Final Independent External Peer Review Report Ala Wai Canal Project, Island of O'ahu, Hawai'i, Feasibility Study with Integrated Environmental Impact Statement

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
Flood Risk Management Planning Center of Expertise
Baltimore District

Contract No. W912HQ-15-D-0001
Task Order: 0005

December 9, 2015

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Executive Summary

PROJECT BACKGROUND AND PURPOSE

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). Section 209 is a general authority that authorizes surveys in harbors and rivers in Hawai'i "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." The project is currently in the feasibility phase, resulting in a feasibility study (FS) report and integrated environmental impact statement (EIS) that will be signed by the Chief of Engineers. If the FS report results in a positive determination recommending implementation of a preferred alternative, Congressional authorization will be needed before the project may proceed to construction. The non-Federal sponsor for this project is the State of Hawai'i, as represented by the Department of Land and Natural Resources (DLNR). Through a separate Memorandum of Agreement with DLNR, the City and County of Honolulu (C&C) is also providing cash and work-in-kind support to earlier phases of this project. The C&C is represented by the Department of Environmental Services (DES).

The Ala Wai watershed is located on the southeastern side of the island of O'ahu, Hawai'i. The watershed is 19 square miles and encompasses three sub-watersheds: Makiki, Manoa, and Palolo. There are three perennial streams and two canals in the watershed. The study area is the most densely populated watershed in Hawai'i with approximately 200,000 residents. Within the urban footprint, the population density is one of the highest in the nation with 12.36 persons per urbanized acre. Waikiki District, within the watershed, is the primary economic engine for the State, providing 7 percent of the gross state product, 7 percent of the civilian jobs in the state, and 9 percent of the state and county tax revenue. Waikiki has over 79,000 visitors a day.

The watershed includes upper, middle, and lower sub-watersheds. The upper watershed (7.5 square miles, or 40 percent of the watershed) is zoned as Conservation District to protect the island's aquifer. Approximately 11 square miles of the middle and lower watershed is urbanized, supporting 1,600 businesses, 21 public schools, 17 private schools and two universities, including the University of Hawai'i at Manoa, the largest university in the state. Approximately 53 parks of varying sizes occur throughout the urbanized watershed. The parks provide for water-based activities, nature-based activities, sports activities, and interpretive activities. Offshore of Waikiki are two state-designated Fishery Management Areas (FMAs), a Marine Life Conservation District (MLCD), and the Hawaiian Humpback Whale National Marine Sanctuary.

Hawai'i streams are flashy by nature. Within the study area, rain often starts in the mountainous areas of the upper watershed, with little precipitation in the lower elevations. The peak flow rate from mountains to sea is approximately 30 minutes. Storms typically last for 24 hours or less. With the sudden nature of the

flood events and the associated high velocities, floods within the watershed threaten life safety and may result in significant damages. Rarely does the watershed experience long periods of standing water from a flood event. When heavy rains do occur over multiple days, standing flood waters become a problem. Based on U.S. Army Corps of Engineers (USACE) hydrology and hydraulic modeling, the majority of the peak flow is from the Manoa Stream, with Palolo Stream being the second highest contributor and Makiki Stream the third.

Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. USACE is conducting an Independent External Peer Review (IEPR) of the Ala Wai Canal Project, Island of O'ahu, Hawai'i, Feasibility Study with Integrated Environmental Impact Statement (hereinafter: Ala Wai Canal IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2012). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate the IEPR of the Ala Wai Canal. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2012) and OMB (2004). This final report presents the Final Panel Comments of the IEPR Panel (the Panel). Details regarding the IEPR (including the process for selecting panel members, the panel members' biographical information and expertise, and the charge submitted to the Panel to guide its review) are presented in appendices.

Based on the technical content of the Ala Wai Canal review documents and the overall scope of the project, Battelle identified potential candidates for the Panel in the following key technical areas: Civil Works planning/economics, hydraulic and hydrology engineering, structural/civil engineering, and environmental law compliance/biological and cultural resources. Battelle screened the candidates to identify those most closely meeting the selection criteria and evaluated them for COIs and availability. USACE was given the list of final candidates to confirm that they had no COIs, but Battelle made the final selection of the four-person Panel.

The Panel received electronic versions of the Ala Wai Canal review documents (1,890 pages in total), along with a charge that solicited comments on specific sections of the documents to be reviewed. Following guidance provided in USACE (2012) and OMB (2014), USACE prepared the charge questions, which were included in the draft and final Work Plans.

The USACE Project Delivery Team (PDT) briefed the Panel and Battelle during a mid-review meeting held via teleconference to provide the Panel an opportunity to ask questions of USACE and clarify uncertainties. Other than Battelle-facilitated teleconferences, there was no direct communication between the Panel and USACE during the peer review process. The Panel produced individual comments in response to the charge questions.

IEPR panel members reviewed the Ala Wai Canal documents individually. The panel members then met via teleconference with Battelle to review key technical comments and reach agreement on the Final Panel Comments to be provided to USACE. Each Final Panel Comment was documented using a four-part format consisting of: (1) a comment statement; (2) the basis for the comment; (3) the significance of the comment (high, medium/high, medium, medium/low, or low); and (4) recommendations on how to resolve the comment. Overall, 19 Final Panel Comments were identified and documented. Of these, two were identified as having medium/high significance, six had medium significance, seven had medium/low significance, and four had low significance.

Battelle received public comments from USACE on the Ala Wai Canal (approximately 64 written comments equating to 332 total pages of comments) and provided them to the IEPR panel members. The panel members were charged with determining if any information or concerns presented in the public comments raised any additional discipline-specific technical concerns with regard to the Ala Wai Canal review documents. After completing its review, the Panel identified one new issue and subsequently generated one Final Panel Comment that summarized the concern.

Results of the Independent External Peer Review

The panel members agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012; p. D-4) in the Ala Wai Canal Decision Document (i.e., the complete set of review documents, consisting of the Ala Wai Canal FS/EIS Draft Report plus appendices). Table ES-1 lists the Final Panel Comment statements by level of significance. The full text of the Final Panel Comments is presented in Section 4.2 of this report. The following summarizes the Panel's findings.

Based on the Panel's review, the Ala Wai Canal FS/EIS Draft Report is well-written, is well-conceived, and thoroughly documents the step-by-step decision-making process leading to the selection of the Tentatively Selected Plan (TSP). The Panel also noted that the project need and intent are well-presented, and that the economic analysis is thorough and well-executed. While the report assessed the plan formulation, economic, engineering, and environmental issues of the Ala Wai Watershed Project, the Panel identified several elements of the project where additional analysis and evaluation are warranted or clarification is required.

Engineering: The Panel found that the USACE PDT made effective and efficient use of existing hydrologic and hydraulic studies performed in the study area. However, several issues were identified that should be reviewed and clarified. A significant finding of the Panel was that interior flooding behind the line of protection resulting from increased elevation of Ala Wai Canal backwater was not addressed. The Panel noted that during periods of high water surface elevation in the Ala Wai Canal, when interior drainage discharge is blocked by the higher canal head, stormwater can back up into the interior storm drains. This issue can be addressed by evaluating the risk from interior flooding due to backwater in gravity storm drains and revising the report to include an expanded discussion on interior drainage and residual risk. Another significant finding by the Panel was that the scour in detention basin culverts could cause embankment failure, jeopardizing public safety. This can be addressed in part by conducting a preliminary scour analysis that considers expected water velocities, the erosive nature of material in the soft bottom of the culvert, and the amount of material that would have to erode to threaten the embankment. Additionally, the Panel recommends evaluating the risk associated with the current concept and design corrective actions, as well as the changes to environmental impacts caused by the corrective action. The Panel also noted that the effectiveness of the detention facilities, as well as the potential influences the proposed basins would have on the downstream hydrology, cannot be assessed based on the hydrological analysis provided. This issue can be resolved by providing a more thorough analysis of the detention facilities and the resulting downstream discharge-versus-frequency relationships, as well as including uncertainties associated with the detention facilities in the Hydrologic Engineering Center Flood Damage Reduction Analysis (HEC-FDA).

Environmental: The Panel found that O'ahu, Hawai'i, has a genuine need for the proposed level of flood control update and improvement, and that the Specific, Measurable, Attainable, Risk Informed, Timely (SMART) process as applied to this project is sound and demonstrates the USACE commitment to more efficient planning. However, the Panel noted that the potential risk to project schedule and costs associated with the inadvertent discovery of human remains is not addressed. This issue can be resolved

by ensuring compliance with federal and state laws such as the Native American Graves Protection and Repatriation Act (NAGPRA), and the Hawai'i Revised Statutes (HRS), Rules of Practice and Procedure Relating to Burial Sites and Human Remains. Additionally, the Panel recommends identifying general mitigation options for the inadvertent discovery of human remains, with each option outlining potential schedule needs. The Panel also noted that the risk and uncertainty associated with the outcome of the discovery of blackline Hawaiian damselfly in the vicinity of the Waihi Debris and Detention Structure have not been addressed and may require revisions to this TSP measure. This issue can be resolved by completing formal Section 7 consultation/coordination with U.S. Fish and Wildlife Service (USFWS) before the Ala Wai Canal FS/EIS Final Report is published, and revising the TSP as needed. The Panel also recommends providing a better understanding of the blackline Hawaiian damselfly habitat needs and relationship to all relevant project alternative measures and to the site for the proposed compensatory mitigation.

Plan Formulation/Economics: The presentation of the project's economics was well-written and well-thought-out. However, the Panel noted that the risks to critical infrastructure and life safety (including loss of transportation access) associated with flooding under the No Action Alternative and the TSP are not quantitatively assessed. This issue can be addressed by providing a detailed discussion on transportation infrastructure (including access to critical infrastructure resources), or including further discussion to the existing critical infrastructure in the report. Additionally, the Panel recommends conducting an evaluation to determine how the regional transportation infrastructure would be impacted under the project alternatives, and report the consequences of the transportation impacts on critical infrastructure. The Panel also noted that the economic benefit of flood risk reduction was based on the median forecast of the sea level rise (SLR) over the period of analysis, which increases the uncertainty of the TSP. This issue can be resolved by conducting a sensitivity analysis of the effects of low and medium SLR conditions, as well as proving the rationale for selecting the median case in the screening and selection of the TSP.

Table ES-1. Overview of 19 Final Panel Comments Identified by the Ala Wai Canal IEPR Panel

No.	Final Panel Comment
Significance – Medium/High	
1	Interior flooding behind the line of protection resulting from increased elevation of Ala Wai Canal backwater is not addressed in the Ala Wai Canal FS/EIS Draft Report.
2	Scour in detention basin culverts could cause embankment failure, jeopardizing public safety.
Significance – Medium	
3	The effectiveness of the detention facilities, as well as the potential influences the proposed basins would have on the downstream hydrology, cannot be assessed based on the hydrological analysis provided.
4	Site conditions for the Ala Wai Canal left bank floodwall may not have sufficient space to design an adequate factor of safety against sliding and overturning.
5	The optimization of the NED Plan did not use a range of flood events, which may have resulted in a selection bias toward the 1% annual chance of exceedance (ACE) event.
6	Risks to critical infrastructure and life safety (including loss of transportation access) associated with flooding under the No Action Alternative and the TSP are not quantitatively assessed.
7	The potential risk to project schedule and costs associated with the inadvertent discovery of human remains is not addressed.
8	The risk and uncertainty associated with the outcome of the discovery of blackline Hawaiian damselfly in the vicinity of the Waihi Debris and Detention Structure have not been addressed and may require revisions to this TSP measure.
Significance – Medium/Low	
9	Construction windows required to protect the Hawaiian hoary bat and the O'ahu 'elepaio are not consistently presented and may result in significant schedule and cost impacts.
10	The various alternatives, including the TSP, do not adequately address public and life safety issues (both adverse and beneficial) for the specific populations of children and the elderly.
11	The life safety hazards associated with the failure of the floodwall, potential breach of the detention facilities, or performance of the detention facility for events greater than the design event are not discussed.

Table ES-1. Overview of 19 Final Panel Comments Identified by the Ala Wai Canal IEPR Panel (Continued)

No.	Final Panel Comment
12	Concerns noted in the public comments on the Ala Wai Canal project regarding the National Historic Preservation Act (NHPA) Section 106 consultation warrant further analysis and documentation.
13	The economic benefit of flood risk reduction was based on the median forecast of the SLR over the period of analysis, which increases the uncertainty of the TSP.
14	The modeling of future with- and without-project benefits does not quantify the non-structural impacts of flooding on business interruption, the long-term effects on foreign tourism, or the loss of consumer surplus to domestic visitors.
15	The assumptions used to define the discharge-versus-frequency relationships, and the uncertainties of these relationships, are inconsistent at various junction locations of the Ala Wai sub-watersheds.
Significance – Low	
16	The operation and maintenance (O&M) requirements do not account for gate operations under conditions of rapidly arriving peak flows or overtopping of debris racks.
17	The method and assumptions for calibrating the steady-flow hydraulic model used to define the stage-versus-discharge relationships, and the uncertainty of these relationships, are not discussed.
18	The hydrologic model was calibrated to several different events; however, no discussion is presented on the performance of the model with the final calibrated model parameters.
19	The values for costs, benefits, and BCR in Tables ES-1 and ES-4 are inconsistent.

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LIST OF ACRONYMS

ACE	Annual Chance of Exceedance
ADM	Agency Decision Milestone
AIS	Archaeological Inventory Survey
APE	Area of Potential Effect
ATR	Agency Technical Review
BA	Biological Assessment
BCR	Benefit-Cost Ratio
C&C	City and County of Honolulu
CAA	Clean Air Act
CE/ICA	Cost Effectiveness / Incremental Cost Analysis
COI	Conflict of Interest
CUWCC	California Urban Water Conservation Council
CWA	Clean Water Act
CWRB	Civil Works Review Board
DES	Department of Environmental Services
DLNR	Department of Land and Natural Resources
DrChecks	Design Review and Checking System
EC	Engineer Circular
EIS	Environmental Impact Statement
EM	Engineer Manual
EO	Executive Order
ER	Engineer Regulation
ERDC	Engineer Research and Development Center
ESA	Endangered Species Act
EYOR	Equivalent Years of Record
FEMA	Federal Emergency Management Agency

FMA	Fishery Management Area
FS	Feasibility Study
HAR	Hawai'i Administrative Rules
HART	Hawai'i Authority for Rapid Transportation
HEC-FDA	Hydrologic Engineering Center Flood Damage Reduction Analysis
HEC-HMS	Hydrologic Engineering Center Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center River Analysis System
HEP	Habitat Evaluation Procedure
HRS	Hawai'i Revised Statutes
HRTP	Honolulu Rail Transit Project
IEPR	Independent External Peer Review
IWR	Institute for Water Resources
MLCD	Marine Life Conservation District
MM	Mitigation Measure
NAGPRA	Native American Graves Protection and Repatriation Act
NED	National Economic Development
NEPA	National Environmental Policy Act
NER	National Ecosystem Restoration
NGO	Non-governmental Organization
NHPA	National Historic Preservation Act
NTP	Notice to Proceed
O&M	Operation and Maintenance
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
PA	Programmatic Agreement
PCX	Planning Center of Expertise
PDT	Project Delivery Team
PED	Preconstruction Engineering & Design

RED	Regional Economic Development
SAR	Safety Assurance Review
SHPO	State Historic Preservation Office
SLISA	Smith Lake Improvement and Stakeholder Association
SLR	Sea Level Rise
SMART	Specific, Measurable, Attainable, Risk Informed, Timely
TSP	Tentatively Selected Plan
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USWRC	United States Water Resources Council
WSE	Water Surface Elevation

1. INTRODUCTION

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). Section 209 is a general authority that authorizes surveys in harbors and rivers in Hawai‘i “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.” The project is currently in the feasibility phase, resulting in a feasibility study (FS) report and integrated environmental impact statement (EIS) that will be signed by the Chief of Engineers. If the FS report results in a positive determination recommending implementation of a preferred alternative, Congressional authorization will be needed before the project may proceed to construction. The non-Federal sponsor for this project is the State of Hawai‘i, as represented by the Department of Land and Natural Resources (DLNR). Through a separate Memorandum of Agreement with DLNR, the City and County of Honolulu (C&C) is also providing cash and work-in-kind support to earlier phases of this project. The C&C is represented by the Department of Environmental Services (DES).

The Ala Wai watershed is located on the southeastern side of the island of O‘ahu, Hawai‘i. The watershed is 19 square miles and encompasses three sub-watersheds: Makiki, Manoa, and Palolo. There are three perennial streams and two canals in the watershed. The study area is the most densely populated watershed in Hawai‘i with approximately 200,000 residents. Within the urban footprint, the population density is one of the highest in the nation with 12.36 persons per urbanized acre. Waikiki District, within the watershed, is the primary economic engine for the State, providing 7 percent of the gross state product, 7 percent of the civilian jobs in the state, and 9 percent of the state and county tax revenue. Waikiki has over 79,000 visitors a day.

