting a high density of single-family residences, condominiums, hotels and businesses, as well as approximately 40 public and private schools, including University of Hawaii at Manoa (UH), the largest university in the State. Within this urban footprint, the population density is one of the highest in the nation (Fulton, 2001). In addition to a range of residential, commercial, and institutional development, the watershed includes the Waikiki District, a prime tourist destination that attracts more than 79,000 visitors per day. In large part because of the tourism industry, Waikiki is the primary economic engine for the State, providing 7 percent of the gross domestic product, 7 percent of the civilian jobs in the State, and 9 percent of the State tax revenue (DBEDT, 2013).

It is estimated that the Ala Wai Canal has the capacity to contain about a 20- to 10-percent chance (5- to 10-year) flood before overtopping the banks. Overtopping of the Canal has caused flooding in Waikiki multiple times, including during the November 1965 and December 1967 storms and during the passage of Hurricane Iniki in 1992. Upstream areas are also at risk of flooding, as demonstrated by the October 2004 storm in Manoa Valley, which was estimated to have caused over \$85 million in damages to property, including loss of irreplaceable documents stored in Hamilton Library at the University of Hawaii (UH) (USACE, 2006). Initial modeling efforts indicate that the 1-percent chance (100-year) flood would result in damages to more than 3,000 structures throughout the watershed, with approximately \$311 million in property damage alone (at a October 2009 price level). Figure 2 provides an outline of the study area with anticipated flooding during a 1-percent chance (100-year) flood event under the existing (without-project) conditions.

The purpose of the project is to reduce overall flood risk, consistent with the project goals and objectives and within the authorities of the USACE Civil Works program. Specifically, the project objective is to reduce riverine flood hazards to property and life safety in the Ala Wai watershed, including (1) improved water conveyance; (2) environmentally sustainable design for flood risk management features, where practicable; and (3) integration of non-structural approaches, where practicable.

² The project has also previously been referred to as the “Ala Wai Watershed Project”; for consistency with the congressional documentation, the project will continue to be referred to as the “Ala Wai Canal Project.”

³ Approximately 16 mi² of the study area drains to the Ala Wai Canal; the remaining 3 mi² drains to the ocean, but is included in the study area based on the State of Hawaii’s delineation of watershed unit boundaries.

Study Background and History

In response to a request from DLNR, the reconnaissance phase of the Ala Wai Canal Project was initiated in April 1999. At that time, Federal, State, and local agencies sought a comprehensive management and restoration plan to restore aquatic habitat and biological diversity in the Canal and upstream tributaries. The reconnaissance report was submitted in August 1999 and recommended that the USACE assist the State with restoration of the Canal. Approval by USACE for continuation into the feasibility phase was granted in September 1999.

Independently, the Ala Wai Flood Study was initiated in September 1998 under the Planning Assistance to States (PAS) Program (Section 22 of the Water Resources Development Act of 1974) to determine the potential flood risk to the Waikiki area, in response to a request by the Land Division of DLNR. The study was completed in October 2001 and documented a high flood hazard associated with potential overtopping of the Ala Wai Canal. This study identified several mitigative measures and conceptual alternatives that could potentially minimize flood damages to Waikiki and surrounding area. The results of this technical study were used to establish that the USACE could be involved in the investigation of flood damage reduction in the Canal. As a result, a flood risk management objective was added to the Ala Wai Canal Project, thus expanding the project focus to both ecosystem restoration and flood risk management in the Canal area.

The FCSA was executed between USACE and the non-Federal sponsor, DLNR Engineering Division, in 2001. The feasibility phase of the project was initiated in July 2002, and an EIS scoping meeting was held in June 2004. Subsequently, in October 2004, heavy rains caused Manoa Stream to overtop its banks, resulting in significant damages. In response, the USACE temporarily ceased work on the feasibility study, such that the project could be expanded to include the upstream portions of the Ala Wai watershed. While the cost-share agreement was being amended to address a more comprehensive scope, the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) received federal funds to identify specific actions to address flooding in Manoa Valley. The Manoa Watershed Project was initiated in 2006 and resulted in detailed topographic mapping, hydrologic and hydraulic modeling, and identification of potential measures to address specific flood problems.⁴ However, because of insufficient federal funding to complete the project, the Manoa Watershed Project was terminated before implementation.

