Final Independent External Peer Review Report South San Francisco Bay Shoreline Interim Feasibility Study, Alviso Ponds and Santa Clara County, California

Prepared by
Battelle Memorial Institute

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

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Task Order: 0075

March 23, 2015

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Executive Summary

PROJECT BACKGROUND AND PURPOSE

The purpose of the Feasibility Study is to document the feasibility of a combined flood risk management and ecosystem restoration project. It is a study being conducted in response to the resolution adopted by the Committee on Transportation and Infrastructure of the U.S. House of Representatives on July 24, 2002, for the South San Francisco Bay Shoreline Study (Shoreline Study), California (Docket 2697) and the Water Resources Development Act (WRDA) of 2007, Section 4027. South San Francisco Bay Shoreline, California.

The Shoreline Study encompasses shoreline and floodplain areas, three groups of former salt-production ponds, and other parcels that represent additional opportunities for flood risk management and/or ecosystem restoration benefits along South San Francisco Bay in Northern California. The Shoreline Study area extends from the Ravenswood Ponds in San Mateo and State Route (SR) 92 in the city of Hayward south along both sides of the bay to its southern end, and includes adjacent areas that may be flooded by the bay and/or that may offer opportunities for restoration of tidal and related habitats. Due to the complexity of the hydrology, hydraulics, and combined flood risk management and ecosystem restoration components, and anticipated Federal and non-Federal funding availability, the study has been divided into several interim feasibility studies. The geographic areas specific to each of the anticipated interim feasibility studies are named “Ravenswood Ponds and San Mateo County,” “Alviso Ponds and Santa Clara County,” “Alameda County Cargill Ponds,” and “Eden Landing.” The Alviso Ponds and Santa Clara County area is the focus of this interim feasibility study and is described below.

The Alviso Ponds and Santa Clara County Interim Feasibility Study area consists of 25 ponds in the Alviso pond complex on the shores of the South Bay in the cities of Fremont, San Jose, Sunnyvale, and Mountain View, located in Santa Clara and Alameda counties. Substantial adjacent areas that may need flood risk management, or that may be affected by flood risk management or ecosystem restoration measures, are also included in the study area. These areas include the Palo Alto/Mountain View Sub-Area (south of San Francisquito Creek), the Alviso Ponds (owned by the U.S. Fish and Wildlife Service [USFWS]), Pond A4 (owned by the Santa Clara Valley Water District [SCVWD]), Pond A18 (owned by the City of San Jose), and Moffett Federal Airfield. The study area is bordered by South San Francisco Bay and the operational salt ponds (owned by the USFWS and operated by Cargill, Inc. [Cargill]) situated in Alameda County to the north and San Francisquito Creek on the west. To the south and east, the study area extends beyond the salt ponds to include all lands subject to inundation from a 0.2-percent tidal flooding event under predicted future conditions with sea level rise (also known as the 500-year flood). These additional lands are primarily urbanized areas in the cities of Palo Alto, Mountain View, Sunnyvale, and San Jose to the south, and urbanized lands in the city of Fremont to the east. This interim feasibility

study will focus on flood risk management and ecosystem restoration within Santa Clara County and southern Alameda County. Flood risk management for San Francisquito Creek is being studied under separate authorization. In March 2011, the study partners concluded a study "reset" process, which resulted in an agreement to focus first on the "Economic Impact Area 11," or EIA 11, which includes Ponds A9-A18 and adjacent shoreline areas. The without-project flood risk analysis identified this area as being in greatest risk of flooding due to future sea level rise. Of all the EIAs, it also represented the greatest potential for ecosystem restoration benefits.

The Feasibility Study evaluated a variety of flood risk management and ecosystem restoration measures, including levee construction, flood wall construction, tidal marsh restoration, structural and non-structural pond management options, and non-structural flood risk management measures. For the Feasibility Study, there are public safety concerns related to the dense development of Silicon Valley immediately adjacent to the former salt evaporation ponds. There is a high level of complexity in analyzing and managing the risk of flooding in an area immediately adjacent to San Francisco Bay, which has 15 local streams running through it. This complexity is heightened by the potential effects of global climate change. There is significant interagency interest in the Study because the single largest landowner in the study area is the Federal government: the USFWS's Don Edwards San Francisco Bay National Wildlife Refuge and the National Aeronautics and Space Administration's (NASA's) Moffett Federal Airfield.

Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The U.S. Army Corps of Engineers (USACE) is conducting an Independent External Peer Review (IEPR) of the South San Francisco Bay Shoreline Interim Feasibility Study, Alviso Ponds and Santa Clara County, California (hereinafter: South San Francisco IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is 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 South San Francisco project. 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 South San Francisco review documents and the overall scope of the project, Battelle identified potential candidates for the Panel in the following key technical areas: environmental planning, civil/cost engineering, hydrology and hydraulic coastal engineering, geotechnical engineering, and economic issues relevant to the project. 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 five-person Panel.

The Panel received an electronic version of the South San Francisco review documents (1,252 pages in total), along with a charge that solicited comments on specific sections of the documents to be reviewed. USACE prepared the charge questions following guidance provided in USACE (2012) and OMB (2004), which were included in the draft and final Work Plans.

The USACE Project Delivery Team briefed the Panel and Battelle during a kick-off meeting held via teleconference prior to the start of the review 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 South San Francisco 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, six was identified as having medium/high significance, five had a medium significance, five had medium/low significance, and three had low significance.

Battelle received public comments from USACE on the South San Francisco IEPR (six written comments totaling 14 pages) 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 South San Francisco review documents. After completing their review, the Panel confirmed that no new issues or concerns were identified other than those already covered in their Final Panel Comments.

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 South San Francisco review documents. 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 report is well-written and the information logically organized. The Panel also found that USACE took advantage of valuable insight gained from complementary restoration efforts in the South Bay, weaving them well into the project development. However, the Panel did identify several elements of the project that should be clarified or revised.

Environmental: Of primary concern to the Panel were three important issues related to the assumptions, projections, and results associated with the Combined Habitat Assessment Protocol (CHAP) model. First, the results of the CHAP modeling of ecological uplift for ecosystem restoration alternatives appear to be inconsistent with the current understanding and value of functioning tidal wetland habitats. USACE can address this by discussing why the CHAP model was selected, and why other ecosystem restoration models or model variants were not used during ecosystem restoration alternative screening. Second, several assumptions (e.g., channel complexity and marsh development) used in the CHAP modeling of potential ecosystem restoration benefits are made without data or information to support use of the model. The Panel believes that this issue can be addressed by providing information (e.g., alteration of data inputs) to support the basis for the assumptions used in the CHAP modeling effort. Third, CHAP model projections have not considered potential indirect disturbances to wildlife from recreational users and wildlife predators or the suitability of island habitats in the restored salt ponds. This matter can be resolved by evaluating the impact of recreational use of the Flood Risk Management (FRM) levees and the use of the levees by wildlife predators on sensitive wildlife species in the CHAP model and by

modeling the suitability of island habitats in the restored salt ponds to meet project ecosystem restoration objectives. The Panel believes that by implementing these measures and then re-running the CHAP model, USACE can confirm that the model can make clear and accurate evaluations of the ecosystem restorations alternatives.