The watershed includes upper, middle, and lower sub-watersheds. The upper watershed (7.5 square miles, or 40 percent of the watershed) is zoned as Conservation District to protect the island’s aquifer. Approximately 11 square miles of the middle and lower watershed is urbanized, supporting 1,600 businesses, 21 public schools, 17 private schools and two universities, including the University of Hawai‘i at Manoa, the largest university in the state. Approximately 53 parks of varying sizes occur throughout the urbanized watershed. The parks provide for water-based activities, nature-based activities, sports activities, and interpretive activities. Offshore of Waikiki are two state-designated Fishery Management Areas (FMAs), a Marine Life Conservation District (MLCD), and the Hawaiian Humpback Whale National Marine Sanctuary.

Hawai‘i streams are flashy by nature. Within the study area, rain often starts in the mountainous areas of the upper watershed, with little precipitation in the lower elevations. The peak flow rate from mountains to sea is approximately 30 minutes. Storms typically last for 24 hours or less. With the sudden nature of the flood events and the associated high velocities, floods within the watershed threaten life safety and may result in significant damages. Rarely does the watershed experience long periods of standing water from a flood event. When heavy rains do occur over multiple days, standing flood waters become a problem. Based on U.S. Army Corps of Engineers (USACE) hydrology and hydraulic modeling, the majority of the peak flow is from the Manoa Stream, with Palolo Stream being the second highest contributor and Makiki Stream the third.

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The objective of the work described here was to conduct an Independent External Peer Review (IEPR) of the Ala Wai Canal Project, Island of O’ahu, Hawai’i, Feasibility Study with Integrated Environmental Impact Statement (hereinafter: Ala Wai Canal IEPR) in accordance with procedures

described in the Department of the Army, USACE, Engineer Circular (EC) *Civil Works Review* (EC 1165-2-214) (USACE, 2012) and the Office of Management and Budget (OMB), *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

This final report presents the Final Panel Comments of the IEPR Panel (the Panel) on the existing engineering, economic, environmental, and plan formulation analyses contained in the Ala Wai Canal IEPR documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted. Appendix B provides biographical information on the IEPR panel members and describes the method Battelle followed to select them. Appendix C presents the final charge to the IEPR panel members for their use during the review; the final charge was submitted to USACE on October 9, 2015. Appendix D presents the organizational conflict of interest (COI) form that Battelle completed and submitted to the Institute for Water Resources (IWR) prior to the award of the Ala Wai Canal IEPR.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review (ATR), as described in USACE (2012).

In general, the purpose of peer review is to strengthen the quality and credibility of USACE decision documents in support of its Civil Works program. IEPR provides an independent assessment of the engineering, economic, environmental, and plan formulation analyses of the project study. In particular, the IEPR addresses the technical soundness of the project study's assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the IEPR of the Ala Wai Canal was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC 1165-2-214). Battelle, a 501(c)(3) organization under the U.S. Internal Revenue Code, has experience conducting IEPRs for USACE.

3. METHODS FOR CONDUCTING THE IEPR

The methods used to conduct the IEPR are briefly described in this section; a detailed description can be found in Appendix A. Table 1 presents the major milestones and deliverables of the Ala Wai Canal IEPR. Due dates for milestones and deliverables are based on the award/effective date of September 20, 2015[1]. Note that the work items listed under Task 6 occurs after the submission of this report. Battelle anticipates submitting the pdf printout of the USACE's Design Review and Checking System (DrChecks) project file (the final deliverable) on February 17, 2015. The actual date for contract end will depend on the date that all activities for this IEPR, including Civil Works Review Board (CWRB) preparation and participation, are conducted.

[1] Although dated September 15, 2015, the actual award was not received from USACE until September 20, 2015.

Table 1. Major Milestones and Deliverables of the Ala Wai Canal IEPR

Task	Action	Due Date
1	Award/Effective Date	9/20/2015
	Review documents available	9/23/2015
	Public comments available	11/24/2015
2	Battelle submits list of selected panel members [a]	10/2/2015
	USACE confirms the panel members have no COI	10/6/2015
3	Battelle convenes kick-off meeting with USACE with Planning Center of Expertise (PCX) and Project Delivery Team (PDT)	9/24/2015
	Battelle convenes kick-off meeting with panel members	10/16/2015
4	Panel members complete their individual reviews	11/2/2015
	Panel members provide draft Final Panel Comments to Battelle	11/30/2015
	Battelle sends public comments to Panel	11/25/2015
	Panel completes its review of the public comments	11/30/2015
5	Battelle submits Final IEPR Report to USACE [a]	12/9/2015
6[b]	Battelle convenes Comment-Response Teleconference with panel members and USACE	12/18/2015
	Battelle submits pdf printout of DrChecks project file to USACE [a]	2/17/2016
	Agency Decision Meeting (Estimated Date) [c]	1/2016
	CWRB Meeting (Estimated Date)[c]	10/23/2016
	Contract End/Delivery Date	5/31/2016

[a] *Deliverable*

[b.] *Task 6 occurs after the submission of this report*

[c.] *The Agency Decision Milestone (ADM) and CWRB meetings were listed in the Performance Work Statement under Task 3 but were relocated in this schedule to reflect the chronological order of activities.*

Battelle identified, screened, and selected four panel members to participate in the IEPR based on their expertise in the following disciplines: Civil Works planning/economics, hydraulic and hydrology engineering, structural/civil engineering, and environmental law compliance/biological and cultural resources. The Panel reviewed the Ala Wai Canal Decision Document and produced 19 Final Panel Comments in response to 17 charge questions provided by USACE for the review. This charge included two overview questions and one public comment question added by Battelle. Battelle instructed the Panel to develop the Final Panel Comments using a standardized four-part structure:

1. Comment Statement (succinct summary statement of concern)
2. Basis for Comment (details regarding the concern)
3. Significance (high, medium/high, medium, medium/low, or low; in accordance with specific criteria for determining level of significance)

4. Recommendation(s) for Resolution (at least one implementable action that could be taken to address the Final Panel Comment).

Battelle reviewed all Final Panel Comments for accuracy, adherence to USACE guidance (Engineer Circular [EC] 1165-2-214, Appendix D), and completeness prior to determining that they were final and suitable for inclusion in the Final IEPR Report. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Panel's findings are summarized in Section 4.1; the Final Panel Comments are presented in full in Section 4.2.

4. RESULTS OF THE IEPR

This section presents the results of the IEPR. A summary of the Panel's findings and the full text of the Final Panel Comments are provided.

4.1 Summary of Final Panel Comments

The panel members agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012; p. D-4) in the Ala Wai Canal Decision Document (i.e., the complete set of review documents, consisting of the Ala Wai Canal FS/EIS Draft Report plus appendices). The following summarizes the Panel's findings.

Based on the Panel's review, the Ala Wai Canal FS/EIS Draft Report is well-written, is well-conceived, and thoroughly documents the step-by-step decision-making process leading to the selection of the Tentatively Selected Plan (TSP). The Panel also noted that the project need and intent are well-presented, and that the economic analysis is thorough and well-executed. While the report assessed the plan formulation, economic, engineering, and environmental issues of the Ala Wai Watershed Project, the Panel identified several elements of the project where additional analysis and evaluation are warranted or clarification is required.

Engineering: The Panel found that the USACE PDT made effective and efficient use of existing hydrologic and hydraulic studies performed in the study area. However, several issues were identified that should be reviewed and clarified. A significant finding of the Panel was that interior flooding behind the line of protection resulting from increased elevation of Ala Wai Canal backwater was not addressed. The Panel noted that during periods of high water surface elevation in the Ala Wai Canal, when interior drainage discharge is blocked by the higher canal head, stormwater can back up into the interior storm drains. This issue can be addressed by evaluating the risk from interior flooding due to backwater in gravity storm drains and revising the report to include an expanded discussion on interior drainage and residual risk. Another significant finding by the Panel was that the scour in detention basin culverts could cause embankment failure, jeopardizing public safety. This can be addressed in part by conducting a preliminary scour analysis that considers expected water velocities, the erosive nature of material in the soft bottom of the culvert, and the amount of material that would have to erode to threaten the embankment. Additionally, the Panel recommends evaluating the risk associated with the current concept and design corrective actions, as well as the changes to environmental impacts caused by the corrective action. The Panel also noted that the effectiveness of the detention facilities, as well as the potential influences the proposed basins would have on the downstream hydrology, cannot be assessed based on the hydrological analysis provided. This issue can be resolved by providing a more thorough analysis of the detention facilities and the resulting downstream discharge-versus-frequency relationships, as well as including uncertainties associated with the detention facilities in the Hydrologic Engineering Center Flood Damage Reduction Analysis (HEC-FDA).

Environmental: The Panel found that O'ahu, Hawai'i, has a genuine need for the proposed level of flood control update and improvement, and that the Specific, Measurable, Attainable, Risk Informed, Timely (SMART) process as applied to this project is sound and demonstrates the USACE commitment to more efficient planning. However, the Panel noted that the potential risk to project schedule and costs associated with the inadvertent discovery of human remains is not addressed. This issue can be resolved by ensuring compliance with federal and state laws such as the Native American Graves Protection and Repatriation Act (NAGPRA), and the Hawai'i Revised Statutes (HRS), Rules of Practice and Procedure Relating to Burial Sites and Human Remains. Additionally, the Panel recommends identifying general mitigation options for the inadvertent discovery of human remains, with each option outlining potential schedule needs. The Panel also noted that the risk and uncertainty associated with the outcome of the discovery of blackline Hawaiian damselfly in the vicinity of the Waihi Debris and Detention Structure have not been addressed and may require revisions to this TSP measure. This issue can be resolved by completing formal Section 7 consultation/coordination with U.S. Fish and Wildlife Service (USFWS) before the Ala Wai Canal FS/EIS Final Report is published, and revising the TSP as needed. The Panel also recommends providing a better understanding of the blackline Hawaiian damselfly habitat needs and relationship to all relevant project alternative measures and to the site for the proposed compensatory mitigation.

Plan Formulation/Economics: The presentation of the project's economics was well-written and well-thought-out. However, the Panel noted that the risks to critical infrastructure and life safety (including loss of transportation access) associated with flooding under the No Action Alternative and the TSP are not quantitatively assessed. This issue can be addressed by providing a detailed discussion on transportation infrastructure (including access to critical infrastructure resources), or including further discussion to the existing critical infrastructure in the report. Additionally, the Panel recommends conducting an evaluation to determine how the regional transportation infrastructure would be impacted under the project alternatives, and report the consequences of the transportation impacts on critical infrastructure. The Panel also noted that the economic benefit of flood risk reduction was based on the median forecast of the sea level rise (SLR) over the period of analysis, which increases the uncertainty of the TSP. This issue can be resolved by conducting a sensitivity analysis of the effects of low and medium SLR conditions, as well as proving the rationale for selecting the median case in the screening and selection of the TSP.

4.2 Final Panel Comments

This section presents the full text of the Final Panel Comments prepared by the IEPR panel members.

Final Panel Comment 1

Interior flooding behind the line of protection resulting from increased elevation of Ala Wai Canal backwater is not addressed in the Ala Wai Canal FS/EIS Draft Report.

Basis for Comment

Ala Wai Canal FS/EIS Draft Report, Appendix A2, Plate 11, TSP 35% Design sheet C-101, indicates that new flap gates and other closure devices will be installed over existing gravity interior drainage outfalls into the Ala Wai Canal. These closure devices prevent backflow up the storm drains when the water surface in the Ala Wai Canal is greater than the elevation head (including the head loss for the flap gate itself) from water draining from areas behind the line of protection.

During periods of high water surface elevation in the Ala Wai Canal when interior drainage discharge is blocked by the higher canal head, stormwater will back up into the interior storm drains.

USACE policy (Planning Guidance Notebook [USACE, 2000]; Hydrologic Analysis of Interior Areas [USACE, 1987) requires that USACE projects address interior drainage to ensure that interior flooding is not induced by a project design to exclude exterior flooding.

The review documents do not analyze (or otherwise indicate) whether flooding will occur behind the line of protection if water backs up in existing stormwater systems because it cannot discharge into the Ala Wai Canal. The potential residual damages from interior flooding affects project effectiveness and completeness. The cost to alleviate interior flooding (i.e., additional detention areas or pumping plants) may affect project efficiency.

Significance – Medium/High

Because an interior drainage analysis was not conducted, a fundamental issue associated with the project has not been evaluated at a level appropriate to this stage in the SMART Planning process.

Recommendation for Resolution

1. Evaluate risk from interior flooding due to backwater in gravity storm drains.
    a. Use existing data to determine the street elevation of stormwater inflow grates or overbank conditions for a corresponding representative and statistically significant number of gravity outfalls. Add the gate head loss associated with outfall flap gates to street grate elevation.
    b. Determine the pipe and channel storage for those representative outfalls.
    c. Use existing rainfall data to predict how long it will take to fill the pipe/channel storage capacity.
    d. Use existing data to determine the Water Surface Elevation (WSE) in the Ala Wai Canal at those representative gravity outfalls, and the frequency and duration that the Ala Wai WSE will exceed the interior elevation plus gate head loss.
    e. Estimate the degree of residual interior flooding based on the duration that the outfall is effectively blocked by Ala Wai Canal WSE and the depth/area/duration on interior rainfall.
2. Based on the findings of 1a-1e above or other semi-quantitative analyses based on professional judgment and existing information, revise the report text on interior drainage and residual risk.

Literature Cited:

USACE (2000). Planning – Planning Guidance Notebook. Engineer Regulation (ER) 1105-2-100. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. April 22. Available online at: http://planning.usace.army.mil/toolbox/library/ERs/entire.pdf

USACE (1987). Hydrologic Analysis of Interior Areas. Engineer Manual (EM) 1110-2-1413. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. January 15. Available online at: http://www.publications.usace.army.mil/Portals/76/Publications/EngineerManuals/EM_1110-2-1413.pdf

USACE (undated). Cost Sharing of Interior Drainage Facilities. Policy Guidance Letter No. 37. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Available online at: http://planning.usace.army.mil/toolbox/library/PGL/pgl37.pdf

Final Panel Comment 2

Scour in detention basin culverts could cause embankment failure, jeopardizing public safety.

Basis for Comment

Ala Wai Canal FS/EIS Draft Report, Appendix A2, Plate 11, TSP 35% Design sheets (C-301, C-308, C-313, C-315, et al.) illustrate detention basin embankments with natural, or 'soft,' bottom inverts on arch culverts to carry the low flows and drain the detention basin following high-flow events. While some culverts (i.e., sheet C-313 Pukele Debris and Detention Basin) have culvert/stream gradients in the range of 1%, others (i.e., sheet C-301 Waihi Debris and Detention Basin, sheet C-308 Waiomao Debris and Detention Basin, sheet C-315 Makiki Debris and Detention Basin) have culvert/stream gradients from 5% to nearly 9%.

Scour potential will increase with increased water velocity. Velocity can increase when gradients become steeper or when flow is under pressure, such as elevation head behind an embankment. Scour of the culvert invert could undermine the culvert and embankment foundations and result in embankment failure.

Failure of a detention basin embankment from scour could jeopardize public safety, produce a downstream flow of debris and mud that could compromise the effectiveness of downstream project elements, and cause long-term deleterious environmental and community impacts. This is a potential fundamental issue with a major project element (detention basins) that may require a significant change to the design concept and re-evaluation of the environmental impacts associated with a design that no longer includes soft bottom culverts.

Scour of detention basin culverts is not addressed in the report. Ordinarily, a detailed scour analysis would be conducted during the design phase. However, the absence of any preliminary scour analysis for this critical project concept introduces significant risk into alternative development and the National Economic Development (NED) Plan.

Significance – Medium/High

Because a scour analysis for detention basin culverts was not conducted, a significant risk has not been evaluated at a level appropriate to this stage in the SMART Planning process.

Recommendation for Resolution

1. Conduct a preliminary scour analysis that considers expected water velocities, the erosive nature of material in the soft bottom of the culvert, and the amount of material that would have to erode to threaten the embankment.
2. Evaluate the risk associated with the current concept and design corrective actions.
3. Evaluate the changes to environmental impacts caused by the corrective action.
   Or alternatively to recommendations 1 through 3:
4. Revise report text, including the project cost estimate, to identify the risk associated with proceeding without a scour analysis.

Final Panel Comment 3

The effectiveness of the detention facilities, as well as the potential influences the proposed basins would have on the downstream hydrology, cannot be assessed based on the hydrological analysis provided.

Basis for Comment

The hydrology for the existing conditions is thoroughly documented in Appendix A1 of the Ala Wai Canal FS/EIS Draft Report. The documentation for the with-project hydrology is limited to Section 5.1 of Appendix A2 of the report, which states:

> "In order to determine the effectiveness of detention basins throughout the Watershed, the HEC-HMS [Hydrologic Engineering Center Hydrologic Modeling System] model, the Technical Summary Report, Manoa Watershed Project (Oceanit, 2008c), and other hydrologic analysis were used to study different detention basin scenarios."