Information developed through the Manoa Watershed Project was subsequently incorporated into the Ala Wai Canal Project, which was re-started in 2007. A second EIS scoping meeting was held in October 2008. Since this time, project-related efforts have been primarily focused on bringing the technical information for the entire watershed up to the same level of detail as produced for Manoa under the Manoa Watershed Project.

In 2012, as part of the USACE Civil Works Planning Modernization process, a re-scoping charette was held for the project.⁵ Based on the project review at the re-scoping charette, ecosystem restoration was removed from the study objectives, as it was determined that the biological resources within the watershed do not have enough national significance to adequately justify an ecosystem restoration objective. However, recognizing the regional and local value of the stream-related resources, all flood risk management measures will be designed as innovative, environmentally sound solutions, with impacts avoided and minimized to the full extent practicable, in compliance with existing laws, USACE regulations and policies. Based on the previously identified problems and opportunities related to ecosystem resources within the watershed, these efforts will focus on maintaining suitable habitat and migratory pathways for endemic gobies (*o'opu*), shrimp (*opae*) and mollusk species (*hapawai and hihiwai*), as well as reduction of erosion and sedimentation.

⁴ This work was conducted by the USACE on behalf of NRCS via a Support Agreement in compliance with a Memorandum of Agreement between USACE and USDA, pursuant to the Economy in Government Act (31 USC S. 1535.).

⁵ The purpose of the re-scoping charette was to reach consensus on the actions needed to complete the project on budget and schedule, including a clear path for identification of the TSP. Participants included the project delivery team, USACE Division and Headquarters staff, and cooperating agency representatives.

Description of Proposed Project

General investigations, such as those carried out under Section 209 of the Flood Control Act of 1962, are funded by specific appropriations and are conducted through a feasibility phase. The results of the feasibility phase are presented in a feasibility report, which in the case of this project will be integrated with the required federal and state environmental review documentation (i.e. Integrated Feasibility Report and EIS). This documentation is used to seek congressional authorization and funding, as needed to proceed to the construction phase. Once authorized and funded, the USACE can provide assistance through construction; operations and maintenance (O&M) are the responsibility of the non-Federal sponsor.

The project is currently in the feasibility phase of this process; the feasibility phase is comprised of six steps, as specified by the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (Principles and Guidelines [P&G]) (U.S. Water Resources Council, 1983) and USACE planning regulations and guidance, including Engineer Regulation (ER) 1105-2-100 "Planning Guidance Notebook" (USACE, 2000). These steps include identification of the problems and opportunities; inventorying of watershed conditions; formulation, evaluation and comparison of alternatives; and finally, selection of an alternative for implementation. Following is a summary of the preliminary results of this process, including a brief description of the final array of alternatives that were considered and the alternative that has been tentatively selected for implementation. Additional detail and further refinements will be provided in the Integrated Feasibility Report and EIS.

Flood Risk Management Measures

In response to the flood-related problems and opportunities within the watershed, a variety of structural and non-structural measures were identified, with a focus on the following approaches to flood risk management: (1) peak flow reduction, (2) increased channel capacity, (3) debris management, and (4) minimization of flood damages. The measures are generally based on the concepts developed in support of the Ala Wai Flood Study (USACE, 2006) and the Manoa Watershed Project (Oceanit, 2008).

The conceptual measures were screened against a set of project-specific criteria, including technical feasibility, availability of land, implementation costs, O&M requirements, legal and public acceptability, flood risk reduction, and life safety risks. Through the screening process, some measures were eliminated while others were carried forward and further refined; this process incorporated the range of agency and public input obtained through scoping efforts and other stakeholder engagement activities conducted to date. The resulting set of measures is described below.