Hydrologic and Hydraulic Engineering: The Panel was concerned that residual risks associated with interior drainage and fluvial flooding are not adequately considered (per ER 1105-2-101), potentially affecting the project completeness and effectiveness. USACE can address this issue by (1) providing a more thorough discussion of residual risk from fluvial and interior drainage in Section 9.8 of the main report and 4.8.2 in Appendix E, (2) discussing the interior drainage and how it will be accomplished as it applies to rainfall and runoff behind the line-of-protection (interior of the levee protected area) and (3) incorporating project components to eliminate any adverse impacts associated with the project on potential fluvial and interior drainage flooding. In addition, replacing all references to “residual risk” with “residual coastal flood risk,” where residual risk is related only to the coastal flood risk and including a map showing the potential flooding from interior drainage for storm events that range from the 10% to the 0.2% ACE will prove to be of great value.

Economics: Of importance to the Panel was that the ring levee has not been analyzed as a separable element of the nonstructural flood risk management option, and the levee segment to protect the San José-Santa Clara Regional Wastewater Facility (WPCP) has not been analyzed as an incremental feature of the Tentative National Economic Development/National Ecological Restoration (NED/NER) plan and the Locally Preferred Plan (LPP) in accordance with ER 1105-2-100. This can be resolved by including an analysis of the levee to protect the WPCP as a first added and last added increment of the Tentative NED/NER plan and the LPP in the final Integrated Report.

Cost Engineering: The Panel was concerned that the project cost estimate does not consider several project details that could impact the project costs and selection of the Tentative NED/NER plan or the LPP. To address this issue, the Panel suggests implementing the nine recommendations linked to the nine examples cited in the basis for comment, including determine the most appropriate cost account for the bench; adjust the cost estimate to include mobilization; site preparation and production rates for the restoration bench and the restoration ecotone for consistent approach to the cost estimate; evaluate assumptions regarding availability of borrow from other non-Federal sponsor-owned FRM project sites; and adjust cost estimate as necessary.

Geotechnical Engineering: The Panel identified two important issues related to geotechnical data and its proposed applications. First, borehole data may not have been taken from sufficient depths to provide a dataset to verify the liquefaction-settlement calculations. USACE can address this by discussing soil consistency and soil type at deeper depths based on available data and analyses (Appendix G) and by considering extending these boreholes to a greater depth than the 30 to 44 feet presented in the documentation to determine if liquefaction may be an issue at deeper depths, if sufficient geotechnical boreholes and cone penetrometer tests (CPTs) are not available. Second, borehole and CPT data are provided to depths up to 45 feet, which is not sufficient to assess the concept-level design of foundations for tidal gate structures and bridges and to determine associated costs. The Panel believes that this issue can be addressed by reviewing available historic CPT and borehole data in the vicinity of the inboard levee system for the Tentatively Selected Plan (TSP) (i.e., LPP), and determine whether enough information is available to accurately present concept alternatives and costs for this phase. In addition, USACE should consider performing additional boreholes and/or CPT to deeper depths to inform the evaluation of alternatives for the bridge structure and tidal gate structures, if sufficient geotechnical information is not available; or revise the narrative in the draft Integrated Document if the additional

geotechnical information is in fact available. The Panel also found inconsistencies in the wick drain spacing, location, and installation procedures presented in the draft Integrated Document. This can be resolved by revising the document narrative and plans to consistently depict the wick drain horizontal spacing required. USACE can also discuss the likelihood that variable or revised spacing of wick drains will be considered during preconstruction engineering design (PED), the potential for levee instability or mud wave formation during construction and how this may impact the success of wick drain installations, and the monitoring and construction procedures that will minimize potential for wick drain failures and costly reconstruction should mud waves or instability occur.

Table ES-1. Overview of 19 Final Panel Comments Identified by the South San Francisco IEPR Panel

No.	Final Panel Comment
Significance – Medium/High	
1	The results of the CHAP modeling of ecological uplift for ecosystem restoration alternatives appear to be inconsistent with the current understanding and value of functioning tidal wetland habitats.
2	Several assumptions (e.g., channel complexity and marsh development) used in the CHAP modeling of potential ecosystem restoration benefits are made without data or information to support use of the model.
3	CHAP model projections have not considered potential indirect disturbances to wildlife from recreational users and wildlife predators or the suitability of island habitats in the restored salt ponds.
4	Residual risks associated with interior drainage and fluvial flooding are not adequately considered (per ER 1105-2-101), potentially affecting the project completeness and effectiveness.
5	The ring levee has not been analyzed as a separable element of the non-structural flood risk management option, and the levee segment to protect the San José-Santa Clara Regional Wastewater Facility has not been analyzed as an incremental feature of the Tentative NED/NER plan and the LPP in accordance with ER 1105-2-100.
6	The project cost estimate does not consider several project details that could impact the project costs and selection of the NED and NER plans, and the LPP.
Significance – Medium	
7	Borehole data may not have been taken from sufficient depths to provide a dataset to verify the liquefaction-settlement calculations.
8	Borehole and cone penetrometer test data are provided to depths up to 45 feet, which is not sufficient to assess the concept-level design of foundations for tidal gate structures and bridges and to determine associated costs.
9	Inconsistencies in wick drain spacing, location, and installation procedures are presented in the draft Integrated Document.
10	The LERRD project requirements appear to be underestimated since the real estate analysis does not consider key design and construction details, including an overbuilt levee cross-section and the need for more staging and stockpiling area.

Table ES-1. Overview of 19 Final Panel Comments Identified by the South San Francisco IEPR Panel (continued)

Significance – Medium	
11	A cost-benefit analysis of capping mercury methylation hot spots in ponds planned for ecotone and levee construction as a mitigation measure is not provided, so it is not known whether this mitigation measure was considered.
Significance – Medium/Low	
12	The Cost Effectiveness/Incremental Cost Analysis was conducted by grouping ponds based on construction phase; however, it appears that analyzing each pond as an independent management measure was not considered.
13	The discussion of the sediment budget does not specify the level of influence the Tentative NED/NER plan or the LPP may have on the overall sediment budget of the system.
14	There appears to be a potential scheduling conflict between the proposed in-water work construction period and plans to minimize project impacts on steelhead and nesting birds.
15	A comprehensive plan for communicating residual risk and expected flood damages to the floodplain residents is not provided.
16	The description of levee access does not provide sufficient information to determine whether required operations and maintenance activities can be conducted.
Significance – Low	
17	It is unclear whether the models and assumptions for assessing life safety hazards have been addressed or if a life safety analysis has been completed.
18	Risks associated with the potential malfunction of the railroad closure structure during an extreme high water event or fluvial flood event are not addressed.
19	It is not clear whether the purpose of the recreation features evaluated is to mitigate the loss of existing recreation or to add features to those that currently exist.