The lack of information about the hydrology for the with-project conditions makes it difficult to assess the appropriateness of the discharge-versus-frequency relationships estimated for these conditions, and the influences the detention facility would have on attenuation and timing of the downstream hydrology. The use of detention facilities also adds a level of uncertainty related to the performance of the facilities (i.e., changes in elevation-volume relationship over time and performance of outlet rating) that is not addressed in the report. The uncertainty regarding the effectiveness of the detention basin facilities, including detention basin performance, should be included in the risk and uncertainty analysis (HEC-FDA analysis) for the with-project conditions. The uncertainty in the detention basin performance could result in a potential reduction in project performance and an increase in residual risks.

Significance – Medium

The effectiveness of the detention facilities could have an influence on the downstream hydrology, performance of the project along the Ala Wai Canal, and residual risk that could reduce the project benefits and the benefit-cost ratio (BCR) of the TSP.

Recommendation for Resolution

1. Provide a more thorough analysis of the detention facilities and the resulting downstream discharge-versus-frequency relationships in Appendix A2 of the final report.
2. Discuss the uncertainties associated with the detention facilities in Appendix A2 of the final report.
3. Account for the uncertainties associated with the detention facilities in the HEC-FDA analysis for the TSP.

Final Panel Comment 4

Site conditions for the Ala Wai Canal left bank floodwall may not have sufficient space to design an adequate factor of safety against sliding and overturning.

Basis for Comment

Ala Wai Canal FS/EIS Draft Report Appendix A2, Plate 11, TSP 35% Design sheets C-103, C-309 and C-316 indicate construction of "inverted T" shaped floodwalls for Hausten Ditch Detention Basin and the right bank (mountain side) Ala Wai Canal with foundations 3 feet below grade and 9.5 feet wide, with a key to resist sliding an additional 3 feet deep. Report Appendix A2, Plate 11, TSP 35% Design sheets C-310 and C-311 indicate construction of "L" shaped floodwalls for the left bank (ocean side) of the Ala Wai Canal with no foundation heel, no key, and the toe foundation 1 foot below grade.

The report does not include specific geotechnical data or floodwall design calculations. The Panel expects that geotechnical data and design loading for floodwalls on both sides of the canal would be similar; thus, the floodwall foundations would also be similar. However, as indicated above, the foundations are very dissimilar.

USACE Engineer Manual (EM) 110-2-2502 Retaining and Flood Walls does not provide guidance for the use of "L" shaped floodwalls, though the same general design process for "inverted T" shaped walls can be applied to "L" shaped walls. While EM 110-2-2502 addresses only specific design methodologies, conservative rule-of-thumb professional judgment would begin with a floodwall foundation width equal to wall height, with the foundation heel equal to approximately 2/3 the foundation width and the foundation toe equal to approximately 1/3 the foundation width (Federal Emergency Management Agency [FEMA] Engineering Principles and Practice Chapter 5F). The "L" shaped left bank floodwall includes a foundation equal to only 2/3 the wall height, with all foundation in the toe and no foundation heel. Therefore, the Panel is concerned that the "L" shaped left bank floodwall foundations may not have sufficient factor of safety to resist sliding and overturning.

Ordinarily, this matter would be corrected during the Preconstruction Engineering & Design (PED) phase and increased incremental cost would be covered by the project contingency. However, the left bank site conditions may not provide adequate available space for construction of either the floodwall design indicated in Detail C of Sheet C-311 or any other cantilever design resulting from a re-evaluation of foundation conditions. The already narrow available left bank work area is complicated by existing, possibly historic, canal wall stone work, existing utilities (street lighting and hydrants observed on Google Earth) and trees (indicated on plan drawings and artist renderings), and proximity of heavy vehicular and pedestrian traffic. If a left bank flood wall foundation designed with an adequate factor of safety against sliding and overturning cannot be constructed within the available site without impacts to site constraints, then a significant change in the TSP 35% design may be required. This change may be so major as to change the design concept and cause more environmental impacts to existing canal stone walls, utilities and trees, and traffic. Furthermore, the design is not aligned with the currently assessed level of risk assigned at this stage in the SMART Planning process.

Significance – Medium

A significant design change may be required during PED to construct the floodwalls, which is not aligned with the currently assessed level of risk assigned at this stage in the SMART Planning process.

Final Panel Comment 4

Recommendation for Resolution

1. Validate foundation design assumptions used for both left and right bank floodwalls.
2. Correlate left and right bank designs and adjust foundation dimensions accordingly.
3. Ensure that the dimension of correlated and adjusted left bank floodwall foundations allow sufficient construction space within existing left bank physical project constraints.
4. Revise the project constraints and impacts stated in the report if sufficient construction space within existing project constraints is not available, or consider revising design concepts away from a cantilever wall.

Final Panel Comment 5

The optimization of the NED Plan did not use a range of flood events, which may have resulted in a selection bias toward the 1% annual chance of exceedance (ACE) event.

Basis for Comment

The selection and optimization of the TSP is based on the 1% ACE flood and did not determine whether other return frequencies (such as the 0.8% or 1.2% ACE) would have resulted in higher net NED benefits.

Ala Wai Canal FS/EIS Draft Report Section 3.9 supports selection of Alternative 3A-2.2 based in part on the fact that it meets FEMA freeboard requirements and provides 1% ACE flood event with a 95% conditional non-exceedance probability (or assurance). The report also states that FEMA accreditation is consistent with the performance levels and design drainage standards desired by the non-Federal sponsor.

USACE guidance (Planning Guidance Notebook [USACE, 2000]; Risk Analysis for Flood Damage Reduction Studies [USACE, 2006) does not recognize a minimum standard for flood risk reduction or the need for freeboard when an adequate risk and uncertainty analysis has been performed. The selection of the NED Plan should be based on the alternative with the highest net NED benefit rather than the requirements of the non-Federal sponsor and/or FEMA.

Report Section 1.4: Purpose and Need, Section 2.1.2: Flood Reduction Opportunities, and Section 2.2.2: Planning Objective do not address FEMA criteria for use on the project as introduced in Section 3.9.

Report Section 3.0: Plan Formulation provides a good discussion on the development of measures and alternatives. Section 3.6.4.1: Technical Analysis and Refinement further discusses the screening process, including (along with Section 3.7.2.2: Optimization) the sizing and placement of detention basins and the need for floodwalls to further reduce flood risk to properties adjacent to the Ala Wai Canal. The greatest potential benefits from the project occur in the area adjacent to the Ala Wai Canal. In accordance with SMART Planning guidance, the Project Delivery Team (PDT) used best professional judgment to fit the maximized possible sized detention basin on site-constrained locations and used the Ala Wai Canal flood walls to capture the remaining economically justified risk. Section 3.7.2.2: Optimization then uses the damages and benefits associated with varying the height of the Ala Wai Canal floodwall as a substitute to analyzing events with slightly greater or less ACE. The Panel is concerned that in using flood wall height as a substitute for performing actual analysis for ACEs other than the 1% ACE (e.g., 2%, 1.5%, 0.8%, or 0.5% ACE), the economic analysis in the report may not be complete. Correspondingly, if this more complete analysis supports a project alternative with an ACE lesser or greater than 1%, the proposed project may not be efficient.

Significance – Medium

The NED analyses may be incomplete and could result in the selection of an alternative that is less economically efficient.

Final Panel Comment 5

Recommendation for Resolution

1. Perform additional analysis on project benefits and costs for floods with slightly greater or less ACE to support and potentially re-evaluate NED Plan selection.
2. Alternatively, add text to Section 1.4: Purpose and Need, Section 2.1.2: Flood Reduction Opportunities, or Section 2.2.2: Planning Objective that discusses the use of the 1% ACE flood for plan formulation.

Literature Cited:

USACE (2000). Planning – Planning Guidance Notebook. Engineer Regulation (ER) 1105-2-100. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. April 22. Available online at: http://planning.usace.army.mil/toolbox/library/ERs/entire.pdf

USACE (2006). Planning – Risk Analysis for Flood Damage Reduction Studies. Engineer Regulation (ER) 1105-2-101. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. January 3. Available online at: http://planning.usace.army.mil/toolbox/library/ERs/er1105-2-101.pdf

Final Panel Comment 6

Risks to critical infrastructure and life safety (including loss of transportation access) associated with flooding under the No Action Alternative and the TSP are not quantitatively assessed.

Basis for Comment

Impacts of the project alternatives evaluated in the Ala Wai Canal FS/EIS Draft Report are only partially quantified and do not explicitly evaluate the effects of flooding on access to critical infrastructure. Consequently, the discussion of important decision-making information, specifically the life-safety impacts of the project alternative, is incomplete.

In Table 7, Section 3.6.5 of the report, a criterion called Community Resilience is specified for the screened alternatives. This criterion includes critical infrastructure impacts, but it is not clear how a metric for such impacts was derived or what it means. No units are specified for the metric.

The number of units of critical infrastructure (i.e., health care facilities, police and fire stations, and emergency shelters) inundated by a 1% probability flood is specified in Table 14 and elsewhere in the report. However, access to non-inundated facilities could be compromised by flooded roadways and debris. For example, under the No Action Alternative, the 1% ACE flood event would close portions of H1 highway and major arterials.

The duration of the 1% ACE flood event and debris accumulation are also important with regard to loss of transportation access. It is not clear how these closures will affect access to critical infrastructure. Such access is not only an issue for the residents in the floodplain; the flooding could also impact roadway and transit infrastructure for populations outside the floodplain. In addition, employees of critical infrastructure resources who live both within and outside of the floodplain might be unable to reach their assigned posts. As a result, impacts under the No Action Alternative could be worse than the report indicates, and the TSP could be more beneficial than indicated.

Significance – Medium

Specific metrics were not provided to quantitatively assess the effects of flooding on critical infrastructure (including access), which effects the completeness of the report but does not affect selection of the TSP/NED Plan.

Recommendation for Resolution

1. Provide a detailed discussion on transportation infrastructure (including access to critical infrastructure resources), or include further discussion to the existing critical infrastructure discussion in Section 5.16 of the report.
2. Evaluate how the regional transportation infrastructure would be impacted under the project alternatives, and report the consequences of the transportation impacts on critical infrastructure.
3. Explain the Community Resilience metric in Table 7, Section 3.6.5, of the report.

Final Panel Comment 7

The potential risk to project schedule and costs associated with the inadvertent discovery of human remains is not addressed.

Basis for Comment

Ala Wai Canal FS/EIS Draft Report, Table ES-6, Summary of Environmental Consequences (IMP), Cultural Resources Comment 5 (IMP CUL-5), "Inadvertent discovery of human remains or other cultural materials," identifies the impact on the TSP of an inadvertent discovery as "less than significant with mitigation."

The proposed Mitigation Measures (MM) are shown as: "MM CUL-4L: Construction contractor would immediately cease all work in the area, and appropriate agencies would be notified according to applicable laws, including [National Historic Preservation Act] and [Hawai'i Revised Statutes] Section 6E." Stopping work and notifying appropriate parties are appropriate immediate actions but do not constitute a complete MM.

The extent to which the mitigation would minimize impacts to the *iwi kūpuna* (ancestral bones) and to the project schedule and costs depends on the approach. Re-interment at another location identified and approved by the Native Hawaiian Descendants/Section 106 Consulting Parties via the National Historic Preservation Act (NHPA) Section 106 Programmatic Agreement (PA) (currently under development) could take from 24 hours to months; leaving remains in place (favored by some Native Hawaiians) may adversely impact the project design. The report does not identify the extent to which the PA-supported mitigation could affect the project schedule and costs, nor does it show a range of Native Hawaiian issues that could be associated with inadvertent discovery.

Per Section 5.8.2.2 (page 5-50) of the report:

> "The Programmatic Agreement is being coordinated with the Advisory Council on Historic Preservation (ACHP), SHPO, and other consulting parties. A copy will be presented in the Final Feasibility Report/EIS. Implementation of the treatment recommendations developed through consultation and as per the Programmatic Agreement is expected to reduce potential impacts to a less-than-significant level."

The report further states (page 5-53):

> "There is a high possibility that *iwi kūpuna* (ancestral bones), may be present within the project area and that land-disturbing activities during construction may uncover presently undetected burials or other cultural materials (**IMP CUL-5**). The Programmatic Agreement will stipulate measures that the USACE will undertake to address the potential for burials. Should burials or other cultural finds be identified during ground disturbance, the construction contractor would immediately cease all work in the area, and the appropriate agencies would be notified pursuant to applicable laws, including NHPA and HRS Section 6E (**MM CUL-4**). Implementing procedures regarding burials as stipulated in the Programmatic Agreement and following legislative protocols for inadvertent discovery of remains would mitigate impacts to a less-than-significant level."

Although the potential for impact is identified, and it is probable that mitigations will be included in the Section 106 PA, a range of mitigation options and their level of impact are not included in the Decision Document. This omission will likely result in unanticipated schedule delays and cost increases during construction. The possibility for inadvertent discovery is high in the study area, as it is throughout areas

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where early Native Hawaiians lived, because family remains were commonly interred in the family's backyard or nearby. Locations of previously identified burials may be mapped to indicate probable sites of additional burials related to various portions of the TSP. Higher-risk sites are expected in the vicinity of the Ala Wai floodwall works and the Ala Wai Golf Course multi-purpose detention basin.

A draft PA that details agreed-upon treatment of inadvertently discovered *iwi kūpuna* was not provided to the Panel. Three stakeholders—the State Historic Preservation Division, Oahu Island Burial Council, and Native Hawaiian Descendants—provide coordination and consultation regarding burials and are expected to be Consulting Parties under Section 106. A state recognition process is in place although not all Native Hawaiians have chosen to be recognized. Various levels of recognition, lineal and cultural, are possible. Documentation of outreach to Native Hawaiians is supported by a report titled "Cultural Resources and Ethnographic Study for the Ala Wai Watershed Project, Volumes I, II and III," prepared by Cultural Surveys Hawai'i in 2010 and referenced in Sections 3, 8, and 12 of the report; however, this documentation is not tied back to the *iwi kūpuna* discussion in Section 5 as a source of identification of Native Hawaiian Consulting Parties.

The report (Section 7.0, Table 40) does not identify or discuss either of the following burial-related laws and regulations:

- Federal - Native American Graves Protection and Repatriation Act (NAGPRA), 25 USC 3001 et seq.
- State of Hawai'i - Hawai'i Administrative Rules (HAR) Chapter 13-300, Rules of Practice and Procedure Relating to Burial Sites and Human Remains

The Decision Document does not consider mitigation options such as the possible use of Cultural Monitors at key sites during construction. A Cultural Monitor acts as an independent observer who is both knowledgeable of and sensitive to Native Hawaiian site management and who has the trust of members of his or her community. A Cultural Monitor may ensure protection, preservation, respect, and culturally appropriate treatment of historic and culturally significant Native Hawaiian resources, artifacts, and *iwi kūpuna*. As stated in Act 306, 1996 Hawai'i Session Laws, "The legislature finds that Native Hawaiian burial sites are especially vulnerable and often not afforded the protection of law which assures dignity and freedom from unnecessary disturbance." USACE is not required to provide Cultural Monitors under state or Federal law.

For each inadvertent discovery, the project schedule could potentially be delayed 90 days or longer. Costs of burial treatment plan implementation together with construction delay costs could be significant and need to be included.

Significance – Medium

Without a discussion of potential impacts and mitigation requirements associated with inadvertent discovery of human remains, the project schedule and cost could be at risk.

Recommendation for Resolution

1. Address the following laws and regulations beyond what is currently identified in the report:
    - Federal law: Clarify that, in accordance with the NAGPRA, 25 USC 3001 et seq., USACE will not directly own or control lands used by this project. If this is not the case, additional mitigation and scheduling actions may be required.

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- State law: In addition to HRS Chapter 6E, HAR Chapter 13-300, Rules of Practice and Procedure Relating to Burial Sites and Human Remains, will need to be followed.

2. Identify general mitigation options for the inadvertent discovery of human remains, with each option outlining potential schedule needs based on HAR Chapter 13-300 (include schedule needs both for re-interment and for leaving remains in place).
3. List assumptions and procedures for implementation in the event a burial site is discovered during construction activities, including possible use of Cultural Monitors at key sites during construction. Suggest including delay time in project construction scheduling for at least one inadvertent discovery of potentially 90 days.
4. Develop a map of previously identified burials in the project area, especially in the vicinity of the proposed Ala Wai floodwall works and the Ala Wai Golf Course multi-purpose detention basin.

Literature Cited:

25 USC Chapter 32, 3001 Native American Graves Protection and Repatriation Act (NAGPRA), et seq.

Hawaii Administrative Rules, Title 13, Department of Land and Natural Resources, Subtitle 13 Historic Preservation Division, Chapter 300, Rules of Practice and Procedure Relating to Burial Sites and Human Remains, 1996. (HAR 13-300)

Hawai‘i Session Laws, Act 306, 1996.

Final Panel Comment 8

The risk and uncertainty associated with the outcome of the discovery of blackline Hawaiian damselfly in the vicinity of the Waihi Debris and Detention Structure have not been addressed and may require revisions to this TSP measure.