Detention Basins

In general, the detention basins are designed to temporarily detain water, so as to delay the surge of storm flows into the stream. The detention basins have been conceptualized to be located either within a stream channel or in an open space area directly adjacent to a stream/canal, as further described below.

In-stream detention basins: The in-stream detention basins would be comprised of an earthen berm that extends perpendicularly across a stream channel that would, in combination with the natural topography, provide temporary containment of storm flows. The basins would not be designed to permanently contain water; they would include a culvert that would maintain passage of low flows and also allow the basin to completely drain into the stream as flood conditions subside. An emergency spillway would allow water to overflow the berm in the event the capacity of the detention basin is exceeded. Debris catchment structures would be incorporated as part of each measure, and would function to capture large in-stream debris. To facilitate safe operation and maintenance of each basin, the area surrounding the berm would be kept clear of woody vegetation.

In-stream detention basins were generally considered for areas that have sufficient open space and appropriate topography to capture and detain peak flows; specific locations that have been considered are listed below.

- Waihi Stream, in the upper Manoa watershed
- Waiakeakua Stream, in the upper Manoa watershed
- Woodlawn Ditch, below Manoa Chinese Cemetery
- Waiomao Stream, in the upper Palolo watershed
- Pukele Stream, in the upper Palolo watershed
- Makiki Stream, above the Board of Water Supply station near Makiki Heights Drive
- Kanaha Ditch, above Roosevelt High School in Makiki
- Husten Ditch, at Ala Wai Park

Off-stream detention basins: These basins would function similarly to the in-stream detention basins, but would be formed by construction of a berm around the perimeter of a nearby open space; stream flows would be directed into the detention basin, then back into the stream, either via a spillway along the stream bank or a culvert. Where possible, these basins would be designed to be multi-purpose; for example, the berms may serve as seating for recreational activities during non-flood conditions.

Off-stream detention basins have been considered in the following locations within the watershed:

- Manoa Stream, at Manoa District Park (near East Manoa Road)
- Manoa Stream, at Kanewai Park (near Dole Street at the University of Hawaii)
- Ala Wai Canal, at the Ala Wai golf course (near Kapahulu Avenue)
- Husten Ditch, on the north side of Ala Wai Canal (near the Marco Polo apartments)

In each location, the detention basin measure would include a temporary staging area, for use during construction. In addition, the measure would include some form of permanent access that would be used both for construction and long-term O&M. These features would utilize existing access corridors and/or other disturbed areas, to the extent possible.

Debris Catchment

As described above, the in-stream detention basins would include a debris catchment feature. In addition, debris catchment structures are also being considered as stand-alone measures; these structures would generally consist of a narrow concrete pad that would span the stream, with evenly-spaced steel posts. They would allow stream flows to pass, while functioning to block large debris as it flows downstream. Similar to the in-stream detention basins, the area surrounding the catchment structure would be kept clear of woody vegetation to facilitate safe O&M activities.

These structures would generally be located in the upper watershed (as part of alternatives that do not include upper watershed detention basins) or in the urbanized mid-reaches of the watershed (either in combination with an off-stream detention basin, or in key locations where debris loading is an identified problem). General locations that have been considered include those listed below.

- Waihi Stream, in the upper Manoa watershed
- Waiakeakua Stream, in the upper Manoa watershed
- Manoa Stream, at Manoa District Park
- Manoa Stream, near the Manoa Innovation Center (near Woodlawn Drive)
- Waiomao Stream, in the upper Palolo watershed
- Pukele Stream, in the upper Palolo watershed

Similar to the detention basins, these measures would include areas for temporary staging during construction and permanent access for long-term O&M.

Floodwalls

This measure would involve the construction of floodwalls that would function to increase channel capacity. The floodwalls would generally be located along reaches that have already been channelized and have

sufficient space to accommodate access and construction activities. They would be comprised of reinforced concrete walls and/or earthen berms and would be set back a minimal distance from the existing channel as needed. Local drainage patterns would be maintained to the extent possible, with flapgates and pumps incorporated where necessary.