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LIST OF ACRONYMS

ACE	Annual Chance of Exceedance
ADM	Agency Decision Milestone
ATR	Agency Technical Review
CE/ICA	Cost-Effectiveness/Incremental Cost Analysis
CHAP	Combined Habitat Assessment Protocols
COA	Code of Accounts
COI	Conflict of Interest
CPT	Cone Penetrometer Test
CSRA	Cost and Schedule Risk Analysis
CWRB	Civil Works Review Board
DrChecks	Design Review and Checking System
EC	Engineer Circular
EIA	Economic Impact Area
ER	Engineer Regulation
FLPE	Flood Levee Permanent Easement
FRM	Flood Risk Management
IEPR	Independent External Peer Review
LERRD	Lands, Easements, Rights-of-Way, Relocations, and Disposal Areas
LPP	Locally Preferred Plan
MII	Micro-Computer Aided Cost Estimating System Second Generation
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NED	National Economic Development
NER	National Ecosystem Restoration
NHI	Northwest Habitat Institute
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
PDT	Project Delivery Team
PED	Preconstruction Engineering Design
SBSPRP	South Bay Salt Pond Restoration Project
SCVWD	Santa Clara Valley Water District
SLC	Sea Level Change
SPT	Standard Penetration Test

SR	State Route
TSP	Tentatively Selected Plan
TWAE	Temporary Work Area Easements
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Services
WPCP	San José-Santa Clara Regional Wastewater Facility
WRDA	Water Resources Development Act

1. INTRODUCTION

The purpose of the Feasibility Study is to document the feasibility of a combined flood risk management and ecosystem restoration project. It is a study being conducted in response to the resolution adopted by the Committee on Transportation and Infrastructure of the U.S. House of Representatives on July 24, 2002, for the South San Francisco Bay Shoreline Study (Shoreline Study), California (Docket 2697) and the Water Resources Development Act (WRDA) of 2007, Section 4027. South San Francisco Bay Shoreline, California.

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The Alviso Ponds and Santa Clara County Interim Feasibility Study area consists of 25 ponds in the Alviso pond complex on the shores of the South Bay in the cities of Fremont, San Jose, Sunnyvale, and Mountain View, located in Santa Clara and Alameda counties. Substantial adjacent areas that may need flood risk management, or that may be affected by flood risk management or ecosystem restoration measures, are also included in the study area. These areas include the Palo Alto/Mountain View Sub-Area (south of San Francisquito Creek), the Alviso Ponds (owned by the U.S. Fish and Wildlife Service [USFWS]), Pond A4 (owned by the Santa Clara Valley Water District [SCVWD]), Pond A18 (owned by the City of San Jose), and Moffett Federal Airfield. The study area is bordered by South San Francisco Bay and the operational salt ponds (owned by the USFWS and operated by Cargill, Inc. [Cargill]) situated in Alameda County to the north and San Francisquito Creek on the west. To the south and east, the study area extends beyond the salt ponds to include all lands subject to inundation from a 0.2-percent tidal flooding event under predicted future conditions with sea level rise (also known as the 500-year flood). These additional lands are primarily urbanized areas in the cities of Palo Alto, Mountain View, Sunnyvale, and San Jose to the south, and urbanized lands in the city of Fremont to the east. This interim feasibility study will focus on flood risk management and ecosystem restoration within Santa Clara County and southern Alameda County. Flood risk management for San Francisquito Creek is being studied under separate authorization. In March 2011, the study partners concluded a study “reset” process, which resulted in an agreement to focus first on the “Economic Impact Area 11,” or EIA 11, which includes Ponds A9-A18 and adjacent shoreline areas. The without-project flood risk analysis identified this area as being in greatest risk of flooding due to future sea level rise. Of all the EIAs, it also represented the greatest potential for ecosystem restoration benefits.

The Feasibility Study evaluated a variety of flood risk management and ecosystem restoration measures, including levee construction, flood wall construction, tidal marsh restoration, structural and non-structural pond management options, and non-structural flood risk management measures. For the Feasibility

Study, there are public safety concerns related to the dense development of Silicon Valley immediately adjacent to the former salt evaporation ponds. There is a high level of complexity in analyzing and managing the risk of flooding in an area immediately adjacent to San Francisco Bay, which has 15 local streams running through it. This complexity is heightened by the potential effects of global climate change. There is significant interagency interest in the Study because the single largest landowner in the study area is the Federal government: the USFWS's Don Edwards San Francisco Bay National Wildlife Refuge and the National Aeronautics and Space Administration's (NASA's) Moffett Federal Airfield.

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 South San Francisco Bay Shoreline Interim Feasibility Study, Alviso Ponds and Santa Clara County, California (hereinafter: South San Francisco IEPR) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers (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 South San Francisco 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 January 28, 2015.

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 the 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 South San Francisco project 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 South San Francisco

IEPR. Due dates for milestones and deliverables are based on the award/effective date of August 7, 2014. Note that the work items listed under Task 6 occur 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 May 15, 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.

Table 1. Major Milestones and Deliverables of the South San Francisco IEPR

Task	Action	Due Date
1	Award/Effective Date	8/7/2014
	Review documents available	1/8/2015
	Public comments available	2/11/2015
2	Battelle submits list of selected panel members	12/18/2014
	USACE confirms the panel members have no COI	1/6/2015
3	Battelle convenes kick-off meeting with USACE	12/10/2014
	Battelle convenes kick-off meeting with USACE and panel members	2/3/2015
4	Panel members complete their individual reviews	2/19/2015
	Panel members provide draft Final Panel Comments to Battelle	3/5/2015
	Battelle sends public comments to panel members for review	3/5/2015
	Panel confirms no additional Final Panel Comment is necessary with regard to the public comments	3/17/2015
5	Battelle submits Final IEPR Report to USACE	3/23/2015
6[a]	Agency Decision Milestone (ADM) Meeting[b]	4/21/2015
	Battelle convenes Comment-Response Teleconference with panel members and USACE	4/24/2015
	Battelle submits pdf printout of DrChecks project file to USACE	5/15/2015
	CWRB Meeting (Estimated Date)[b,c]	9/18/2015
	Contract End/Delivery Date [c]	8/7/2015

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

[b.] *The 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.*

[c.] *A time extension contract modification will be required to accommodate CWRB activities and project closeout activities.*

Battelle identified, screened, and selected five panel members to participate in the IEPR based on their expertise in the following disciplines: environmental planning, civil/cost engineering, hydrology and hydraulic coastal engineering, geotechnical engineering, and economic issues relevant to the project. The Panel reviewed the South San Francisco IEPR document and produced 19 Final Panel Comments in

response to 22 charge questions provided by USACE for the review. This charge included two questions added by Battelle that sought summary information from the IEPR Panel. 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 (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 South San Francisco IEPR review document. The following summarizes the Panel's findings.