Basis for Comment

On July 28, 2015, the U.S. Fish and Wildlife Service (USFWS) announced that it had discovered the presence of endangered blackline Hawaiian damselfly in the project area (specifically, in the vicinity of the Waihi Debris and Detention Structure). The Ala Wai Canal FS/EIS Draft Report acknowledges the USFWS discovery but was unable to address it fully because of the report's imminent (August 2015) publication date. Appendix E5 Draft Biological Assessment (BA), which pre-dates this discovery, still states that "The proposed action is expected to have No Effect on the blackline Hawaiian damselfly." The Panel acknowledges that Section 7 formal consultation with the USFWS would not have been completed in time for publication of the Decision Document.

The TSP as defined in the report does not take into account the presence of blackline Hawaiian damselfly in the vicinity of the Waihi Debris and Detention Structure and the possible need to revise the TSP measure or the construction footprint. Because formal Section 7 consultation, with associated agency coordination, has not been completed, the potential impact of the proposed Waihi Debris and Detention Structure and its construction footprint on the blackline Hawaiian damselfly and critical habitat have not been quantified. It is unclear if there will be impacts to other TSP measures and to the site for the proposed compensatory mitigation. These impact refinements will depend on completion of the BA and the formal Section 7 consultation. Additional environmental impact analyses may be required should the TSP footprint change.

Report Section 5.7.2.2, page 5-45, states that construction of the Waihi Debris and Detention Structure

> "…could impact the blackline Hawaiian damselfly (**BIO-11**). Potential effects could include mortality or other forms of take (e.g., harm or harassment) as a result of heavy equipment used to clear the approximately one acre construction site and construct the Waihi debris and detention structure; other effects could include permanent loss of or temporary impacts to habitat. Although the detailed species occurrence information has not yet been provided by USFWS, based on the verbal description provided to date, the proposed action is likely to adversely affect the blackline Hawaiian damselfly." (per July 29, 2015 communication). "In accordance with Section 7 of the ESA, consultation with USFWS will identify actions to avoid and minimize potential impacts to the blackline Hawaiian damselfly. Potential actions could range from modification of project feature location or design to implementation of other measures to minimize impacts (**MM BIO-7**). The objective would be to reduce impacts to the blackline Hawaiian damselfly, such that the project would not be likely to adversely affect the species."(see page 5-45)

Note: **BIO** refers to Biological Resources Environmental Consequence and **MM** refers to Mitigation Measure.

Per "Endangered and Threatened Wildlife and Plants; Endangered Status for 23 Species on Oahu and Designation of Critical Habitat for 124 Species" (77 FR 57647), the blackline Hawaiian damselfly

> "…occurs in the slow sections or pools along mid-reach and headwater sections of perennial upland streams and in seep-fed pools along overflow channels bordering such streams… all colonies of the blackline Hawaiian damselfly are constrained to portions of

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streams not occupied by nonnative predatory fish—that is, stream portions above geologic or manmade barriers (e.g., waterfalls, steep gradients, dry stream midreaches, or constructed diversions)".

The requirement for formal Section 7 consultation, with associated agency coordination and support document review times, could also cause delays at the planning level.

Significance – Medium

Depending on the outcome of formal Section 7 consultation/coordination, the presence of the blackline Hawaiian damselfly could impact the TSP, its construction footprint, and possibly other project and mitigation measures.

Recommendation for Resolution

1. Complete formal Section 7 consultation/coordination with USFWS before the Ala Wai Canal FS/EIS Final Report is published, and revise the TSP if required.
2. Provide a better understanding of the blackline Hawaiian damselfly habitat needs and relationship to all relevant project alternative measures and to the site for the proposed compensatory mitigation.
3. Apply this type of information back to the TSP measures to ensure there is not a conflict for other measures besides the Waihi Debris and Detention Structure.
4. Refer to the public comment letter from Kathleen Martyn Goforth (EPA Region IX) 9-Nov-15, pages 260-267 (which further supports this comment regarding the blackline Hawaiian damselfly), and consider this letter when revising the report.

Literature Cited:

Endangered and Threatened Wildlife and Plants; Endangered Status for 23 Species on Oahu and Designation of Critical Habitat for 124 Species. Department of the Interior, Fish and Wildlife Service, Final Rule, 77 FR 57647 (September 18, 2012).

Final Panel Comment 9

Construction windows required to protect the Hawaiian hoary bat and the O'ahu 'elepaio are not consistently presented and may result in significant schedule and cost impacts.

Basis for Comment

Ala Wai Canal FS/EIS Draft Report Appendix E5, Draft BA, identifies construction windows, also known as construction exclusion periods, to protect the Hawaiian hoary bat and the O'ahu 'elepaio. These species are protected under the Endangered Species Act (ESA). However, Appendix D Cost Estimate, Section 3: Estimated Design and Construction Schedule does not identify any construction windows for protection of these species

Furthermore, construction windows outlined in the Draft BA and the report are inconsistent. Specifically, Table ES-6 (IMP BIO-8 and IMP BIO-9) and Section 5.7 (pages 5-43 and 5-44) contradict Appendix E5, pages 13 and 15. The inconsistencies and omissions are documented below. Note: **IMP** refers to Environmental Consequences and **BIO** refers to Biological Resources.

O'ahu 'elepaio

Page 5-44 in the report states:

> "Direct effects could include mortality or other forms of take (e.g., harm or harassment) to individual birds or destruction of their nests as a result of heavy equipment used to clear the site and construct the flood risk management structures. The use of heavy equipment would also generate noise, which could disrupt birds that are present within the action area. To minimize the potential for these impacts, trimming or clearing of vegetation in areas of suitable habitat would be restricted during the 'elepaio nesting season (January through May)."

Table ES-6 of the report states**:**

> "MM BIO-9: Trimming or clearing of vegetation in areas of suitable habitat would be restricted during the nesting season (January through May)."

However, Appendix E5 (BA) states:

> "Direct effects could include mortality or other forms of take (e.g., harm or harassment) to individual birds or destruction of their nests as a result of heavy equipment used to clear the site and construct the flood risk management structures. The use of heavy equipment would also generate noise, which could disrupt birds that are present within the action area. To avoid and minimize the potential for these impacts, trimming or clearing of vegetation in areas of suitable habitat would be restricted during the 'elepaio nesting season (January through June)."

Appendix D Section 3 does not include a construction window for this species. The construction windows could effectively restrict work on some upper watershed sites for between five and six months per year. The schedule and cost contingency should include site restrictions, construction window, and adjusted cost estimates.

Hawaiian hoary bat
Page 5-43 of the report states:

> "To avoid and minimize the potential for these impacts, removal of any woody vegetation that exceeds 15 feet in height would be conducted outside the season when lactating or non-volant bats could be present (June 1 through September 15). In addition, all construction activities would

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be scheduled to occur during daytime hours, thus avoiding potential bat foraging activities, which typically occur in the evening hours."

Table ES-6 of the report states:

> "MM BIO-8: Removal of vegetation >15 feet in height to be conducted outside the breeding season (June 1 through September 15). All construction activities would occur during daytime hours to avoid potential bat foraging activities."

Appendix E5 (BA) states:

> "To avoid and minimize the potential for these impacts, vegetation clearing for the project would be performed during times of the year when Hawaiian hoary bats are not expected to be breeding to avoid potential for harm or disruption to non-volant juvenile bats; specifically, trees greater than 15 feet in height would not be cleared between July 1 and August 1. In addition, all construction activities would be scheduled to occur during daytime hours, thus avoiding potential bat foraging activities, which typically occur in the evening hours."

Appendix D Section 3 does not include a construction window for this species. The construction windows could effectively restrict work on some upper watershed sites for between one and three-and-a-half months per year. The schedule and cost contingency needs to include site restrictions, construction window, and adjusted cost estimates.

Significance – Medium/Low

Inconsistencies and omissions regarding construction windows for protected species affect the completeness of the report.

Recommendation for Resolution

1. Make necessary revisions so that consistent information is shown on Table ES-6; in Section 5.7, pages 5-43 and 5-44; and in Appendix E5 (BA).
2. Include corrected required construction windows in Appendix D, Section 3.
3. Re-evaluate the schedule and cost contingency to include site restrictions and correct construction windows, and adjust estimates accordingly.

Final Panel Comment 10

The various alternatives, including the TSP, do not adequately address public and life safety issues (both adverse and beneficial) for the specific populations of children and the elderly.

Basis for Comment

Two populations, children and the elderly, are identified in the Ala Wai Canal FS/EIS Draft Report, but impacts to these populations are not adequately addressed under public and life safety hazards. Additional characterization of these populations in Sections 5.16 and 5.18 may be supported by information provided elsewhere in the report. It is likely that the project would benefit both populations, but this is not reflected in pertinent sections of the report as noted.

Children. Per Section 5.18.1.1 of the report:

> "The objective of [Executive Order] 13045 (Protection of Children from Environmental Health Risks and Safety Risks) is to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children."

The text in Section 5.18.2.2, page 5-89, notes no effects to human health, including no disproportionate impact on children, through discharge of pollutants or contaminants. However, the report does not address children who might be affected at the two schools that remain subject to flooding. Both Hokulani Elementary and Iolani School are identified as impacted under the TSP (affecting a total of approximately 2,250 students [page 3-25]) (see Sections 5.16 and 5.18).

The concept of "social fairness" as a screening criterion (as identified in Table 2 of the report) may apply. Social fairness is defined as "the extent to which the measure/alternative treats each community fairly (i.e., does not transfer flood risk to another community, or does not unfairly favor one community over another)." This criterion measures neighborhood impacts rather than schools. However, the report does not explain how the neighborhoods that contain the two affected schools are weighted.

The report also does not indicate the TSP benefits to a larger number of students compared with the No Action Alternative in Sections 5.16 and 5.18. Yet, page 2-2 identifies approximately 28,529 students within the 1% ACE floodplain. The reduction of adverse impacts to 2, 250 students would be significant and can be quantified to illustrate the benefit to this population. (Note that some discussion in Section 8 regarding the Iolani School could be included in Section 5.18.)

One well-designed map focused on the schools could be helpful, showing affected infrastructure (including major roadways) under the No Action Alternative and the TSP. Figures such as Figure ES-1 and Figure 4 used in the report do not provide a base to illustrate these impacts. Mitigation contributions from the non-Federal partner and others in the community, combined with structural and non-structural improvements that would benefit the student/child population, could also be identified.

Elderly. Per Section 5.18.1.2 of the report:

> "…the neighborhoods in the watershed all have a relatively high median age, which is indicative of a high percentage of elderly residents. The percentage of the population that is 65 years and older ranges from 17.3 (McCully/Mō'ili'ili) to 19.7 (Kaimuki); these values are all higher than the national average of 13.2 percent. Aging of the population is one of the most prominent population trends in Hawai'i."

Final Panel Comment 10

Although the higher percentage of elderly population is identified, it is not addressed elsewhere in the report. Additional information on public and life safety hazards under the TSP or other alternatives may help determine whether the project would benefit or adversely impact this significant population.

Significance – Medium/Low

Identification of project benefits as well as adverse impacts to both children (especially school populations) and elderly populations will address the proper application of social fairness as a screening criterion and compliance with Executive Order (EO) 13045.

Recommendation for Resolution

1. Include additional discussion on impacts and benefits to schools/children in Section 5.18, including statements and graphics regarding any beneficial impact of the TSP on schools.
2. Discuss mitigation opportunities from other sources and identify structural and non-structural improvements that would benefit the student/child population for Hokulani Elementary and Iolani School. Explain whether any benefits gained would outweigh adverse impacts to these important community facilities and the children.
3. In Sections 5.16 and 5.18, address the high elderly population in terms of benefits or adverse impacts under the TSP versus the No Action Alternative.
4. See public comment letters from: Kenneth Masden II (Hawai'i Department of Education) 30-Sep-15, pages 34-35; Les Ihara (Hawai'i Senator) 9-Nov-15, page 196; Reid Gushiken (Iloani School) 9-Nov-2015, pages 201-202; and Timothy Cottrell (Iolani School) 9-Nov-15, pages 203-212 regarding concerns related to project impacts on schools and schoolchildren, and consider these letters when revising the report.

Final Panel Comment 11

The life safety hazards associated with the failure of the floodwall, potential breach of the detention facilities, or performance of the detention facility for events greater than the design event are not discussed.

Basis for Comment

Ala Wai Canal FS/EIS Draft Report Section 8.3.3: Resiliency discusses how well the system performs in case of capacity exceedance or overtopping of the floodwalls, or how well a community can recover from an overtopping event usually by limiting the impacts from an overtopping event. The section also explains that the resiliency can be incorporated as a structural measure into a levee and floodwall design by constructing a scour protection apron on the protected side of the levee or floodwall for the purpose of minimizing erosion during flood events that exceed the top of wall elevation. Figure 21 of the report shows potential areas of shallow flooding due to overtopping of floodwalls/berms or failure of interior drainage system. The discussion following the figure focuses on the 1% ACE event, noting that the overtopping flow conditions would occur for short durations (30 minutes to 1 hour). However, Section 8.3.3 of the report does not discuss the resiliency of the system for events greater than the 1% ACE or life safety hazards associated with potential failure of the floodwall and/or berms.

Section 8.3.3 also addresses superiority—i.e., providing a defined location of initial overtopping. This section states that no superiority reach can be safely identified because of highly urbanized areas all around the Ala Wai Canal. This statement is correct on the Waikiki side, but there are several locations on the northern side where the overtopping location could be identified.

Section 8.3.3 focuses only on the floodwall feature of the project. To properly document the resiliency and life safety hazards associated with the TSP, the report should also discuss the resiliency and life safety hazards of the detention facilities. Specifically, the report should address the life safety hazards associated with the failure of the detention facilities and the performance of the detention facility and life safety hazards for events greater than the design event or the condition that the low-level outlets are completely blocked with debris.

Significance – Medium/Low

Including a discussion of the resiliency and life safety hazards for the TSP would not affect the study recommendations, but it would improve the overall completeness of the report.

Recommendation for Resolution

1. Revise Section 8.3.3 of the report to include a discussion on resiliency of the floodway for events greater than the 1% ACE event.
2. Discuss the life safety hazards associated with potential failure of the floodwall or detention facilities.
3. Discuss the performance of the detention facilities for events greater than the design event or for the condition that the low-level outlets are completely blocked with debris.

Final Panel Comment 12

Concerns noted in the public comments on the Ala Wai Canal project regarding the National Historic Preservation Act (NHPA) Section 106 consultation warrant further analysis and documentation.

Basis for Comment

During review of the public comments, the Panel found several issues raised by stakeholders and members of the public specifically with regard to steps in the NHPA Section 106 consultation process. Two members of the public provided comments regarding definitions of the Area of Potential Effect (APE) and Historic Property Effects Determinations, as well as consultation leading to those determinations. These concerns can be found in:

- Letter from Kiersten Faulkner (Historic Hawaii Foundation) 1-Nov-15, pages 47-60
- Letter from Michelle Matson 9-Nov-15, pages 283-295

The Panel notes that per the Ala Wai Canal FS/EIS Draft Report, Section 5.8.3:

> "A Programmatic Agreement is being developed to further identify resources, determine effects and establish the process for resolving adverse effects that may arise throughout the remaining planning, design, and construction phases of the project. This determination, with a request for concurrence, was provided to SHPO and other consulting parties in a letter dated June 29, 2015; responses from SHPO and other consulting parties are pending. Responses received, as well as the Final Programmatic Agreement will be included as part of the Final Feasibility Report/EIS. The Programmatic Agreement will be used to ensure that the USACE satisfies its responsibilities under Section 106 of the NHPA and other applicable laws and regulations."

However, in the Cultural Resources discussions (Section 5.8 of the report and Appendix F), there are inconsistencies between APE definitions and Historic Property Effects Determinations. For example, the APE definition appears to have evolved through correspondence provided in Appendix F. Clarification of the steps taken and decisions made in the Section 106 consultation activities would address the public's concerns and provide the documentation necessary to understand where the project is in the Section 106 consultation process.

The Panel bases the need for additional assessment and documentation of this issue on experience gained through previous work conducted in the project area that was delayed due to similar issues that arose after the project was under construction.

Significance – Medium-Low

Clarifying concerns raised in the public comments would make the document more complete and demonstrate compliance with Section 106 of the NHPA.

Recommendation for Resolution

1. Clearly define the APE and the Historic Property Effects Determinations, and explain the NHPA Section 106 consultation process as it relates to these cultural resource issues.

Final Panel Comment 13

The economic benefit of flood risk reduction was based on the median forecast of the sea level rise (SLR) over the period of analysis, which increases the uncertainty of the TSP.