General locations that were considered include those listed below.

- Manoa-Palolo Drainage Canal, between the confluence with the Ala Wai Canal and Date Street
- Ala Wai Canal, between Kapahulu Avenue and the Ala Moana Boulevard Bridge

These measures are expected to include areas for temporary staging during construction; construction and O&M access would likely be available via existing access corridors.

Non-structural Measures (Floodproofing)

Non-structural measures generally involve the use of knowledge, practices or agreements to change a condition, such as through policies and laws. These may also include efforts such as improved flood warning, greater communication of flood risks, and tools or incentives to property owners to help protect their property (such as flood insurance). Non-structural measures that have been identified as feasible options for this project include improvements to the flood warning system and floodproofing of key infrastructure that is currently vulnerable to flooding.

Alternatives Formulation

The measures described above were combined into an initial set of alternatives to address the identified flood risk problems. In general, the alternative formulation process incorporated the following flood risk reduction strategies:

- Attenuation of water where the highest volume of peak flows occur (i.e. upper reaches of Manoa and Palolo streams)
- Attenuation of water within the currently developed portions of the watershed
- Focusing solutions where the majority of the flood risk occurs (i.e. lower portions of the watershed, particularly Waikiki)

Each alternative was formulated such that flood risk reduction would be provided throughout the watershed, with variations in terms of the specific type or location of flood management measures.⁶ The alternatives all include debris catchment in the upper portions of the watershed (either as part of a detention basin or as a stand-alone measure), as debris is recognized as an important factor in the existing flood risk. In addition, all of the alternatives include floodwalls to reduce flooding in the lower portions of the watershed (i.e. in the Ala Wai/Waikiki area), as modeling results indicate that upstream measures alone do not adequately reduce flood risk in the lower portions of the watershed. Non-structural measures are also included as a component of each alternative, where feasible.

The initial array of alternative plans were iteratively screened and reformulated; this process incorporated the same criteria that were used for screening of the management measures (i.e., technical feasibility, availability of land, implementation costs, O&M requirements, legal and public acceptability, flood risk reduction, and life safety risks). Through this process, a final array of alternatives was identified. The final array is comprised of two alternatives - Alternatives 2A and 3A; the conceptual measures in each alternative are listed in Table 1. These two alternatives were evaluated and compared based on the above-listed set of criteria, leading to identification of Alternative 3A as the TSP. The measures in Alternative 3A are shown in Figure 3. A detailed discussion of the alternatives formulation process, the alternatives in the final array, and additional refinements to the TSP will be presented in the Integrated Feasibility Report and EIS.

⁶ In parallel with the project, DLNR is also proceeding with implementation of the Woodlawn Bridge chute structure, which will function to increase the channel capacity at Woodlawn Bridge.