Based on the Panel's review, the report is well-written and the information logically organized. The Panel also found that USACE took advantage of valuable insight gained from complementary restoration efforts in the South Bay, weaving them well into the project development. However, the Panel did identify several elements of the project that should be clarified or revised.

Environmental: Of primary concern to the Panel were three important issues related to the assumptions, projections, and results associated with the Combined Habitat Assessment Protocol (CHAP) model. First, the results of the CHAP modeling of ecological uplift for ecosystem restoration alternatives appear to be inconsistent with the current understanding and value of functioning tidal wetland habitats. USACE can address this by discussing why the CHAP model was selected, and why other ecosystem restoration models or model variants were not used during ecosystem restoration alternative screening. Second, several assumptions (e.g., channel complexity and marsh development) used in the CHAP modeling of potential ecosystem restoration benefits are made without data or information to support use of the model. The Panel believes that this issue can be addressed by providing information (e.g., alteration of data inputs) to support the basis for the assumptions used in the CHAP modeling effort. Third, CHAP model projections have not considered potential indirect disturbances to wildlife from recreational users and wildlife predators or the suitability of island habitats in the restored salt ponds. This matter can be resolved by evaluating the impact of recreational use of the Flood Risk Management (FRM) levees and the use of the levees by wildlife predators on sensitive wildlife species in the CHAP model and by modeling the suitability of island habitats in the restored salt ponds to meet project ecosystem restoration

objectives. The Panel believes that by implementing these measures and then re-running the CHAP model, USACE can confirm that the model can make clear and accurate evaluations of the ecosystem restorations alternatives.

Hydrologic and Hydraulic Engineering: The Panel was concerned that residual risks associated with interior drainage and fluvial flooding are not adequately considered (per ER 1105-2-101), potentially affecting the project completeness and effectiveness. USACE can address this issue by (1) providing a more thorough discussion of residual risk from fluvial and interior drainage in Section 9.8 of the main report and 4.8.2 in Appendix E, (2) discussing the interior drainage and how it will be accomplished as it applies to rainfall and runoff behind the line-of-protection (interior of the levee protected area) and (3) incorporating project components to eliminate any adverse impacts associated with the project on potential fluvial and interior drainage flooding. In addition, replacing all references to “residual risk” with “residual coastal flood risk,” where residual risk is related only to the coastal flood risk and including a map showing the potential flooding from interior drainage for storm events that range from the 10% to the 0.2% ACE will prove to be of great value.

Economics: Of importance to the Panel was that the ring levee has not been analyzed as a separable element of the nonstructural flood risk management option, and the levee segment to protect the San José-Santa Clara Regional Wastewater Facility (WPCP) has not been analyzed as an incremental feature of the Tentative National Economic Development/National Ecological Restoration (NED/NER) plan and the Locally Preferred Plan (LPP) in accordance with ER 1105-2-100. This can be resolved by including an analysis of the levee to protect the WPCP as a first added and last added increment of the Tentative NED/NER plan and the LPP in the final Integrated Report.

Cost Engineering: The Panel was concerned that the project cost estimate does not consider several project details that could impact the project costs and selection of the Tentative NED/NER plan or the LPP. To address this issue, the Panel suggests implementing the nine recommendations linked to the nine examples cited in the basis for comment, including determine the most appropriate cost account for the bench; adjust the cost estimate to include mobilization; site preparation and production rates for the restoration bench and the restoration ecotone for consistent approach to the cost estimate; evaluate assumptions regarding availability of borrow from other non-Federal sponsor-owned FRM project sites; and adjust cost estimate as necessary.

Geotechnical Engineering: The Panel identified two important issues related to geotechnical data and its proposed applications. First, borehole data may not have been taken from sufficient depths to provide a dataset to verify the liquefaction-settlement calculations. USACE can address this by discussing soil consistency and soil type at deeper depths based on available data and analyses (Appendix G) and by considering extending these boreholes to a greater depth than the 30 to 44 feet presented in the documentation to determine if liquefaction may be an issue at deeper depths, if sufficient geotechnical boreholes and cone penetrometer tests (CPTs) are not available. Second, borehole and CPT data are provided to depths up to 45 feet, which is not sufficient to assess the concept-level design of foundations for tidal gate structures and bridges and to determine associated costs. The Panel believes that this issue can be addressed by reviewing available historic CPT and borehole data in the vicinity of the inboard levee system for the Tentatively Selected Plan (TSP) (i.e., LPP), and determine whether enough information is available to accurately present concept alternatives and costs for this phase. In addition, USACE should consider performing additional boreholes and/or CPT to deeper depths to inform the evaluation of alternatives for the bridge structure and tidal gate structures, if sufficient geotechnical information is not available; or revise the narrative in the draft Integrated Document if the additional geotechnical information is in fact available. The Panel also found inconsistencies in the wick drain

spacing, location, and installation procedures presented in the draft Integrated Document. This can be resolved by revising the document narrative and plans to consistently depict the wick drain horizontal spacing required. USACE can also discuss the likelihood that variable or revised spacing of wick drains will be considered during preconstruction engineering design (PED), the potential for levee instability or mud wave formation during construction and how this may impact the success of wick drain installations, and the monitoring and construction procedures that will minimize potential for wick drain failures and costly reconstruction should mud waves or instability occur.

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

The results of the CHAP modeling of ecological uplift for ecosystem restoration alternatives appear to be inconsistent with the current understanding and value of functioning tidal wetland habitats.

Basis for Comment

Final Panel Comments 1, 2, and 3 are interrelated and all focus on various aspects of the Combined Habitat Assessment Protocol (CHAP) modeling effort. However, the Panel has concluded that due to their individual significance, they should be reported as distinct issues identified during the IEPR.