Basis for Comment

The analysis of the future with and without the TSP was based on the assumption that SLR will occur at the median (in some instances referred to as the "intermediate") level estimate. This median rise is forecast to be 0.74 foot, while the low estimate is 0.25 foot and the high estimate is 2.22 feet (Ala Wai Canal FS/EIS Draft Report Table 21, page 5-18). The project performance and benefits derived from HEC-FDA modeling are based only on this SLR assumption. Appendix B, page B-3, states that the PED phase will utilize the intermediate value for SLR. Although the sensitivity of the SLR parameter might have been assessed as part of the HEC-FDA modeling, this assessment is not evident in the report. According to the Hawai'i Environmental Policy Act Citizen's Guide (page 16) (OEQC, 2014), the effect of SLR must be evaluated for all Hawai'i environmental assessments. Although the report does evaluate SLR, it does so only for the median/intermediate estimate. The wide range of SLR estimates gives rise to considerable uncertainty on project impacts. If the SLR proves to fall at the higher end of this range, the optimal height of the Ala Wai floodwalls would likely be higher. The benefits of the TSP would be lower if the high-SLR scenario were to occur.

Significance – Medium/Low

Improving the discussion on the selection of the median SLR will add to the completeness of the report but is unlikely to affect TSP selection.

Recommendation for Resolution

1. Analyze the sensitivity of the effects of low and medium SLR conditions.
2. Include results of the above analysis in the final report.
3. Provide the rationale for selecting the median case in the screening and selection of the TSP.

Literature Cited:

OEQC (2014). Hawai'i Environmental Policy Act Citizen's Guide. State of Hawai'i Office of Environmental Quality Control. October 2014. Available online at: http://oeqc.doh.hawaii.gov/Shared%20Documents/Preparation_of_Hawaii_Environmental_Policy_Act_Documents/2014%20HEPA%20Citizen's%20Guide.pdf

Final Panel Comment 14

The modeling of future with- and without-project benefits does not quantify the non-structural impacts of flooding on business interruption, the long-term effects on foreign tourism, or the loss of consumer surplus to domestic visitors.

Basis for Comment

The benefits and BCRs reported in the Decision Document are limited to with-project benefits associated with reduction in inundation damage to structures. However, considerable non-structural benefits would also accrue under with-project conditions because the project would reduce the likelihood of business interruptions and would avoid economic losses from foreign tourists traveling elsewhere. Although there is substantial discussion of these benefits, especially in Economics Appendix B Section 3.1.6 of the Ala Wai Canal FS/EIS Draft Report, they were excluded from the calculation of BCR or NED benefits. The discussion in Section 3.1.6 does recognize that while non-structural flood control benefits are typically Regional Economic Development (RED) benefits, an argument can be made that in the case of Honolulu, these benefits are properly NED benefits because of the isolation of the island and because of the large proportion of foreign tourism (Appendix B Economics, pages B-12, B19-20). Appendix Table B-3 documents the considerable impacts of tourism on the local and state economy. On page B-20, it is estimated that 30% of tourism expenditures are from foreign visitors. The report further notes that a major flooding event could have a chilling long-term impact on future foreign tourism and would have a prolonged business interruption impact on an area that comprises a major proportion of state employment and revenue. Despite the acknowledgment of this issue, these benefits were not included in the NED calculation; it also was noted that that this omission effectively results in a conservative estimate of project benefits. Furthermore, the with-project alternatives would contribute to NED benefits by avoiding loss of consumer surplus from domestic tourism. Consumer surplus from recreational activities is included as a NED benefit by the U.S. Water Resources Council (USWRC) Principles and Guidelines (USWRC, 1983). (Consumer surplus can be defined as the difference between what consumers must pay for goods and services and what they would be willing to pay for them).

The Panel agrees that with-project benefits from tax revenues and diversion of domestic tourism preferences to other domestic destinations are properly considered RED benefits. However, the Panel does not agree with the decision not to quantify the NED benefits associated with continued foreign tourism and business operations. Although it might be difficult to specify these benefits with high precision, a reasonable lower-bound estimate could be derived by utilizing the data presented in Appendix B.

Significance – Medium/Low

Not providing an estimate of project benefits properly attributable to the NED account effects the completeness of the report and understates the BCR.

Recommendation for Resolution

1. Consider including at least lower-bound estimates of non-structural benefits under the with-project alternatives, such as avoiding business interruptions and retaining foreign tourism revenues, in the benefit estimates and the BCRs.
2. Consider estimating the avoided loss of domestic consumer surplus and including the results in the BCR under the with-project alternatives.

Literature Cited:

USWRC (1983). Economic and Environmental Principles and Guidelines for Water and Related Land Resource Implementation Studies. U.S. Water Resources Council. USGPO, Washington DC. Section 2.82 Paragraph (a). Available online at: http://planning.usace.army.mil/toolbox/library/Guidance/Principles_Guidelines.pdf

Final Panel Comment 15

The assumptions used to define the discharge-versus-frequency relationships, and the uncertainties of these relationships, are inconsistent at various junction locations of the Ala Wai sub-watersheds.

Basis for Comment

Ala Wai Canal FS/EIS Draft Report Appendix A1, Section 5 documents the selection of the final discharge-versus-frequency relationships and the uncertainties of these relationships under the without-project conditions. The final peak discharges at junctions of interest for the sub-watersheds was defined in three steps: (1) the peak flow discharge values produced by each method were weighted; (2) all the available peak flow discharge values were plotted on log probabilistic graph paper by percent chance exceedance; and (3) the best fit curve of the peak flow discharges was graphed assuming watershed linearity—that is, that the peak flow discharge-frequency curves should be defined by a single function (illustrated as a smooth curve) for each sub-watershed.

The first step accounts for the known difference in the level of accuracy of the various methods. As stated in the report, the general order based on the level of accuracy (higher to lower) is flood frequency analysis of gage data, HEC-HMS modeling (calibrated), regression equations, and Plate 6 equations. The use of the weighted discharge would result in the adopted relationship being closest to the relationship with the highest level of accuracy. Step 2 indicates that all peak flow discharges were plotted on log probabilistic graph paper, with the final relationship being defined with a best fit curve. The use of a best fit curve approach is based on the assumption that all of the methods have the same level of accuracy. Therefore, there is an inherent inconsistency with the procedure described.

A review of the various figures shows that the weighted discharges were not included in the log probabilistic graphs, which could imply that the best fit of the peak flow discharge was completed for all of the flows expect for the weighted discharges. A review of the tabular data of the defined relationships (Appendix A1, Table 5-2 through Table 5-5, of the report) indicates that the weighted discharges were considered in defining the adopted discharge-versus-frequency relationship at several junction locations. However, this was not the case at the following locations: (1) the final relationship at JM1 is closest to the HEC-HMS relationship, (2) the final relationship at JP1 is closest to the gage flood frequency analysis relationship, and (3) the final relationship at JP4 is closest to the regression relationship. As a result, the defined relationships are inconsistent. For example, the final relationship for JP1 is closest to the gage flood frequency analysis relationship, while the relationship at the next downstream location (JP2) is closest to the regression relationship and then the weighted relationship, but not the flood frequency analysis relationship, which has the highest level of accuracy. The adopted approach also makes it difficult to assess how the relationships would change for the with-project conditions.

Another concern with the adopted procedure is the uncertainty of the adopted relationship. The uncertainty for the HEC-FDA analysis is defined using the Equivalent Years of Record (EYOR) approach. The adopted EYOR at several locations is not reflective of the adopted discharge-versus-frequency relationship. As an example, an EYOR of 30 years was used for the Ala Wai reach locations, but the discharge frequency relationship was defined using HEC-HMS (EYOR of 20 years), Plate 6 (EYOR of 10 years), and FEMA (EYOR of 15 years) data. Another example is an EYOR of 27 years for JP3, where the adopted relationship is closest to the regression method (EYOR of 15 years).

Changes in the discharge-versus-frequency relationship and uncertainty of these relationships could result in a reduction in project performance and an increase residual risk, resulting in a reduction in the BCR.

Final Panel Comment 15

Significance – Medium/Low

Inconsistencies in the assumptions used to define discharge-versus-frequency relationships under without-project conditions and changes to the uncertainty of these relationship will change the project performance at various junction locations, but the recommendation or justification of the project will not be affected.

Recommendation for Resolution

1. Revise the adopted discharge-versus-frequency relationship to ensure that it is closest to the weighted relationship or the relationship with the highest level of accuracy.
2. Revise the define EYOR in the HEC-FDA analysis to ensure that it is consistent with the adopted discharge-versus-frequency relationships.

Final Panel Comment 16

The operation and maintenance (O&M) requirements do not account for gate operations under conditions of rapidly arriving peak flows or overtopping of debris racks.

Basis for Comment

Floodgates

Ala Wai Canal FS/EIS Draft Report Appendix A2, Plate 11, TSP 35% Design sheet C-105 indicates a floodgate on Ala Wai Golf Course Road and two concrete slide gates adjacent to Pump Station #1. Sheet C-107 indicates a new floodgate in the vicinity of McCully Street. Section 2.1.1: Flood-Related Problems of the report states that the time to peak flow is only 30 minutes. Section 3.6.5.1 Refinement and Analysis of Final Array of the report indicates adding the golf course floodgate. Table 9 of the report indicates annual O&M of the gates without providing further detail on those activities. Additional details in Table 9 regarding O&M, as indicated below, would better inform the non-Federal sponsor understanding of project requirements.

Floodgates such as those on the Ala Wai Golf Course Road and near Mc Cully Street typically operate under a “normally open” mode and are to be closed in the event of high water. The concrete slide gates would typically operate in “normally closed” mode. Typical floodgate O&M includes annual lubrication and exercise of the gate to ensure that the gate functions properly and that the staff are trained in proper gate operation.

The Panel is concerned that with a stated 30-minute duration to peak flow, there will not be sufficient time to assemble staff to close the “normally open” golf course road and McCully Street floodgates in the event of a heavy storm event. If the golf course road floodgate were operated in “normally closed” mode, the Panel is concerned that extra wear and tear on the gate due to many more open/close cycles will result in increased operation, maintenance, repair, rehabilitation and replacement cost or a gate out-of-service for periods of time. An open or inoperable floodgate would effectively provide a breach in the line of protection during a high-water event. The public’s presumed preference for ‘normally open’ floodgates would compromise project ‘effectiveness’ and ‘completeness.’ ‘Normally closed’ but frequently cycled gates would affect project O&M cost and ‘acceptability’.

Note that Appendix G: Public and Agency Comment of the report mentions a local desire for more floodgates in floodwalls to reduce impacts to canal public access. Neither the TSP nor the NED Plan includes these requested additional floodgates; however, if additional gates were incorporated into either plan, this Final Panel Comment would apply to those additional floodgates as well.

Debris

Report Section 2.1.1: Flood Related Problems, Section 2.1.2: Flood Related Opportunities, and many other report sections describe debris from the upper watershed as an exacerbating issue with regard to effective flood risk reduction. Therefore, management of this debris is listed as an important flood risk reduction measure. Appendix A2, Plate 11 Tentatively Selected Plan 35% Design sheet C-301 Waihi Debris and Detention Basin, sheet C-302 Waiakeakua Debris and Detention Basin, sheet C-308 Waiomao Debris and Detention Basin, sheet C-313 Pukele Debris and Detention Basin, and sheet C-315 Makiki Debris and Detention Basin illustrate detention basin debris structures consisting of steel posts 8 feet high and 4 feet on-center. Detention basin spillway elevations are 3 feet to 10 feet higher than the debris-catching steel posts. During high-flow events, as the detention basin fills, any floating debris could be lifted over the steel posts; subsequently, as the detention basin water level drops, that floating debris could enter and obstruct the arch culvert. If this type of blockage were not promptly removed, it could

Final Panel Comment 16

induce increased bottom scour, requiring repair. Culvert cleaning and repair as a result of debris overtopping debris-catching structures increases O&M cost. It is worth noting that a blocked culvert does not affect the operation of the detention basin during the actual high-water event.

Note that a comment from Lloyd Nakata, P.E., on pages 3 through 8 of the public comments document cites empirical evidence regarding the transport of boulders within the debris of at least one stream (Waiakeakua) and their possible impact on detention basin O&M. That public comment supports this Final Panel Comment.

Significance – Low

A full description of gate operations and detention basin debris clearing, including an explanation of how they affect project effectiveness and the cost of O&M, will increase the understanding of the project.

Recommendation for Resolution

1. In Section 3.6.5.1 and Table 9 of the report, clarify whether floodgates are to be operated as 'normally open' or 'normally closed,' and address O&M constraints for each condition. If 'normally open,' address the process for closing the gates within 30 minutes. If 'normally closed,' address the increased life-cycle cost to O&M.
2. In Section 3.6.5.1 and Table 9 of the report, identify the conditions during O&M that would require the non-Federal sponsor to clear debris that has floated over the 8-foot-high catchment posts to prevent blockage of or damage to culverts.

Final Panel Comment 17

The method and assumptions for calibrating the steady flow hydraulic model used to define the stage-versus-discharge relationships, and the uncertainty of these relationships, are not discussed.

Basis for Comment

Appendix A1 of the Ala Wai Canal FS/EIS Draft Report includes a detailed discussion describing the calibration of the hydrology for the existing conditions and defining the necessary hydrologic relationships for the HEC-FDA (risk and uncertainty analysis). Similar discussions are not provided for the hydraulic relationships required for the HEC-FDA analysis. Appendix A2 of the report discusses the development of the hydraulic model in detail. The appendix also includes a limited discussion about the calibration of the hydraulic model. However, it does not discuss the development of the stage-versus-discharge relationship and uncertainty of the relationship required for the HEC-FDA analysis. Documentation of this information in the report is necessary to support the assessment of the project performance and benefits (HEC-FDA analysis).

Significance – Low

A discussion related to the calibration of the hydraulic model, development of the hydraulic relationships for the HEC-FDA analysis, and the uncertainty of these relationships would not affect the study recommendations but would improve the overall completeness of the report.

Recommendation for Resolution

1. Provide a more thorough discussion on the calibration of the hydraulic model in Appendix A2 of the final report.
2. Discuss the development of the hydraulic relationships (stage versus discharge) and uncertainty of these relationships used in the HEC-FDA analysis in Appendix A2 of the final report.

Final Panel Comment 18

The hydrologic model was calibrated to several different events; however, no discussion is presented on the performance of the model with the final calibrated model parameters.

Basis for Comment

Ala Wai Canal FS/EIS Draft Report Appendix A1, Sections 4.4 and 4.5 document the calibration of the HEC-HMS model. Section 4.4 of the report focuses on the calibration of the Manoa-Palolo sub-watershed model, which was calibrated at two to three locations (depending on the event) for three different flood events: (1) October 2004, (2) December 1967, and (3) March 2006. The calibration of the Makiki sub-watershed, documented in Section 4.5, was calibrated at one location using the peak discharge associated with the October 2004 event.

The calibrated parameters for each event, final adopted (weighted averaged) parameters, and comparison plots of observed versus simulated hydrographs are presented in the report for each calibrated event. However, tabular values to clearly identify the performance of the calibrated models are missing. Common statistical data associated with the calibrated model that were not provided in the report include (1) percent difference of peak discharge, (2) percent difference of runoff volume, (3) root mean square error, and (4) Nash-Sutcliffe model efficiency coefficient.

As previously stated, the Manoa-Palolo sub-watershed was calibrated using three flood events. The final calibrated model is based on a weighted average of the parameters determined from the three events, with the October 2004 and December 1967 events given twice the weight as the March 2006 event. Information on the performance of the final calibrated model is not included in the report. This information is needed to document the overall performance of the final calibrated model.

The calibrated model was then utilized with precipitation frequency information to estimate the discharge-versus-frequency relationships at various locations within the Ala Wai watershed. This approach is based on the assumption that the rainfall frequency is equivalent to the discharge frequency relationship; however, this is not always the case due to many factors influencing runoff from the watershed. Therefore, additional calibration efforts would ensure that the model appropriately simulates the discharge-versus-frequency relationship defined at the various gage locations.

Significance – Low

The overall completeness of the report would be improved by documenting the performance of the HEC-HMS model with the final calibrated model parameters.

Recommendation for Resolution

1. Revise Section 4.5 of the report to include numeric values of the comparison of the observed and simulated peak discharges for the calibrated event.
2. Revise Section 4.4 of the report to include the following values for each of the calibrated events: (1) percent difference of peak discharge, (2) percent difference of runoff volume, (3) root mean square error, and (4) Nash-Sutcliffe model efficiency coefficient.
3. Revise Section 4.4 of the report to include the following values for the final calibrated model (each of the calibrated events): (1) percent difference of peak discharge, (2) percent difference of runoff volume, (3) root mean square error, and (4) Nash-Sutcliffe model efficiency coefficient.
4. Calibrate the HEC-HMS model to the discharge-versus-frequency relationships at the various gage locations.

Final Panel Comment 19

The values for costs, benefits, and BCR in Tables ES-1 and ES-4 are inconsistent.