TABLE 1. Summary of Management Measures Included in Final Array of Alternatives

Measure	Location	Alternative		Brief Description of Conceptual Measure	
		2A	3A		
Manoa	Detention and debris basin	Waiakeakua Stream		x	Earthen berm, approximately 20' high and 185' across; arch culvert to allow small storm flows to pass; concrete spillway above culvert, with riprap on downstream edge; 20-foot-wide perimeter to be maintained as cleared around perimeter of berm
	Detention and debris basin	Waihi Stream		x	Earthen berm, approximately 24' high and 225' across; arch culvert to allow small storm flows to pass; concrete spillway above culvert, with riprap on downstream edge; 20-foot-wide perimeter to be maintained as cleared around perimeter of berm
	Debris catchment	Waiakeakua Stream	x		Concrete pad, approximately 8' wide and 140' across; steel posts (up to approximately 7' high) evenly spaced along concrete pad
	Debris catchment	Waihi Stream	x		Concrete pad, approximately 8' wide and 140' across; steel posts (up to approximately 7' high) evenly spaced along concrete pad
	Detention basin	Woodlawn Ditch, below cemetery	x	x	Three-sided berm, approximately 20' high; arch culvert to allow small storm flows to pass; concrete spillway above culvert, with riprap on downstream edge; 20-foot-wide perimeter to be maintained as cleared around perimeter of berm
	In-stream debris catchment	Po'elua Place	x		Basin with small berm and debris catcher to capture debris on east side of stream; grate with inlet to culvert for delivery of water to Manoa District Park detention basin; requires acquisition of residential lot
	Debris catchment	Near Manoa District Park		x	Concrete pad, approximately 8' wide and 60' across; steel posts (up to approximately 7' high) evenly spaced along concrete pad
	Multi-purpose detention basin	Manoa District Park	x		Earthen berm (approximately 13 feet high) around 3 sides of Manoa Park; intake pipe from Poelua Place to bubble-up structure in detention area; concrete outlet to release water back to stream
	In-stream debris catchment	Innovation Center	x		Acquisition of residential property; lower grade to allow high flows across site; debris catchment structures installed along edge to catch debris as flows re-enter stream
	Multi-purpose detention basin	Kanewai Park	x	x	Earthen berm (approximately 7' high) around 3 sides of field; spillway on northwest end that allows high flows to enter basin; drainage pipe at south end to allow water to re-enter stream
Nonstructural	Kanewai Park and UH	x		Non-structural candidates include 2 commercial/institutional buildings; these would involve a ring wall around a UH classroom building and elevating a Kanewai Park storage building	
Palolo	Detention and debris basin	Waiomao Stream		x	Earthen berm, approximately 24' high and 120' across; arch culvert to allow small storm flows to pass; concrete spillway above culvert, with riprap on downstream edge; 20-foot-wide perimeter to be maintained as cleared around perimeter of berm; excavation of approximately 1,500,000 cubic feet to provide required volume
	Debris catchment	Waiomao Stream	x		Concrete pad, approximately 8' wide and 50' across; steel posts (up to approximately 7' high) evenly spaced along concrete pad
	Detention and debris basin	Pukele Stream		x	Earthen berm, approximately 24' high and 120' across; arch culvert to allow small storm flows to pass; concrete spillway above culvert, with riprap on downstream edge; 20-foot-wide perimeter to be maintained as cleared around perimeter of berm
	Debris catchment	Pukele Stream	x		Concrete pad, approximately 8' wide and 25' across; steel posts (up to approximately 7' high) evenly spaced along concrete pad
	Floodwalls	Manoa-Palolo Drainage Canal	x		Add floodwalls along the right bank of the canal up to Date Street

Measure	Location	Alternative		Brief Description of Conceptual Measure	
		2A	3A		
Makiki	Detention basin	Upstream of Makiki Pumping Station	x	x	Earthen berm, approximately 24' high and 125' across; arch culvert to allow small storm flows to pass; concrete spillway above culvert, with riprap on downstream edge; 20-foot-wide perimeter to be maintained as cleared around perimeter of berm
	Detention basin	Roosevelt High School	x		Earthen berm, approximately 22' high and 260' across; arch culvert to allow small storm flows to pass; concrete spillway, with riprap on downstream edge; 20-foot-wide perimeter to be maintained as cleared around perimeter of berm
Ala Wai	Floodwalls	Both sides of canal	x	x	Add floodwalls along Ala Wai Canal; concrete walls and/or earthen berms, up to 5 feet high
	Multi-purpose detention basin	Golf course	x	x	Earthen berm (up to approximately 7' high) around outside perimeter of golf course property; passive drainage back into Ala Wai Canal
	Detention basin	Hausten Ditch	x	x	Add floodwalls and earthen berm (approximately 4' high) to increase capacity and provide detention for local drainage; install sluice gates at existing bridge to control flow of floodwaters between Hasten Ditch and Ala Wai Canal