The ecological value of tidal wetland to upland transition/ecotone habitats is well-documented in the scientific literature (Levin et al., 2001; Traut, 2005; Craft et al., 2009; Basset et al., 2013). In several sections of the draft Integrated Document; however, the CHAP model outputs are considered inconsistent with current best available scientific understanding of functioning tidal wetland transitional habitats and in the context that tidal wetland transitional habitats currently are almost non-existent in the South Bay compared to historic distribution of these habitats. As such, the modeling output may not be appropriate given the following excerpts from the draft Integrated Document:

- "Adding this feature (ecotone) beyond the proposed bench in the Tentative NED/NER Plan would benefit the recovery of protected wetland species and help to restore ecological functions. In addition, a large ecotone will buffer maintenance actions that are necessary on the adjacent flood risk management levee." (p. S-51)
- "By providing this refuge, the ecotone would greatly increase the resiliency and longevity of the outboard tidal wetlands and the incidental flood benefits they provide, such as wave attenuation and flood water storage. In contrast, the bench feature would provide less protection from wave run-up and does not provide long term accommodation space for the restored marsh to migrate inland as sea level rises." (p. S-52)
- "The CHAP model did not recognize differences between ecosystem structures or functions, for example, the difference between a mudflat (valuable habitat) to a transitional ecotone was not recognized as a lift because it did not know which habitat was more highly valued." (p. 3-37)
- Accelerated pond restoration and ecotone construction would provide a more complete and sustainable restoration plan. (p. 3-45)
- There currently are no certified models sophisticated enough to demonstrate the value of accelerated pond restoration and ecotone construction. (p. 3-45)

The CHAP model was used to estimate habitat values that were used in the screening of ecosystem restoration alternatives and development of the National Economic Development/National Ecosystem Restoration (NED/NER) plans and the Locally Preferred Plan (LPP). The CHAP model outputs (i.e., results) were generally unable to demonstrate that additional costs associated with accelerating salt pond restoration or adding 30:1 ecotone transitional habitat to the Bay side of the new Flood Risk Management (FRM) levees would result in additional environmental outputs. As such, ecotone construction was not included in the NER plan. As stated in the draft Integrated Document, the non-Federal sponsors have determined that the ecotone with the 30:1 side slopes is preferable to the levee bench refugia measure based on habitat objectives associated with the South Bay Salt Pond Restoration Project (SBSPRP) and current understanding of the benefits provided by broad transitional tidal habitats.

The project review material implies that additional CHAP analysis was considered but deferred due to cost and schedule impacts. It is unclear if the impacts to be avoided were modeling cost and schedule impacts or project implementation cost and schedule impacts. These statements further put into question the

scope and effectiveness of the CHAP modeling effort.

The CHAP model was developed by Northwest Habitat Institute (NHI). A review of completed CHAP modeling projects listed on NHI's website did not show use of the model in tidal wetland systems (NWI, 2015). This further puts into question the suitability of using the CHAP model to assess ecosystem restoration alternatives. As noted in the draft Integrated Document, other certified models that accurately model tidal wetland ecosystem restoration may not be available or suitable for this project. However, hydrologic and sediment modeling could have been considered to make general inferences on potential ecosystem uplift from the restoration alternatives, given the importance these two factors have for the development of tidal and upland habitats.

The CHAP model outputs are significant because they inform the cost-effectiveness/incremental cost analysis (CE/ICA) and Best Buy plans, and ultimately the selection of the Tentative NED/NER plan and the LPP.

Significance – Medium/High

CHAP modeling has resulted in ecosystem restoration screening results that do not accurately reflect likely beneficial ecological outcomes that would result from accelerated pond restoration and ecotone construction, and presents uncertainty regarding key elements of the NER plan. As such, sole use of this modeling output to develop the ecosystem restoration component of the Tentative NED/NER plan may not be adequate given the study objectives.

Recommendations for Resolution

1. Discuss why the CHAP model was selected and why other ecosystem restoration models or model variants were not used during ecosystem restoration alternative screening.
2. Re-run the CHAP model to confirm that the model can make accurate evaluations of ecosystem restorations alternatives.
    a. If re-running the CHAP model results in different outputs from the initial CHAP modeling effort, re-run the CE/ICA Best Buy analysis.
    b. Use other models or model variants to screen ecosystem restoration alternatives if a second CHAP modeling effort results in the same outputs.

Literature Cited:

Basset, A., E. Barbone, M. Elliott, B. Li, S. Jorgensen, P. Lucena-Moya, I. Pardo, and D. Mouillot (2013). A unifying approach to understanding transitional waters: fundamental properties emerging from ecotone ecosystems. Estuarine, Coastal and Shelf Science 132:5-16.

Craft, C., J. Clough, J. Ehman, S. Joye, R. Park, S. Pennings, H. Guo, and M. Machmuller (2009). Forecasting the effects of accelerated sea-level rise on tidal habitat marsh ecosystem services. Frontiers in Ecology and the Environment 7:73-78.

Levin, L.A., D. Boesch, A. Covich, C. Dahm, C. Erséus, K. Ewel, R. Kneib, A. Moldenke, M. Palmer, P. Snelgrove, D. Strayer, and J. Weslawski (2001). The function of marine critical transition zones and the importance of sediment biodiversity. Ecosystems 4(5):430-445.

NWI (2015). Northwest Habitat Institute website. URL: http://www.nwhi.org/. Accessed February 20, 2015.

Traut, B.H. (2005). The role of coastal ecotones: a case study of the salt marsh/upland transition zone in California. Journal of Ecology 93(2):279-290.

Final Panel Comment 2

Several assumptions (e.g., channel complexity and marsh development) used in the CHAP modeling of potential ecosystem restoration benefits are made without data or information to support use of the model.

Basis for Comment

Final Panel Comments 1, 2, and 3 are interrelated and all focus on various aspects of the Combined Habitat Assessment Protocol (CHAP) modeling effort. However, the Panel has concluded that due to their individual significance, they should be reported as distinct issues identified during the IEPR.