Basis for Comment

Table ES-1 of the Ala Wai Canal FS/EIS Draft Report Executive Summary shows a BCR of 3.62 for Alternative 3A (this table also appears in the report as Table 11). The report text accompanying Table 11 explains that the values are based on the 10% design, and the table title characterizes it as the "Refined Cost and Benefit Estimates." Table ES-4 in the Executive Summary and Table 16 of the report present the BCRs for optimization results ranging from 2.21 to 2.38, the latter being the BCR for the TSP. The report text accompanying Table 16 discusses floodwall heights and supports the selection of the originally selected floodwall height of 4 feet as optimal. The small ($2 million) cost difference does not explain why the BCR is lowered 35% between Table ES-4 and Table 16. The change is largely due to lower benefits, but the report does not explain why the benefits are so much lower in the optimized result. The Panel understands that the decreased benefits in the optimized result were due to changes in the hydrologic and hydraulic modeling analysis as the estimates were refined between the 10% and 35% design calculations. However, this information is not presented in the report.

Significance – Low

While the results presented in the tables are correct, the documentation of the process and analyses are incomplete, and the discrepancy in the tables could be misconstrued.

Recommendation for Resolution

1. Discuss why the benefits of Alternative 3A were reduced in the 35% design estimates in both the Executive Summary and Section 3 of the report.
2. Consider changing the Executive Summary presentation so that the first table does not present a BCR which has been superseded by a more accurate estimate.

5. REFERENCES

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APPENDIX A

IEPR Process for the Ala Wai Canal Project

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A.1 Planning and Conduct of the Independent External Peer Review (IEPR)

Table A-1 presents the schedule followed in executing the Ala Wai Canal Project, Island of O'ahu, Hawai'i, Feasibility Study with Integrated Environmental Impact Statement Independent External Peer Review (hereinafter: Ala Wai Canal IEPR). Due dates for milestones and deliverables are based on the award/effective date of September 20, 2015. The review documents were provided by U.S. Army Corps of Engineers (USACE) on September 23, 2015. Note that the work items listed under Task 6 occur after the submission of this report.

Battelle will enter the 19 Final Panel Comments developed by the Panel into USACE's Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle. Battelle will provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closeout, as a final deliverable and record of the IEPR results.

Table A-1. Ala Wai Canal Complete IEPR Schedule

Task	Action	Due Date
1	Notice to Proceed (NTP)	9/20/2015[1]
	Review documents available	9/23/2015
	Battelle submits draft Work Plan[a]	9/25/2015
	USACE provides comments on draft Work Plan	10/2/2015
	Battelle submits final Work Plan[a]	10/9/2015
2	Battelle requests input from USACE on the conflict of interest (COI) questionnaire	9/22/2015
	USACE provides comments on COI questionnaire	9/24/2015
	Battelle submits list of selected panel members[a]	10/2/2015
	USACE confirms the panel members have no COI	10/6/2015
	Battelle completes subcontracts for panel members	10/15/2015
3	Battelle convenes kick-off meeting with USACE	9/24/2015
	Battelle sends review documents to panel members	10/16/2015
	Battelle convenes kick-off meeting with panel members	10/19/2015
	Battelle convenes kick-off meeting with USACE and panel members	10/19/2015
	Battelle convenes Mid-Review Teleconference for panel members to ask clarifying questions of USACE	10/26/2015
4 – Review documents	Panel members complete their individual reviews	11/2/2015
	Battelle provides panel members with talking points for Panel Review Teleconference	11/5/2015

Table A-1. Ala Wai Canal Complete IEPR Schedule (continued)

Task	Action	Due Date
4	Battelle convenes Panel Review Teleconference	11/6/2015
	Battelle provides Final Panel Comment templates and instructions to panel members	11/9/2015
	Panel members provide draft Final Panel Comments to Battelle	11/17/2015
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	11/18-29/2015
	Panel finalizes Final Panel Comments	12/4/2015
4 - Public comments	Battelle receives the public comments from USACE	11/24/2015
	Battelle sends public comments to Panel	11/25/2015
	Panel completes its review of the public comments	11/30/2015
	Battelle and Panel review Panel's responses to public comments	11/30/2015
	Panel drafts Final Panel Comment for public comments, if necessary	12/1/2015
	Panel finalizes Final Panel Comment regarding public comments	12/2/2015
5	Battelle provides Final IEPR Report to panel members for review	12/7/2015
	Panel members provide comments on Final IEPR Report	12/8/2015
	Battelle submits Final IEPR Report to USACE[a]	12/9/2015
	USACE PCX Provides Decision on Final IEPR Report Acceptance	12/16/2015
6[b]	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	12/18/2015
	Battelle convenes teleconference with USACE to review the Post-Final Panel Comment Response Process	12/18/2015
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process	12/18/2015
	USACE PDT provides draft Evaluator Responses to USACE PCX for review	1/6/2016
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses	1/12/2016
	USACE PCX provides draft PDT Evaluator Responses to Battelle	1/13/2016
	Battelle provides the panel members the draft PDT Evaluator Responses	1/15/2016
	Panel members provide Battelle with draft BackCheck Responses	1/21/2016
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	1/22/2016
	Battelle convenes Comment-Response Teleconference with panel members and USACE	1/25/2016
	USACE inputs final PDT Evaluator Responses to DrChecks	2/1/2016

Table A-1. Ala Wai Canal Complete IEPR Schedule (continued)

Task	Action	Due Date
	Battelle provides final PDT Evaluator Responses to panel members	2/3/2016
	Panel members provide Battelle with final BackCheck Responses	2/8/2016
	Battelle inputs the Panel's final BackCheck Responses in DrChecks	2/16/2016
	Battelle submits pdf printout of DrChecks project file[a]	2/17/2016
	Agency Decision Milestone Meeting[c]	1/2016
	Civil Works Review Board[c]	10/23/2016[d]
	Contract End/Delivery Date	5/31/2016[d]

a Deliverable.

b Task 6 occurs after the submission of this report

c The Agency Decision Milestone (ADM) and CWRB meeting were listed in the Performance Work Statement under Task 3 but were relocated in this schedule to reflect the chronological order of activities.

d A time extension is required to accommodate the CWRB and project closeout activities, which includes time to close out subcontracts with panel members.

At the beginning of the Period of Performance for the Ala Wai Canal IEPR, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., clarify expertise areas needed for panel members). Any revisions to the schedule were submitted as part of the final Work Plan. The final charge consisted of 17 charge questions provided by USACE, two overview questions and one public comment question added by Battelle (all questions were included in the draft and final Work Plans), and general guidance for the Panel on the conduct of the peer review (provided in Appendix C of this final report).

Prior to beginning their review and within 1 day of their subcontracts being finalized, all the members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel. Before the meeting, the IEPR Panel received an electronic version of the final charge, as well as the Ala Wai Canal review documents and reference materials listed below. The documents and files in bold font were provided for review; the other documents were provided for reference or supplemental information only.

- Draft Feasibility Report with Integrated EIS (250 pages)
- Appendix A1. Hydrology and Appendix A2, A3, & A4. Hydraulics and Plates (467 pages)
- Appendix B. Economics (83 pages)
- Appendix C. Real Estate (59 pages)
- Appendix D. Cost Engineering (88 pages)
- Appendix E. Environmental & Regulatory Compliance (436 pages)
- Appendix F. Cultural Resources (382 pages)
- Appendix G. Public Involvement (75 pages)
- Public Comments (332 pages)

- Risk Register
- Decision Management Plan
- USACE guidance, *Civil Works Review* (EC 1165-2-214), December 15, 2012
- Office of Management and Budget, *Final Information Quality Bulletin for Peer Review,* December 16, 2004.

About halfway through the review of the Ala Wai Canal IEPR documents, a teleconference was held with USACE, the Panel, and Battelle so that USACE could answer any questions the Panel had concerning either the review documents or the project. Prior to this teleconference, Battelle submitted 16 panel member questions to USACE. USACE was able to provide responses to all the questions during the teleconference. Written responses were provided to the Panel via email on November 2, 2015.

In addition, throughout the review period, USACE provided documents at the request of panel members. These documents were provided to Battelle and then sent to the Panel as additional information only and were not part of the official review. A list of these additional documents requested by the Panel is provided below.

- Ala Wai Historic Properties Assessment Final 18 March 10
- Cultural Resources and Ethnographic Study for the Ala Wai Watershed Project: Makiki, Manoa, and Palolo Ahupua'a, Honolulu District O'ahu Island Volumes I and II, April 2010.

A.2 Review of Individual Comments

The Panel was instructed to address the charge questions/discussion points within a charge question response table provided by Battelle. At the end of the review period, the Panel produced individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. At the end of the review, Battelle summarized the individual comments in a preliminary list of 27 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

A.3 IEPR Panel Teleconference

Battelle facilitated a 3.5-hour teleconference with the Panel so that the panel members could exchange technical information. The main goal of the teleconference was to identify which issues should be carried forward as Final Panel Comments in the Final IEPR Report and decide which panel member should serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the Final IEPR Report would accurately represent the Panel's assessment of the project, including any conflicting opinions. The Panel engaged in a thorough discussion of the overall positive and negative comments, added any missing issues of significant importance to the findings, and merged any related individual comments. At the conclusion of the teleconference, Battelle reviewed each Final Panel Comment with the Panel, including the associated level of significance, and confirmed the lead author for each comment.

At the end of these discussions, the Panel identified 20 comments and discussion points that should be brought forward as Final Panel Comments.

A.4 Preparation of Final Panel Comments

Following the teleconference, Battelle prepared a summary memorandum for the Panel documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the Ala Wai Canal IEPR:

- Lead Responsibility: For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed the merged individual comments table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.
- Directive to the Lead: Each lead was encouraged to communicate directly with the other panel members as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- Format for Final Panel Comments: Each Final Panel Comment was presented as part of a four-part structure:

    1. Comment Statement (succinct summary statement of concern)
    2. Basis for Comment (details regarding the concern)
    3. Significance (high, medium/high, medium, medium/low, and low; see description below)
    4. Recommendation(s) for Resolution (see description below).

- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:

    1. **High:** Describes a fundamental issue with the project that affects the current recommendation or justification of the project, and which will affect its future success, if the project moves forward without the issue being addressed. Comments rated as high indicate that the Panel determined that the current methods, models, and/or analyses contain a “showstopper” issue.

    2. **Medium/High:** Describes a potential fundamental issue with the project, which has not been evaluated at a level appropriate to this stage in the SMART Planning process. Comments rated as medium/high indicate that the Panel analyzed or assessed the methods, models, and/or analyses available at this stage in the SMART Planning process and has determined that if the issue is not addressed, it could lead to a “showstopper” issue.

    3. **Medium:** Describes an issue with the project, which does not align with the currently assessed level of risk assigned at this stage in the SMART Planning process. Comments rated as medium indicate that, based on the information provided, the Panel identified an issue that would raise the risk level if the issue is not appropriately addressed.

    4. **Medium/Low:** Affects the completeness of the report at this time in describing the project, but will not affect the recommendation or justification of the project. Comments rated as

medium/low indicate that the Panel does not currently have sufficient information to analyze or assess the methods, models, or analyses.

5. **Low:** Affects the understanding or accuracy of the project as described in the report, but will not affect the recommendation or justification of the project. Comments rated as low indicate that the Panel identified information that was mislabeled or incorrect or that certain data or report section(s) were not clearly described or presented.

- Guidelines for Developing Recommendations: The recommendation section was to include specific actions that USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. At the end of this process, 18 of the original 20 Final Panel Comments were prepared and assembled. During the Final Panel Comment development process, the Panel determined that two of the Final Panel Comments no longer were needed. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Final Panel Comments are presented in the main report.

A.5 Conduct of the Public Comment Review

Battelle received a PDF file containing 332 pages of public comments on the Ala Wai Canal (approximately 64 written comments) and a spreadsheet summarizing the letters received from USACE on November 24, 2015. Battelle then sent the public comments to the panel members on November 25, 2015, along with the following charge question:

1. **Does information or do concerns raised in the public comments raise any additional discipline-specific technical concerns with regard to the overall report?**

The Panel produced individual comments in response to the charge question. Each panel member's individual comments were shared with the full Panel via email. Battelle reviewed the comments to identify any new technical concerns that had not been previously identified during the initial IEPR. The panel members confirmed that one new Final Panel Comment would be developed to summarize the additional issue raised by the IEPR Panel.

One panel member was identified by Battelle as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to the other panel members and Battelle. The Final Panel Comment was developed as part of the four-part structure following guidance previously described in the Final IEPR Report.

Battelle reviewed and edited the Final Panel Comment for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that the comment did not make any observations regarding either the appropriateness of the selected alternative or USACE policy. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comment.

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APPENDIX B

Identification and Selection of IEPR Panel Members for the Ala Wai Canal Project

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B.1 Panel Identification

The candidates for the Ala Wai Canal Project, Island of O'ahu, Hawai'i, Feasibility Study with Integrated Environmental Impact Statement (hereinafter: Ala Wai Canal IEPR) Panel were evaluated based on their technical expertise in the following key areas: Civil Works planning/economics, hydraulic and hydrology engineering, structural/civil engineering, and environmental law compliance/biological and cultural resources. These areas correspond to the technical content of the Ala Wai Canal IEPR review documents and overall scope of the Ala Wai Canal project.

To identify candidate panel members, Battelle reviewed the credentials of the experts in Battelle's Peer Reviewer Database, sought recommendations from colleagues, contacted former panel members, and conducted targeted Internet searches. Battelle evaluated these candidate panel members in terms of their technical expertise and potential conflicts of interest (COIs). Of these candidates, Battelle chose the most qualified individuals, confirmed their interest and availability, and ultimately selected four experts for the final Panel. The remaining candidates were not proposed for a variety of reasons, including lack of availability, disclosed COIs, or lack of the precise technical expertise required.

The candidates were screened for the following potential exclusion criteria or COIs.[1] These COI questions serve as a means of disclosure and to better characterize a candidate's employment history and background. Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit.

- Previous and/or current involvement by you or your firm[2] in the Ala Wai Canal, Island of O'ahu, Hawai'i, Integrated Feasibility Study/Environmental Impact Statement (FS/EIS) Draft Report
- Previous and/or current involvement by you or your firm[2] in flood control in Hawaii
- Previous and/or current involvement by you or your firm[2] in Ala Wai Canal, Island of O'ahu, Hawai'i, FS/EIS related projects.
- Previous and/or current involvement by you or your firm[2] in the conceptual or actual design, construction, or operation and maintenance (O&M) of any flood risk or stormwater management projects in the Ala Wai Canal watershed, Island of O'ahu, Hawai'i.
- Current employment by the U.S. Army Corps of Engineers (USACE).

[1] Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. See OMB (2004, p. 18), "….when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects."

[2] Includes any joint ventures in which a panel member's firm is involved and if the firm serves as a prime or as a subcontractor to a prime.

- Previous and/or current involvement with paid or unpaid expert testimony related to the Ala Wai Canal, Island of O'ahu, Hawai'i, FS/EIS.

- Previous and/or current employment or affiliation with the non-Federal sponsors:

  State of Hawai'i, as represented by the Department of Land and Natural Resources (DLNR) (for pay or pro bono).

- Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to the southern side of the island of O'ahu, Hawai'i.

- Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, Engineer Research and Development Center [ERDC], etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Honolulu District.

- Previous or current involvement with the development or testing of models that will be used for, or in support of the Ala Wai Canal, Island of O'ahu, Hawai'i, Feasibility Report/EIS project.

- Current firm[2] involvement with other USACE projects, specifically those projects/contracts that are with the Honolulu District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the Honolulu District. Please explain.

- Any previous employment by USACE as a direct employee, notably if employment was with the Honolulu District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.

- Any previous employment by USACE as a contractor (either as an individual or through your firm[2]) within the last 10 years, notably if those projects/contracts are with the Honolulu District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.

- Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning flood management, and include the client/agency and duration of review (approximate dates).

- Pending, current, or future financial interests in Ala Wai Canal, Island of O'ahu, Hawai'i, Feasibility Report/EIS related contracts/awards from USACE.

- Significant portion of your personal or office's revenues within the last three years came from USACE contracts.

- Significant portion of your personal or office's revenues within the last three years came from State of Hawai'i, as represented by the DLNR contracts.

- Any publicly documented statement (including, for example, advocating for or discouraging against) related to the Ala Wai Canal, Island of O'ahu, Hawai'i, FS/EIS.
- Participation in relevant prior and/or current Federal studies relevant to this project and/or the Ala Wai Canal, Island of O'ahu, Hawai'i, FS/EIS
- Previous and/or current participation in prior non-Federal studies relevant to this project and/or the Ala Wai Canal, Island of O'ahu, Hawai'i, FS/EIS
- Is there any past, present, or future activity, relationship, or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project? If so, please describe.

Other considerations:

- Participation in previous USACE technical review panels.
- Other technical review panel experience.

B.2 Panel Selection

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. All four final reviewers are affiliated with consulting companies. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. USACE was given the list of candidate panel members, but Battelle selected the final Panel.

Table B-1 presents an overview of the credentials of the final four members of the Panel and their qualifications in relation to the technical evaluation criteria. More detailed biographical information regarding each panel member and his or her area of technical expertise is given in Section B.3.