Determination and Supporting Rationale

Pursuant to HAR §11-200-12, the determination of whether a proposed action would have a significant impact on the environment should be based on an evaluation of the expected consequences of the action, including the overall and cumulative effects, relative to the following significance criteria:

- Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;
- Curtails the range of beneficial uses of the environment;
- Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders;
- Substantially affects the economic welfare, social welfare, and cultural practices of the community or State;
- Substantially affects public health;
- Involves substantial secondary impacts, such as population changes or effects on public facilities;
- Involves a substantial degradation of environmental quality;
- Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions;
- Substantially affects a rare, threatened, or endangered species, or its habitat;
- Detrimentially affects air or water quality or ambient noise levels;
- Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;
- Substantially affects scenic vistas and viewplanes identified in county or state plans or studies; or,
- Requires substantial energy consumption.

Based on the established significance criteria, the scope and scale of the flood management measures being considered, and input received via scoping and stakeholder engagement efforts to date, it is anticipated that the proposed action may result in significant impacts to the natural and/or human environment. Therefore, pursuant to HRS §343-5, it has been determined from the outset that an EIS is required for the project.

The Integrated Feasibility Report and EIS will report the results of the feasibility study, including a detailed description of the TSP (proposed action), as well as alternatives that were considered through the

alternatives screening and formulation process. The potential for direct, indirect, and cumulative effects on the natural and human environment will also be addressed; mitigation measures that avoid or minimize the potential adverse effects of the project will also be identified. The following resource categories have been tentatively identified for consideration in the Integrated Feasibility Report and EIS:

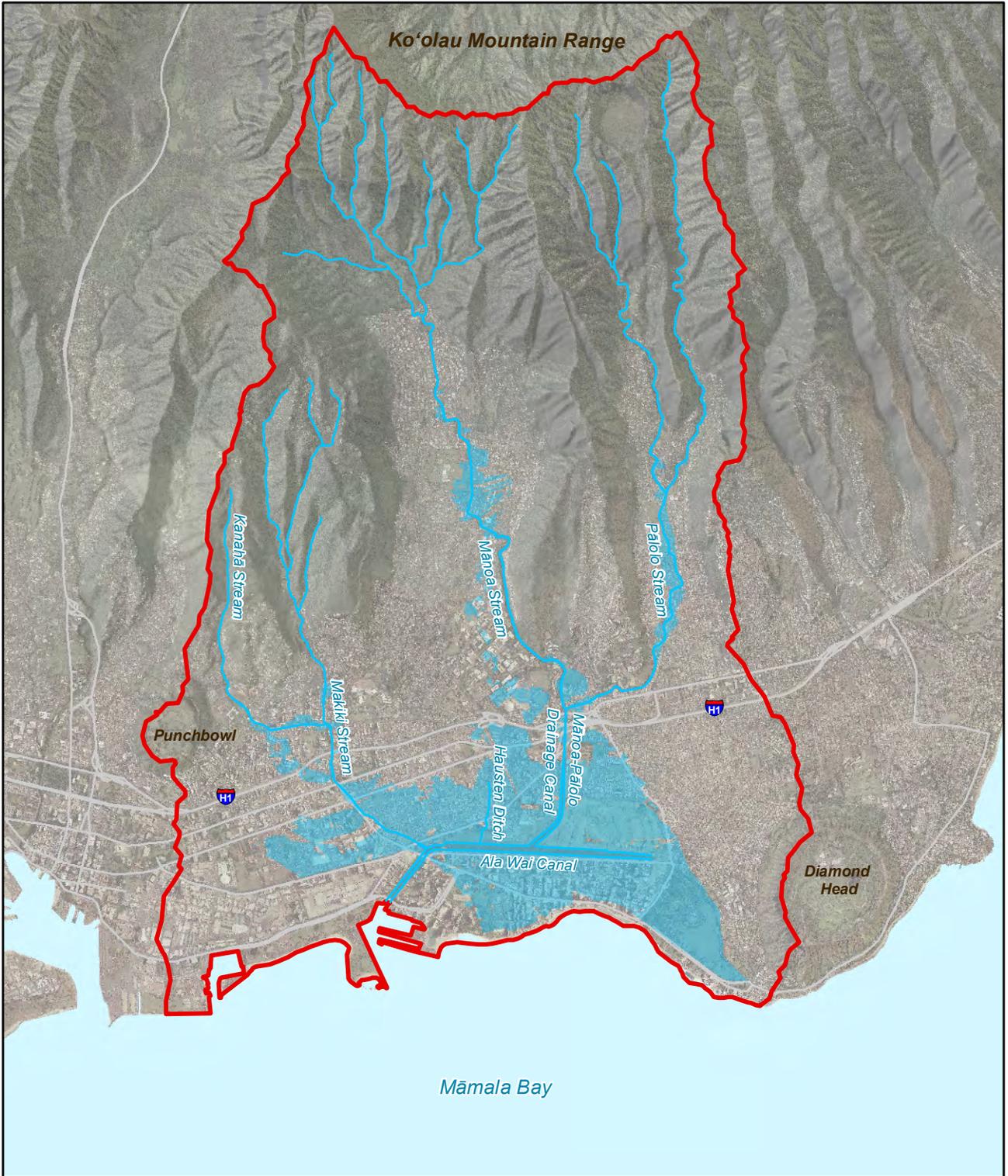
- Climate
- Air Quality
- Land Use
- Geology and Soils
- Water Resources
- Water Quality
- Hazardous and Toxic Waste
- Biological Resources
- Archaeological, Cultural and Historic Resources
- Socioeconomics and Environmental Justice
- Recreational Resources
- Visual Resources
- Noise
- Public Health and Safety
- Transportation and Traffic
- Public Services and Utilities