The Panel finds that several assumptions made in the CHAP modeling of potential ecosystem restoration benefits may affect model outputs. These assumptions make it difficult for the Panel to assess the accuracy and suitability of the CHAP modeling effort to inform NED/NER plan development and the subsequent selection of a Tentative NED/NER plan. The Panel cites the following statements in the CHAP Wildlife Habitat Assessment Report:

- "Informed predictions of habitat value for each of the 5 proposed restoration alternatives were calculated by altering the inputs to the CHAP accounting system to match the desired outcomes of the different restoration approaches." (p. 5). It is difficult to determine whether altering the inputs to the CHAP accounting system with informed predictions resulted in outputs that are empirically supported.
- "In regard to the marsh polygons, several assumptions were developed in conjunction with the habitat team on how to represent this evolution spatially." (p. 6). Since the report does not list the assumptions made by the habitat team and used in the analysis, it is difficult for the Panel to assess the suitability of the CHAP modeling data input effort with regard to marsh polygons.
- "The assumption in applying this dataset is that immediately after the breach the channels will be restored to tidal action. However the fine features of channel complexity may not be fully evolved in the short term. Therefore, the channel dataset was reduced in complexity by removing the fine features derived from the channel line work initially." (p. 7). This statement assumes that tidal channels will be restored immediately after pond berm breaches without supporting data or information to substantiate the assumption based on pond location and the stated schedule for each pond restoration action.
- "Various management actions within the ponds are considered to help accelerate the marsh development process. Examples of these types of management actions are: the creation of pilot channels, ditch blocks, sidecast berms, existing berm lowering, and others. Because the effects of these management options on habitat development have not been modeled or quantified, it was decided to just visually represent these features in the analysis." (pp. 7, 8). This statement suggests that accelerated pond restoration (an aspect of the ecosystem restoration process that was screened in the draft Integrated Document and eliminated) was not completely modeled or quantified and does not support the draft Integrated Document statements regarding why accelerated pond restoration was eliminated for the Tentative NED/NER plan and the Tentatively Selected Plan (TSP) (i.e., LPP).
- Table 1 (p. 8) lists the timeline for pond breaches and the associated model analysis period for each pond breach. However, no information is provided to support why the specific model analysis time period was chosen after each of the pond breaches.

Significance – Medium/High

Without supporting data or information to substantiate assumptions in the CHAP model, it is difficult to be

certain of the suitability of the modeling data and scheduling and ultimate cost of restoration efforts.

Recommendations for Resolution

1. Provide information (e.g., alteration of data inputs) to support the basis for the assumptions used in the CHAP modeling effort.
2. Re-run the CHAP model using assumptions that provide clear and accurate evaluations of ecosystem restorations alternatives.

Final Panel Comment 3

CHAP model projections have not considered potential indirect disturbances to wildlife from recreational users and wildlife predators or the suitability of island habitats in the restored salt ponds.

Basis for Comment

Final Panel Comments 1, 2, and 3 are interrelated and all focus on various aspects of the Combined Habitat Assessment Protocol (CHAP) modeling effort. However, the Panel has concluded that due to their individual significance, they should be reported as distinct issues identified during the IEPR.

The CHAP model projections of potential habitat uplift from the ecosystem restoration alternatives do not include potential indirect disturbances to wildlife such as recreational use of the FRM levees and use of the levees by wildlife predators. Modeling these indirect effects on wildlife may not be possible with the CHAP model; however, these issues do not appear to have been considered during the screening and selection of the ecosystem restoration alternatives, either quantitatively or qualitatively. Use of these areas by recreationalists without ecotone dispersal refugia would potentially expose non-aquatic wildlife species, such as the Federally listed salt marsh harvest mouse, to a higher potential of disturbance than if an ecotone was present for dispersal habitat from recreation use areas.

The draft Integrated Document states (p. 4-246) that, “Levees are used as corridors for mammalian predators and as roosting and nesting habitat by shorebirds and waterfowl.” Several sensitive, Federally listed species are known to periodically occur in the general area where the FRM levee is proposed, such as Western snowy plover, California Ridgeway’s rail, and salt marsh harvest mouse. As shown in Figure 6 in Appendix Q, SSFBSS Existing Biological Conditions Report, the only known consistent use of the study area by Federally listed Western snowy plovers is along the proposed FRM levee and ecotone alignment in Pond A12. Given this, it seems reasonable to assume that an ecotone transitional habitat that extends from the FRM levee would increase cover and dispersal habitat from recreation impacts and minimize predation of sensitive species from predators that use the levee for seeking prey, and thus benefit the recovery of local Western snowy plover populations.

Appendix Q also notes (pp. 67 and 70) that island habitat in salt ponds and salt marshes benefits a variety of bird species that use estuarine environments, including Western snowy plovers. However, there is no evidence in the draft Integrated Document or CHAP Wildlife Habitat Assessment Report that creation of island habitats in the restored salt ponds was considered or modeled for suitability with project ecosystem restoration objectives. The Panel is therefore unable to determine whether incorporation of these habitats into the CHAP model would have changed the model outputs or restoration cost-effectiveness.

Significance – Medium/High

CHAP modeling has resulted in ecosystem restoration screening results that may over- or underestimate ecosystem benefits.

Recommendations for Resolution

1. Evaluate the impact of recreational use of the FRM levees and the use of the levees by wildlife predators on sensitive wildlife species in the CHAP model.
2. Model the suitability of island habitats in the restored salt ponds to meet project ecosystem restoration objectives.

Final Panel Comment 4

Residual risks associated with interior drainage and fluvial flooding are not adequately considered (per ER 1105-2-101), potentially affecting the project completeness and effectiveness.

Basis for Comment

USACE ER 1105-2-101 (USACE, 2006) defines "residual risk" as the flood risk that remains if a proposed flood damage reduction project is implemented. A similar definition is provided in the draft Integrated Document (pp. S-42, 3-10, 3-24, and 3-84). The majority of the discussion about residual risk for the Tentative NED/NER plan and the LPP focuses on the residual coastal flood risk, but is identified as residual risk throughout the entire report except in Section 9.8.2. Section 9.8.2 clearly identifies the residual risk as "residual coastal flood risk" and briefly mentions that there would still be some riverine flood risk in the study area. USACE ER 1105-2-100 (USACE, 2000) states that the residual risk must be carefully analyzed, documented, and communicated, and adequately identified and communicated to the non-Federal sponsor and floodplain occupants.

The draft Integrated Document does not adequately communicate the residual risk of the Tentative NED/NER plan and the LPP. Without identifying the residual risk as "residual coastal flood risk," the project performance (Tables 3.5-5 and 3.10-1) and residual annual damage (YR 2067) could be misinterpreted to mean that, depending on the sea level change (SLC) scenario, flooding of the Alviso community would be extremely rare for the Tentative NED/NER plan and the LPP (long-term risk over a 30-year period of 0.6% for the NED plan and 0.3% for the LPP). However, the risk of flooding for the Alviso community will be higher than the reported values when fluvial flooding and possibly interior drainage flooding are included.

Figure 12 of Appendix E shows that there will be pronounced fluvial flooding within the Alviso area from Guadalupe River for the 0.2% annual chance of exceedance (ACE) event, which has about a 10% chance of occurring over the 50-year project life. Appendix E indicates fluvial flooding will also occur for the 0.5% ACE event. The report contains limited discussions related to fluvial flooding. The draft Integrated Document does not discuss the uncertainties and damages associated with the fluvial flooding, or whether the Tentative NED/NER plan would adversely impact the fluvial flooding in terms of depths and/or duration of flooding. Increases in flood duration could result in additional flood damages from microbial contamination and silt deposition that may make a building re-use impossible or result in significant costs to rehabilitate. Without an evaluation of residual risk, riverine flooding could occur even though the project provides protection from tidal flooding.