Table B-1. Ala Wai Canal IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Feldman	Morsicato	Bahner	Brozek
Civil Works Planning/Economics				
Minimum 10 years of experience in Civil Works planning	X			
Familiar with large, complex Civil Works projects with high public and interagency interests	X			
Very familiar with USACE plan formulation process, procedures, and standards as they relate to flood risk management	X			
Minimum of five years of experience directly dealing with the USACE six-step planning process, which is governed by Engineer Regulation [ER] 1105-2-100, Planning Guidance Notebook.	X			
Experience related to economic evaluation of traditional National Economic Development (NED) plans	X			
Experience related to economic evaluation of National Ecosystem Restoration (NER) plan benefits associated with flood risk management projects	X			
Experience with Cost Effectiveness/Incremental Cost Analysis (CE/ICA) and trade-off analysis	X			
Experience in the use of the Hydrologic Engineering Center's Flood Damage Reduction Analysis (HEC-FDA) model	X			
Experience with the Institute for Water Resources (IWR) Planning Suite	X			
Degree in economics or related field	X			
Environmental Law Compliance/Biological & Cultural Resources				
Minimum 15 years of experience directly related to water resource environmental evaluation or review and National Environmental Policy Act (NEPA) compliance		X		
Familiar with large, complex civil works projects with high public and interagency interests		X		
Familiar with the habitat, fish and wildlife species, and tribal cultures and archeology that may be affected by the project alternatives in this study area (i.e. Ala Wai Watershed located on the southeastern side of the island of O'ahu, Hawai'i).		X		
Experienced with National Historic Preservation Act (NHPA) consultation specifically related to the archeology and history of Pacific Islands		X		
Expert in compliance with additional environmental laws, policies, and regulations, including compliance in Fish and Wildlife Coordination Act, Clean Water Act and Endangered Species Act		X		
Familiar with United States Fish and Wildlife Service Habitat Evaluation Procedure (HEP) (USFWS, 1980)		X		
MS degree or higher in a related field		X		
Hydrology and Hydraulic Engineering				
Minimum 15 years of experience in hydrologic and hydraulic engineering as it relates to flood risk management in flash-flood urbanized watersheds (preferably with familiarity of tropical and mountain systems)			X	
Familiar with large, complex civil works projects with high public and interagency interests			X	

Table B-1. Ala Wai Canal IEPR Panel: Technical Criteria and Areas of Expertise (Continued)

Technical Criterion	Feldman	Morsicato	Bahner	Brozek
Familiar with:				
application of detention/retention basins,			X	
application of flood walls,			X	
non-structural solutions involving flood warning systems and flood proofing,			X	
computer modeling such as Hydraulic Engineering Center River Analysis System (HEC-RAS)			X	
Familiar with Executive Order (EO) 11988 Floodplain Management (May 1977).			X	
Degree in engineering			X	
Structural/Civil Engineering				
Minimum 15 years of experience in engineering				X
Familiar with large, complex civil works projects with high public and interagency interests				X
Extensive experience in:				
earthen berm designs for flow through flood water detention basins				X
reinforced concrete design /construction/evaluation of flood risk management structures (i.e., concrete channels, floodwalls, levee embankments, etc.), including pump stations to maintain internal drainage				X
Familiarity and experience in working with geotechnical evaluations and geo-civil design for flood risk management projects				X
Capable of addressing the USACE Safety Assurance Review (SAR) aspects of all projects. See EC 1165-2-214, Appendix D, Para. 2.c(3)				X
Degree in engineering				X

B.3 Panel Member Qualifications

Marvin Feldman, Ph.D.

Role: Civil Works planning/economics expert
Affiliation: Resource Decisions

Dr. Feldman, an independent consultant and principal economist at Resource Decisions, has more than 35 years of experience in water resource and environmental economics. He earned his M.S. in water resource management in 1969 and a Ph.D. in natural resource economics in 1979 from the University of Wisconsin.

Dr. Feldman is experienced in the evaluation and conduct of complex multi-objective public works projects with high public and interagency interests, including flood risk analysis. As a senior economist at the University of Wisconsin under contract to the U.S. Department of Energy, he worked on developing a multi-attributable site selection model for evaluating risks of alternative sites for the Preliminary Nevada High-level Nuclear Waste Siting Analysis. For the Smith Lake Improvement and Stakeholder Association (SLISA), Alabama, he provided economic evaluation of alternative costs and benefits of municipal and industrial, navigation, recreation, and hydroelectric water uses and non-power evaluations for recreation, property values flood control, navigation, and erosion control to support SLISA's negotiations with the Federal Energy Regulatory Commission and Alabama Power. For the Alaska Department of Natural Resources, he applied risk/cost/benefit analysis to environmental protection methods for petroleum exploration in the Beaufort Sea.

Dr. Feldman is familiar with the USACE plan formulation process, procedures, and standards as they relate to flood risk management and has more than 30 years of demonstrable experience dealing directly with the USACE Six-Step Planning Process, governed by ER 1105-2-100, Planning Guidance Notebook. Most notably, he applied the Six-Step Process to his work on the USACE/Bureau of Reclamation Central Arizona Water Control Study.

Dr. Feldman's has experience related to the economic evaluation of traditional National Economic Development (NED) plans, including as part of the University of Wisconsin test team that helped develop the original U.S. Water Resources Council (USWRC) Principles and Guidelines. In conjunction with the USACE/Bureau of Reclamation Central Arizona Water Control Study, he designed a multi-attribute utility analysis framework for selecting preferred alternatives. This framework included flood risk management and National Ecosystem Restoration (NER) attributes and structured the tradeoffs among hundreds of alternative plans with regard to these and other attributes. The framework allowed the specification of minimum and maximum acceptable attribute values. Identification of attributes and the importance of weighting these attributes was a key aspect of the public involvement program. By focusing the public involvement on NER and flood control, as well as other key attributes, the plan selection process was more cooperative and less competitive. While working at USACE Sacramento District, he developed and applied a methodology for the cost effectiveness / incremental cost analysis (CE/ICA) of alternative mitigation measures to enhance the habitat of the endangered winter-run salmon on the Sacramento River.

Dr. Feldman has a strong working knowledge of USACE economic benefit calculations. Throughout his career, he has conducted studies requiring economic benefit analysis for flood risk management. For example, he evaluated the state-of-the-art municipal and industrial water conservation benefit evaluation techniques for the California Urban Water Conservation Council (CUWCC), and identified promising methods for application by CUWCC member water agencies in evaluating their conservation options. His

advanced expertise and extensive experience in flood damage analysis and risk and decision analysis is reflected in his work on such studies as the Smith Lake-Black Warrior River (Alabama) benefit-cost analysis of lake levels, studies of cost-benefit tradeoffs for the North Fork of the Feather River (Pacific Gas and Electric, California), and an economic analysis of agricultural diversion alternatives for the Glenn-Colusa Irrigation District (California).

Dr. Feldman is also familiar with methodologies for estimating damages, including the Hydrologic Engineering Center's Flood Damage Reduction Analysis (HEC-FDA) software. His familiarity with HEC-FDA includes his knowledge of inputs, assumptions, calculations, and results attributed to the program. He has applied his knowledge of USACE flood risk management and damage calculations/analysis in his work as economist/planner on the USACE/Bureau of Reclamation Central Arizona Water Control Study. This study was a flood control and dam safety study involving the consideration of feasibility alternatives and the selection of preferred alternatives. Other studies requiring the assessment of risk and damage included the aforementioned Preliminary Nevada High-level Nuclear Waste Siting and the SLISA studies. Dr. Feldman has participated on a previous USACE IEPR (model certification review) panel as an economics expert for the Institute of Water Resources (IWR) Planning Suite Model II Review.

Joanna Morsicato

Role: Environmental law compliance/biological & cultural resources expert
Affiliation: Michael Baker International

Ms. Morsicato is currently the environmental and planning lead at Michael Baker International. She has 40 years of experience working on environmental protection programs using applicable laws, regulations, and practices associated with the National Environmental Policy Act (NEPA), Clean Air Act (CAA), Clean Water Act (CWA), Endangered Species Act (ESA), and National Historic Preservation Act (NHPA) for public infrastructure and private projects. She earned a master's degree in geography and urban planning from the University of Colorado in 1976.

Ms. Morsicato is familiar with large complex Civil Works projects with high public and interagency interests, including having served as the Deputy Manager of Planning and Environment for the Honolulu, Hawai'i Authority for Rapid Transportation (HART) working on the final design and construction phase of the Honolulu Rail Transit Project (HRTP), a $5.2 billion, 20-mile, elevated steel wheel-on-steel rail transit system with 21 transit stations. For this project, she was responsible for participating in various Section 404 permitting activities for HRTP waterway crossings with the USACE Honolulu District as well as U.S. Fish and Wildlife (USFWS) ESA Section 7 coordination for the project. She also wrote the project's Hawaii Coastal Zone Management Program Consistency Assessment. She provided management and oversight of the NHPA Section 106 Programmatic Agreement (PA) implementation and served as Archaeological Inventory Survey (AIS) Manager for HART. Her work on this project under NHPA included oversight of contractors, stakeholder outreach, chair of the Historic Preservation Committee, coordination of compliance with stipulations for Traditional Cultural Properties, AISs, Historic American Building Surveys, Historic American Engineering Record documentation, Historic American Landscape Surveys, and National Register of Historic Places nominations for up to 33 adversely affected historic properties. As the AIS manager for the project, Ms. Morsicato was responsible for ensuring that AIS work earned State Historic Preservation Office (SHPO) approvals required by Hawai'i state law. Other AIS-related work included stakeholder coordination with Native Hawaiian Organizations to ensure burial treatment concerns were met together with side-by-side teaming with the State Historic Preservation Division staff and project archaeology contractors.

Ms. Morsicato has extensive expertise in consistency reviews and environmental compliance for large and small projects, including the preparation of corridor studies, baseline surveys, categorical exclusions (CEs), environmental assessments (EAs), EISs, cultural resource assessments, and Section 106 PAs. She was involved with NEPA activities associated with the Beech Ridge Wind Energy EIS for USFWS in Greenbrier and Nicholas Counties, West Virginia, and she worked on an EA and a Finding of No Significant Impact (FONSI) for the Denver Regional Transportation District Environmental Evaluations for extension of the Southeast and Southwest Light Rail Corridors and Colorado Department of Transportation projects. Both of these projects, as well as the HART project described above, had elements of compliance and coordination with the CWA (including USACE) and ESA as well as consultation with (informal and formal) with USFWS. She is familiar with the USFWS Habitat Evaluation Procedures (HEPs).

Chris Bahner, P.E.

Role: Hydrologic/hydraulic engineering expert
Affiliation: WEST Consultants, Inc.

Mr. Bahner, a hydraulic engineer with WEST Consultants, Inc., has more than 20 years of experience, nine of which were with the USACE Los Angeles District. He is a registered professional engineer in the states of California, Nevada, and Oregon. He earned his B.S. in civil engineering and his M.S. in water resources engineering from California State University, Long Beach.

Mr. Bahner has been involved in several large flood control projects in California while working for the USACE Los Angeles District, including the San Luis Rey River Flood Control Project, Oceanside; Prado Dam, Corona; Murrieta Creek Flood Control Project, Murrieta; and Santa Paula Creek Flood Control Study, Santa Paula. He has also worked on a number of high public interest projects while at WEST Consultants, Inc., including the Interstate 5 bridge replacement over the McKenzie River, the TriMet Bridge over the Willamette River, the Morganza to the Gulf Hurricane Project, and the Bradwood Landing Proposed Liquid Natural Gas (LNG) Facility on the Lower Columbia River.

Mr. Bahner has worked on the following projects in California that included detention/retention basins: Murrieta Creek Flood Control and Restoration Project, Murrieta; Gunnerson Pond Restoration Project, Lake Elsinore; San Luis Rey River Flood Control Project, Oceanside; and Napa River and Napa Creek Interior Drainage Area No. 5, Napa. Detention/retention basins were also parts of such projects as Modification of Beaver Creek Outlet Works Structure, Bristol, Virginia, and Camp Humphreys Base Expansion, South Korea.

Mr. Bahner has also worked on the following projects in California that included flood walls: Murrieta Creek Flood Control and Restoration Project, Murrieta ; San Luis Rey River Flood Control Project, Oceanside; Santa Paula Creek Flood Control Project, Santa Paula; and Napa River and Napa Creek Interior Drainage Area No. 5, Napa.

In addition, he has been involved in Life Loss studies that consider the effectiveness of flood warning systems, and is currently working of a modeling effort of Mill Creek in Salem, Oregon, that will be part of the City's flood warning system.

Mr. Bahner has applied HEC-RAS (Steady) to assess the hydraulics and potential bridge scour at proposed bridge modifications in Idaho, Oregon, Hawaii, California, and Cabo San Lucas, Mexico; define flood inundation boundaries for various flood insurance study and Letter of Map Revisions; and evaluate

the hydraulics of lower Las Vegas Wash for existing conditions and for several proposed grade control structures and a bypass channel.

Mr. Bahner has applied HEC-RAS (Unsteady) to evaluate the impacts that upstream improvements would have on the floodplain boundaries of the lower Truckee River; analyze the hydraulics through several quarry ponds along Mill Creek in Salem, Oregon; assess the risk associated with the releases from the proposed Systems Conveyance and Operations Program; evaluate potential impacts of Early Implementation Projects on the Sacramento River; evaluate the hydraulics through several tidally influenced bridges on the Oregon coast; and assess dam and levee breaches and corresponding inundation boundaries.

Mr. Bahner has applied hydrologic models to determine the hydrology for several different stream and river systems, including the Des Lacs River, SD; McMullen Creek, OR; Murrieta Creek, CA; three local tributaries to Little Butte Creek, OR; Mill Creek, WA; nine subbasins near Brookings, OR; Chester Creek, WA; and Salmon Creek, WA.

Mr. Bahner has applied HEC-RAS (Sediment Transport) to assess the sedimentation of slag deposits on the upper Columbia River, Washington; sedimentation behind Cochiti Dam on the Rio Grande, New Mexico; sedimentation of Big River, Missouri; and sedimentation of Salt-Gila River, Arizona.

Mr. Bahner has followed Executive Order (EO) 11988 Floodplain Management, which provides guidance that includes an eight-step process for Federal agencies to implement as part of their decision-making on projects that have potential impacts on or within the floodplain. He is capable of addressing the USACE Safety Assurance Review (SAR) aspects of projects.

Phillip Brozek, P.E.

Role: Structural/civil engineering expert
Affiliation: Brozek & Associates

Mr. Brozek, a principal with Brozek & Associates, has 32 years of experience as a practicing engineer. He earned his B.S. in civil engineering in 1979 from California State University, Sacramento, and is a registered professional engineer in California and Oregon. Mr. Brozek holds a Certificate in Hazardous Material Management from the University of California Extension, Davis; earned an Associates Certificate in Project Management from George Washington University; and was a founding member of the Practitioner Advisory Committee at the California State University Sacramento, Department of Civil Engineering.

Mr. Brozek is familiar with large, complex Civil Works projects with high public and interagency interests. He served as a Civil Works Senior Project Manager for 11 years with the USACE Sacramento District, overseeing large multi-objective projects on the San Lorenzo River, South Sacramento Streams Group, Yuba River, and Sacramento River (RM 207). He was project and program manager for the interagency restoration of the Lake Tahoe watershed, which included multi-objective planning and implementation to address the watershed's nine Environmental Threshold Carrying Capacity targets and a Total Maximum Daily Load (TMDL) water quality plan as part of long-term, $3.5 billion watershed restoration plan. For more than five years, he served as a consultant on large Civil Works projects such as Phase 4 and 5 of the Folsom Dam Joint Federal Project and Folsom Dam Raise. All these projects enjoyed significant

scrutiny from political leadership; Federal, state, and local agencies; tribes; non-governmental organizations (NGOs); and engaged and vocal stakeholders.

As Sacramento District USACE Civil Works senior project manager, Mr. Brozek was responsible for large multi-objective projects that used off-stream detention basins and on-stream overbank storage with earthen embankments and control features to maximize storage while attenuating and reducing peak discharge. Vegetated basins also provided incremental water quality improvements, aquatic ecosystem improvements, and recreation opportunities when not inundated. Detention basins on these projects used existing parkways and other undeveloped space. Typical projects included South Sacramento Streams Group and multiple stream restoration projects (e.g., Mill Creek, Blackwood Creek, Upper Truckee River) in the Lake Tahoe watershed.

In the area of reinforced concrete design/construction/evaluation of flood risk management structures, Mr. Brozek has extensive experience on projects that included reinforced concrete channels and floodwalls on top of embankments, box culverts, bridge appurtenances, pump stations, control structures, buildings, and transposition infrastructure. Project examples include South Sacramento Streams Group, San Lorenzo River, Magpie Creek, Incline Creek, Mill Creek, and Folsom Dam Joint Federal Project.

Mr. Brozek also has experience in levee embankment design/construction/evaluation of flood risk management structures through projects that included levee embankment, stability berms, water control berms for wetland creation, and detention basins. Project examples include South Sacramento Streams Group, San Lorenzo River, Yuba River, Magpie Creek, Sacramento River (RM 207), and Folsom Dam Joint Federal Project.