Figures

- Figure 1 Overview of the Ala Wai Watershed
- Figure 2 1-Percent Chance (100-Year) Flood Inundation Map
- Figure 3 Alternative 3A (Tentatively Selected Plan)

References

- DBEDT (State of Hawaii, Department of Business Economic Development and Tourism). 2013. Economic Contribution of Waikiki. May.
- Fulton, W., R. Pendall, M. Nguyen and A. Harrison. 2001. "Who Sprawls Most? How Growth Patterns Differ Across the U.S." Center on Urban & Metropolitan Policy. The Brookings Institution. July.
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- U.S. Water Resources Council. 1983. Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. March 10.
- USACE (U.S. Army Corps of Engineers). 2000. "Planning Guidance Notebook." Engineer Regulation 1105-2-100. April 22.
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LEGEND

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

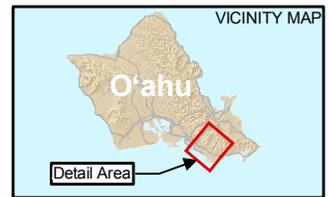


FIGURE 2
1-Percent Chance (100-Year)
Flood Inundation Map
 Ala Wai Watershed Project
 O'ahu, Hawai'i

ALA WAI CANAL PROJECT ALTERNATIVE 3A

(Conceptual, with potential variations)

Waiakeakua Debris/
Detention Basin

Waihi Debris/
Detention Basin

Pukele Debris/
Detention Basin

Waiomao Debris/
Detention Basin

Woodlawn
Detention Basin

Manoa In-Stream
Debris Catchment

PALOLO VALLEY
DISTRICT PARK

Makiki Debris/
Detention Basin

Kanewai Field
Detention Basin

ROOSEVELT
HIGH SCHOOL

UNIVERSITY
OF HAWAII
AT MANOA

Waiālae Avenue
H-1 Freeway

Hausten Ditch
Detention Basin

ALA WAI
GOLF COURSE

Ala Wai Golf Course
Detention Basin

Ala Wai Canal
Floodwalls

ALA MOANA
BEACH PARK

KAPIOLANI
PARK