The draft Integrated Document also does not address interior drainage due to rainfall and runoff behind the line-of-protection (USACE, undated). The report states that a majority of the interior area is below sea level. Thus, there could be a potential for flood damages to occur during an extreme tide event with pronounced rainfall on the interior area. Both the extent and duration of this flooding are important. The proposed drainage system should be able to drain the area in a timely manner to reduce the risk from back-to-back storm events. Similar physical settings have required a pump station to address interior drainage. The project first and operational costs would be affected if a pumping station is required. An evaluation of interior drainage and its residual risks are essential to ensuring the effectiveness and acceptability of the project.

Significance – Medium/High

Inclusion of the residual fluvial and interior drainage flooding would improve the overall completeness and effectiveness of the project, and possibly lead to an increase in the project cost.

Recommendations for Resolution

1. Provide a more thorough discussion of residual risk from fluvial and interior drainage in Section 9.8 of the main report and 4.8.2 in Appendix E. Indicate whether the proposed project would have an adverse impact (depths and/or duration of flooding) on the fluvial flooding.
2. Change all references to “residual risk” to “residual coastal flood risk,” where residual risk is related only to the coastal flood risk.
3. Include a map showing the potential flooding from interior drainage for storm events that range from the 10% to the 0.2% ACE.
4. Discuss the interior drainage and how it will be accomplished as it applies to rainfall and runoff behind the line-of-protection (interior of the levee protected area) including:
    a. the magnitude and duration of Artesian Slough backwater when tidal flooding prevents flow through tide gate check valves
    b. possible impacts on San José-Santa Clara Regional Wastewater Facility operations.
5. Incorporate project components to eliminate any adverse impacts associated with the project on potential fluvial and interior drainage flooding.

Literature Cited:

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

USACE (2000). Planning – Planning Guidance Notebook. 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 (1989). Clarification of Policy on Relocations at Flood Control Projects. Policy Guidance Letter No. 16. Department of the Army, U.S. Army Corps of Engineers, Directorate of Civil Works. May 24. Available online at: http://planning.usace.army.mil/toolbox/library/MemosandLetters/pgl16.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 5

The ring levee has not been analyzed as a separable element of the non-structural flood risk management option, and the levee segment to protect the San José-Santa Clara Regional Wastewater Facility has not been analyzed as an incremental feature of the Tenative NED/NER plan and the LPP in accordance with ER 1105-2-100.

Basis for Comment

A ring levee to protect the San José-Santa Clara Regional Wastewater Facility (WPCP) was identified as part of the non-structural FRM option, and a levee segment to protect the WPCP was included in the Tentative NED/NER plan and the LPP.

The non-structural FRM option, which included the ring levee, was eliminated from further consideration because it has a much higher cost and fewer NED benefits than many of the structural FRM options (draft Integrated Document, p. 3-20). The higher cost, associated with floodplain acquisition, resulted in elimination of the ring levee to protect the WPCP as a non-structural FRM option. The Panel is concerned that the ring levee was eliminated from consideration without thorough analysis as required by ER 1105-2-100 (USACE, 2000; p. 2-10).

The Tentative NED/NER plan and the LPP include a levee segment to protect the WPCP. However, the levee segment to protect the WPCP is a separable element that has not been subjected to an incremental analysis. Per ER 1105-2-100 (USACE, 2000; p. 2-10), incremental analysis of project features is a fundamental principle of the plan formulation process and economic analysis to identify the NED plan. The Panel is concerned that not all separable features of the Tentative NED/NER plan and the LPP have been incrementally justified.

Significance – Medium/High

Formulation and evaluation of all options and incremental justification of separable elements are needed to determine the NED features of the Tentative NED/NER plan and the LPP.

Recommendations for Resolution

1. Include, in the final Integrated Report, an analysis of the levee to protect the WPCP as a first added and last added increment of the Tentative NED/NER plan and the LPP.

Literature Cited:

USACE (2000). Planning – Planning Guidance Notebook. Engineer Regulation (ER) No. 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

Final Panel Comment 6

The project cost estimate does not consider several project details that could impact the project costs and selection of the NED and NER plans, and the LPP.

Basis for Comment

The Panel has identified several design and construction details that have not been considered in developing the Micro-Computer Aided Cost Estimating System Second Generation (MII) project costs. Since the cost of project elements plays a crucial role in selection of an alternative, the examples provided below affect the efficiency and completeness of the project.

1. **Tidal Side Bench**: In numerous locations the 50-foot wide bench on the tidal side of the levee is identified as a transitional habitat feature and having only an incidental benefit to the FRM levee. The 50-foot bench would not survive on it own merits as a FRM addition to the levee and should be included only as a restoration feature. The MII cost estimate, Table S-7, and other locations in the draft Integrated Document assign the cost of a 50-foot bench to Code of Accounts (COA) 11 as a FRM feature and not COA 6 as a transitional habitat feature. The error in identification of bench cost account can alter the relative NED/NER plan costs and that of the LPP.
2. **Ecotone**: The relative costs of the ecotone and bench, both restoration features, are portrayed inconsistently. The cost of the tidal side bench is significantly subsidized by having the mobilization, clearing, grubbing, and stripping performed as a FRM levee construction cost. The ecotone mobilization, clearing, grubbing, and stripping is performed as a stand-alone restoration cost. The production rate for ecotone earth fill at 250 cubic yards/hour (CY/hr) is less than half that of the bench at 560 CY/hr, even though both ecotone and bench have similar construction requirements. The reduction in ecotone production is predicated on material being hauled in from a stockpile. For comparison, elsewhere in the cost estimate the levee embankment material has a production rate of 430 CY/hr and its stockpile is significantly further away than that for the ecotone. The relative cost per cubic yard for placement of project features can alter the respective NER plan and LPP restoration costs.
3. **Final Grade of Levee Cross-section**: In accordance with Appendix G, Civil Design, Part 1, Figure 15, and Appendix G, Civil Design, Part 3, Geotechnical Appendix (dated 5 Aug 2011 by CESPN-ET-EG), the FRM levee cross-section will be overbuilt initially to allow for Bay mud consolidation. This overbuilt cross-section will be 2 to 5 feet higher than finish elevation and add ~6 to 15 feet of width to each side of the levee cross-section until consolidation is complete. Once consolidation is complete, any final grading would be performed. The cost estimate does not appear to allow the equipment and crew time required to re-grade the overbuilt levee to the final cross-section.
4. **Construction Site Dewatering**: Construction site dewatering (not the same as using wick drains for consolidation) is not addressed in Appendix G, Civil Design. This situation is more pronounced in Reaches 2 and 3, where Pond A16 appears to have been breached and may cause standing water up to the levee toe. It is not clear how soil treatment or production rate adjustment was included in the cost estimate to account for wet foundation conditions.
5. **Wick Drain Length**: MII Cost Estimate descriptor 2.2.2.1.7, Wick Drains (p. 17 in both the NED plan and the LPP estimates) uses a quantity of 1,200,673 feet of wick drains. Appendix G, Part 1, Section 2.1.10, which describes features of the Aviso North-WPCP South 1% ACE levee alignment, cites 2,661,126 linear feet of wick drains. Section 3.2.1 states, “Wick drains will be required from approximately STA 65+00 to 94+75.” Section 4.1.2, with a levee at lower elevation states wick drains “required from approximately STA 65+00 to 150+00.” This is a large and wide range of values with a variance as much as 120% or $6M+. The Panel understands that a risk-based estimate is necessary at this stage of the project; however, the estimate should be