Mr. Brozek is familiar with and experienced in geotechnical evaluations and geo-civil design for flood risk management projects, having been involved in required foundation exploration plans, evaluation of foundation conditions, and design or other mitigation of unsuitable foundation conditions. Project examples include South Sacramento Streams Group, San Lorenzo River, Yuba River, Magpie Creek, Sacramento River (RM 207), Folsom Dam Joint Federal Project and many smaller vertical construction and hazardous, toxic, and radioactive waste investigations.

In addition, Mr. Brozek is capable of addressing USACE SAR as applied to Type I IEPRs. He has planned and facilitated the Folsom Dam Joint Federal Project Phase IV Type II IEPR (SAR), including design in accordance with ER 1110-2-1150, Engineering and Design for Civil Works Projects, with due consideration for the sufficiency of surveys, investigations, and engineering; appropriateness of assumptions and models; and analysis of risk. He also prepared a modification of the Folsom Dam Water Control Manual Review Plan to better integrate elements of both Type I and Type II IEPRs into a hybrid IEPR process for a unique project. Mr. Brozek served as panel member for Type I IEPRs on other USACE projects where those projects would pose a significant threat to human life and public safety and the review charge included elements of SAR review.

APPENDIX C

Final Charge to the IEPR Submitted to USACE on October 9, 2015 for the Ala Wai Canal Project

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CHARGE QUESTIONS AND GUIDANCE TO THE PANEL MEMBERS FOR THE IEPR OF THE Ala Wai Canal Project, Island of O'ahu, Hawai'i, Feasibility Study with Integrated Environmental Impact Statement

BACKGROUND

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). Section 209 is a general authority that authorizes surveys in harbors and rivers in Hawai'i "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." The project is currently in the feasibility phase, resulting in a feasibility study (FS) report and integrated environmental impact statement (EIS) that will be signed by the Chief of Engineers. If the FS report results in a positive determination recommending implementation of a preferred alternative, Congressional authorization will be needed before the project may proceed to construction. The non-Federal sponsor for this project is the State of Hawai'i, as represented by the Department of Land and Natural Resources (DLNR). Through a separate Memorandum of Agreement with DLNR, the City and County of Honolulu (C&C) is also providing cash and work-in-kind support to earlier phases of this project. The C&C is represented by the Department of Environmental Services (DES).

The Ala Wai watershed is located on the southeastern side of the island of O'ahu, Hawai'i. The watershed is 19 square miles and encompasses three sub-watersheds: Makiki, Manoa, and Palolo. There are three perennial streams and two canals in the watershed. The study area is the most densely populated watershed in Hawai'i with approximately 200,000 residents. Within the urban footprint, the population density is one of the highest in the nation with 12.36 persons per urbanized acre. Waikiki District, within the watershed, is the primary economic engine for the State, providing 7 percent of the gross state product, 7 percent of the civilian jobs in the state, and 9 percent of the state and county tax revenue. Waikiki has over 79,000 visitors a day.

The watershed includes upper, middle, and lower sub-watersheds. The upper watershed (7.5 square miles, or 40 percent of the watershed) is zoned as Conservation District to protect the island's aquifer. Approximately 11 square miles of the middle and lower watershed is urbanized, supporting 1,600 businesses, 21 public schools, 17 private schools and two universities, including the University of Hawai'i at Manoa, the largest university in the state. Approximately 53 parks of varying sizes occur throughout the urbanized watershed. The parks provide for water-based activities, nature-based activities, sports activities, and interpretive activities. Offshore of Waikiki are two state-designated Fishery Management Areas (FMAs), a Marine Life Conservation District (MLCD), and the Hawaiian Humpback Whale National Marine Sanctuary.

Hawai'i streams are flashy by nature. Within the study area, rain often starts in the mountainous areas of the upper watershed, with little precipitation in the lower elevations. The peak flow rate from mountains to sea is approximately 30 minutes. Storms typically last for 24 hours or less. With the sudden nature of the flood events and the associated high velocities, floods within the watershed threaten life safety and may result in significant damages. Rarely does the watershed experience long periods of standing water from

a flood event. When heavy rains do occur over multiple days, standing flood waters become a problem. Based on U.S. Army Corps of Engineers (USACE) hydrology and hydraulic modeling, the majority of the peak flow is from the Manoa Stream, with Palolo Stream being the second highest contributor and Makiki Stream the third.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Ala Wai Canal Project, Island of O'ahu, Hawai'i, Feasibility Study with Integrated Environmental Impact Statement (hereinafter: Ala Wai Canal IEPR) in accordance with the Department of the Army, USACE, Water Resources Policies and Authorities' *Civil Works Review* (Engineer Circular [EC] 1165-2-214, dated December 15, 2012), and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

The purpose of the IEPR is to assess the "adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (EC 1165-2-214; p. D-4) for the Ala Wai Canal documents. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) with extensive experience in Civil Works planning/economics, environmental law compliance/biology and cultural resources, hydrology and hydraulic engineering, and structural/civil engineering issues relevant to the project. They will also have experience applying their subject matter expertise to flood risk management.

The Panel will be "charged" with responding to specific technical questions as well as providing a broad technical evaluation of the overall project. Per EC 1165-2-214, Appendix D, review panels should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel members may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

DOCUMENTS PROVIDED

The following is a list of documents, supporting information, and reference materials that will be provided for the review.

Documents for Review

The following documents are to be reviewed by designated discipline:

Title	Actual. No. of Pages	Required Disciplines
Draft FS with Integrated EIS	250	All Disciplines
Appendix A1. Hydrology	467	Hydrology and Hydraulic Engineer; Structural/Civil Engineer
Appendix A2, A3, & A4. Hydraulics and Plates		
Appendix A2. Plates 9, 10 & 11 Alternative Designs		
Appendix B. Economics	83	Civil Works Planner/ Economist
Appendix C. Real Estate	59	Civil Works Planner/ Economist
Appendix D. Cost Engineering	88	Structural/ Civil Engineer; Hydrology and Hydraulic Engineer; Civil Works Planner/ Economist
Appendix E. Environmental & Regulatory Compliance	436	Civil Works Planner/ Economist; Environmental Law Compliance / Biologist & Cultural Resources
Appendix F. Cultural Resources	382	Civil Works Planner/ Economist; Environmental Law Compliance / Biologist & Cultural Resources
Appendix G. Public Involvement	75	Civil Works Planner/ Economist; Environmental Law Compliance / Biologist & Cultural Resources
Public Comments (estimated 50 pages; November 2015)	50	All Disciplines
Total	**1,890**	

Supporting Information

- Risk Register
- Decision Log
- Decision Management Plan

Documents for Reference

- USACE guidance *Civil Works Review,* (EC 1165-2-214, December 15, 2012)
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004)
- Foundations of SMART Planning

- SMART Planning Bulletin (PB 2013-03)
- SMART – Planning Overview
- Planning Modernization Fact Sheet

SCHEDULE

This draft schedule is based on the September 23, 2015, receipt of the final review documents. Note that dates presented in the schedule below could change due to panel member and USACE availability.

Task	Action	Due Date
Conduct Peer Review	Battelle sends review documents to panel members	10/16/2015
	Battelle convenes kick-off meeting with panel members	10/19/2015
	Battelle convenes kick-off meeting with USACE and panel members	10/19/2015
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	10/26/2015
	Panel members complete their individual reviews	11/2/2015
Prepare Final Panel Comments and Review Public Comments	Battelle provides panel members with talking points for Panel Review Teleconference	11/5/2015
	Battelle convenes Panel Review Teleconference	11/6/2015
	Battelle provides Final Panel Comment templates and instructions to panel members	11/9/2015
	Panel members provide draft Final Panel Comments to Battelle	11/17/2015
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	11/18/2015 - 11/29/2015
	Battelle finalizes Final Panel Comments	11/30/2015
	Battelle receives the public comments from USACE	11/16/2015
	Battelle sends public comments to Panel	11/17/2015
	Panel completes its review of the public comments	11/20/2015
	Battelle and Panel review Panel's responses to public comments	11/23/2015
	Panel drafts Final Panel Comment for public comments, if necessary	11/24/2015
	Panel finalizes Final Panel Comment regarding public comments	11/30/2015
Review Final IEPR Report	Battelle provides Final IEPR Report to panel members for review	12/2/2015
	Panel members provide comments on Final IEPR Report	12/4/2015
	*Battelle submits Final IEPR Report to USACE	12/9/2015
	USACE Planning Center of Expertise (PCX) Provides Decision on Final IEPR Report Acceptance	12/16/2015
Comment/ Response Process	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	12/18/2015
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process	12/18/2015

Task	Action	Due Date
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	1/6/2016
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	1/12/2016
	USACE PCX provides draft PDT Evaluator Responses to Battelle	1/13/2016
	Battelle provides the panel members the draft PDT Evaluator Responses	1/15/2016
	Panel members provide Battelle with draft BackCheck Responses	1/21/2016
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	1/22/2016
	Battelle convenes Comment-Response Teleconference with panel members and USACE	1/25/2016
	USACE inputs final PDT Evaluator Responses to DrChecks	2/1/2016
	Battelle provides final PDT Evaluator Responses to panel members	2/3/2016
	Panel members provide Battelle with final BackCheck Responses	2/8/2016
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	2/16/2016
	*Battelle submits pdf printout of DrChecks project file	2/17/2016
Civil Works Review Board (CWRB) – Lead Panel Member Only	Panel prepares and/or reviews slides for CWRB	2/2016
	Civil Works Review Board	10/23/2016

* Deliverables

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the Ala Wai Canal documents are credible and whether the conclusions are valid. The Panel is asked to determine whether the technical work is adequate, competently performed, and properly documented; satisfies established quality requirements; and yields scientifically credible conclusions. The Panel is being asked to provide feedback on the economic, engineering, environmental resources, and plan formulation. The panel members are not being asked whether they would have conducted the work in a similar manner.

Specific questions for the Panel (by report section or appendix) are included in the general charge guidance, which is provided below.

General Charge Guidance

Please answer the scientific and technical questions listed below and conduct a broad overview of the Ala Wai Canal documents. Please focus your review on the review materials assigned to your discipline/area of expertise and technical knowledge. Even though there are some sections with no questions associated with them, that does not mean that you cannot comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition,

please note the following guidance. Note that the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-214; Appendix D).

1. Your response to the charge questions should not be limited to a "yes" or "no." Please provide complete answers to fully explain your response.

2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.

3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluating economic or environmental impacts of the proposed project.

4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.

5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.

6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.

7. Please focus the review on assumptions, data, methods, and models.

Please **do not** make recommendations on whether a particular alternative should be implemented, or whether you would have conducted the work in a similar manner. Also please **do not** comment on or make recommendations on policy issues and decision making. Comments should be provided based on your professional judgment, **not** the legality of the document.

1. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Agency Technical Review (ATR).

2. Please contact the Battelle Project Manager (Lynn McLeod, mcleod@battelle.org) or Program Manager (Karen Johnson-Young (johnson-youngk@battelle.org) for requests or additional information.

3. In case of media contact, notify the Battelle Program Manager, Karen Johnson-Young (johnson-youngk@battelle.org) immediately.

4. Your name will appear as one of the panel members in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form to Lynn McLeod, mcleod@battelle.org, no later than November 2, 2015, 10 pm ET.

Independent External Peer Review

of the

Ala Wai Canal Project, Island of O'ahu, Hawai'i, Feasibility Study with Integrated Environmental Impact Statement

Charge Questions and Relevant Sections as Supplied by USACE

The following Charge to Reviewers outlines the objective of the Independent External Peer Review (IEPR) for the subject study and the specific advice sought from the IEPR panel.

> The objective of the IEPR is to obtain an independent evaluation of whether the interpretations of analysis and conclusions based on analysis are reasonable for the subject study. The IEPR panel is requested to offer a broad evaluation of the overall study decision document in addition to addressing the specific technical and scientific questions included in the charge. The panel has the flexibility to bring important issues to the attention of decision makers, including positive feedback or issues outside those specific areas outlined in the charge.
>
> The panel review is to focus on scientific and technical matters, leaving policy determinations for USACE and the Army. The panel should not make recommendations on whether a particular alternative should be implemented or present findings that become "directives" in that they call for modifications or additional studies or suggest new conclusions and recommendations. In such circumstances the panel may have assumed the role of advisors as well as reviewers, thus introducing bias and potential conflict in their ability to provide objective review.

Panel review comments are to be structured to fully communicate the panel's intent by including the comment, why it is important, any potential consequences of failure to address, and suggestions on how to address the comment.

Broad Evaluation Charge Questions

1. Is the need for and intent of the decision document clearly described?
2. Does the decision document adequately address the stated need and intent?
3. Given the need for and intent of the decision document, assess the adequacy and acceptability of the project evaluation data used in the study analyses.
4. Given the need for and intent of the decision document, assess the adequacy and acceptability of the economic, environmental, and engineering assumptions that underlie the study analyses.
5. Given the need for and intent of the decision document, assess the adequacy and acceptability of the economic, environmental, and engineering methodologies, analyses, and projections.

6. Given the need for and intent of the decision document, assess the adequacy and acceptability of the models used in the evaluation of existing and future without-project conditions and of economic or environmental impacts of alternatives.

7. Given the need for and intent of the decision document, assess the adequacy and acceptability of the methods for integrating risk and uncertainty.

8. Given the need for and intent of the decision document, assess the adequacy and acceptability of the formulation of alternative plans and the range of alternative plans considered.

9. Given the need for and intent of the decision document, assess the adequacy and acceptability of the quality and quantity of the surveys, investigations, and engineering sufficient for conceptual design of alternative plans.

10. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.

11. For the tentatively selected plan, assess whether the models used to assess life safety hazards are appropriate?

12. For the tentatively selected plan, assess whether the assumptions made for the life safety hazards are appropriate?

13. For the tentatively selected plan, assess whether the quality and quantity of the surveys, investigations, and engineering are sufficient for a concept design considering the life safety hazards and to support the models and assumptions made for determining the hazards?

14. For the tentatively selected plan, assess whether the analysis adequately address the uncertainty and residual risk given the consequences associated with the potential for loss of life for this type of project?

15. For the tentatively selected plan, assess whether from a public safety perspective, the proposed alternative is reasonably appropriate or are there other alternatives that should be considered?

Specific Technical and Scientific Charge Questions

16. Are the assumptions made in the H&H modeling appropriate for study's tropical storm events and characteristics?

17. Are the assumptions and evaluations sufficient to address the requirements of the Endangered Species Act and the National Historic Preservation Act for the study location?

Battelle Summary Charge Questions to the Panel Members

18. Please identify the most critical concerns (up to five) you have with the project and/or review documents. These concerns can be (but do not need to be) new ideas or issues that have not been raised previously.

19. Please provide positive feedback on the project and/or review documents.

Public Comment Questions

20. Does information or do concerns raised by the public raise any additional discipline-specific technical concerns with regard to the overall report?

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APPENDIX D

Conflict of Interest Form

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Eric Thor
USACE, Institute for Water Resources
September 4, 2015
C-2

Conflicts of Interest Questionnaire

Independent External Peer Review

Ala Wai Canal Project, HI, Feasibility Study IEPR

The purpose of this document is to help the U.S. Army Corps of Engineers identify potential organizational conflicts of interest on a task order basis as early in the acquisition process as possible. Complete the questionnaire with background information and fully disclose relevant potential conflicts of interest. Substantial details are not necessary; USACE will examine additional information if appropriate. Affirmative answers will not disqualify your firm from this or future procurements.

NAME OF FIRM: **Battelle Memorial Institute**
REPRESENTATIVE'S NAME: **LaDonna F. James**
TELEPHONE: **614-424-5543**
ADDRESS: **505 King Avenue, Columbus, OH 43210**
EMAIL ADDRESS: **jamesl@battelle.org**

I. INDEPENDENCE FROM WORK PRODUCT. Has your firm been involved in any aspect of the preparation of the subject study report and associated analyses (field studies, report writing, supporting research etc.) No

II. INTEREST IN STUDY AREA OR OUTCOME. Does your firm have any interests or holdings in the study area, or any stake in the outcome or recommendations of the study, or any affiliation with the local sponsor? No

III. REVIEWERS. Do you anticipate that all expert reviewers on this task order will be selected from outside your firm? Yes

IV. AFFILIATION WITH PARTIES THAT MAY BE INVOLVED WITH PROJECT IMPLEMENTATION. Do you anticipate that your firm will have any association with parties that may be involved with or benefit from future activities associated with this study, such as project construction? No

V. ADDITIONAL INFORMATION. Report relevant aspects of your firm's background or present circumstances not addressed above that might reasonably be construed by others as affecting your firm's judgment. Please include any information that may reasonably: impair your firm's objectivity; skew the competition in favor of your firm; or allow your firm unequal access to nonpublic information.

LaDonna F. James

Digitally signed by LaDonna F. James
DN: cn=LaDonna F. James, o=Government Contracts, ou=SAS, email=jamesl@battelle.org, c=US
Date: 2015.09.04 13:46:59 -04'00'

LaDonna F. James

September 4, 2015
DATE

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