consistent.

6. **Cost of Borrow**: The Phase I report (Appendix G, Section 6.2, Appendix W various locations, MII NED/NER plan cost estimate sections 1.2.2.1.2.4, 1.2.2.1.3.4, 1.2.2.1.4.4, 1.2.2.1.4.5, MII LPP cost estimate sections 2.2.2.1.2.5, 2.2.2.1.3.4,2.2.2.1.4.4 , et al.) assumes 960,000 CY borrow will be available from three non-Federal sponsor-owned project sites undergoing FRM improvements. This borrow is channel excavation spoil from the other FRM projects. The assumptions for timing and cost of borrow should be better established in the report to reflect an accurate cost estimate. The cost estimate assumes a cost of borrow ($2/CY or $1.9M) plus pit development and excavation plus transportation. These costs may be borne by the other FRM sites. The current MII cost estimate in assuming a cost of borrow and cost to develop borrow pit is conservative.
7. **Ditch Blocks**: Appendix G, Part 1, Section 2.2.2.4, states the ditch blocks would be placed in former borrow ditches that occur on the land side of salt pond dikes to steer post-breach tidal flow into restoration channels and that "ditch blocks would be located so that the borrow ditch on both sides of the block connect to a breach, also reducing the potential for fish stranding." Numerical page count 48, 49, 50 (sheets do not have figure numbers but from Table of Content they look to be Figures 13a, 13b, and 13c) indicate the position and number of ditch blocks. In an e-mail response to an IEPR clarifying question from the Panel, USACE stated that the existing borrow ditches extend along the entire inboard perimeter of dikes. This appears to leave borrow ditch with ditch blocks at both ends and no apparent drainage path to a channel. The MII estimate for Pond A18 indicates four ditch blocks. There is no estimate provided for restoration on USFWS ponds. There do not appear to be enough breaches or channels to reduce the risk for stranding by the proposed number and location of ditch blocks and channel cuts. The blocks themselves are relatively inexpensive; additional channels or fill in the abandoned borrow ditches would add significant cost.
8. **Hazardous Waste**: Wick drains are indicated for use in areas identified as having known groundwater contamination (Main Report, Tables 4.8.1, 4.8.2, 4.8.3, et al.). Water expressed out of wick drains could be contaminated. Additionally, over excavated Bay mud in area adjacent to landfills may be contaminated. Table S-6 in the report states that contingency has been increased to account for the risk of hazardous waste. However, no indication is found in the Cost and Schedule Risk Analysis (CSRA) that the risk of hazardous waste is included in the contingency.
9. **Haul Road Speed Limits**: The air quality analysis (Main Report, Section 4.10.2.1) lists off-pavement haul road speed limit restrictions to 15 mph as a mitigation measure. It is not clear how the cost estimate adjusted MII production rates downward to account for this mitigation.

The nine examples above, individually and in aggregate, increase project cost and schedule risk and impact project efficacy and completeness.

Significance – Medium/High

The cost of project elements plays a crucial role in the selection of a project alternative. The MII cost estimate for the NED and NER plans, and the LPP do not align with key design and construction details of the project, and if not appropriately addressed, in aggregate these issues raise the risk level of the project with regard to cost and schedule.

Recommendations for Resolution

Recommendations are keyed to the nine examples cited in the Basis for Comment:

1. Tidal Side Bench: Determine the most appropriate cost account for the bench (e.g., COA 11 as a FRM feature or CO6 as a transitional habitat feature). Modify the cost estimate and Integrated Document accordingly to correctly identify the feature. Reevaluate NER and restoration increment of the LLP plan.

2. Ecotone: Adjust cost estimate including mobilization, site preparation, and production rates for the restoration bench and the restoration ecotone for consistent approach to the cost estimate.
3. Adjust cost estimate to add final grading of overbuilt levee section.
4. Evaluate risk associated with the need for dewatering, especially in Reaches 2 and 3 adjacent to Pond A16, and adjust estimate or contingency.
5. Correct Appendix G text regarding the quantity of wick drain linear feet. Check cost estimate to ensure correct quantity of wick drain linear feet was previously provided and used in the estimate.
6. Evaluate assumptions regarding availability of borrow from other non-Federal sponsor-owned FRM project sites and adjust cost estimate as necessary.
7. Evaluate the number and placement of ditch blocks or additional channels to achieve the objective to not strand fish. Conversely, modify the objective regarding stranding fish.
8. Evaluate risk associated with hazardous waste discharge at wick drains and update the CSRA (contingency).
9. Evaluate impact of air quality mitigation on MII cost estimate production rates and adjust either the estimate or the CSRA (contingency).

Final Panel Comment 7

Borehole data may not have been taken from sufficient depths to provide a dataset to verify the liquefaction-settlement calculations.

Basis for Comment

The draft Integrated Document provides geotechnical information summaries in Appendix O, supported by borehole logs and cone penetrometer test (CPT) soundings contained in additional information provided to the Panel (AMEC, 2010; USACE, 2009). There have been a substantial number of CPTs and boreholes conducted, along with newer geotechnical investigations to fill in data gaps, including an additional 20 standard penetration test (SPT) borings and 58 CPT soundings along the TSP (i.e. LPP) inboard levee.

Liquefaction has also been evaluated. Liquefaction-induced settlement is a function of seismic intensity, duration, and soil conditions. Liquefaction usually occurs in soils when the cyclic stress ratio exceeds the resisting stress. The depth of liquefaction is dependent on soil conditions and may exceed 60 feet in depth. Typically, liquefaction does not occur in stiff to hard cohesive soils or medium dense to dense cohesionless soils, which are the conditions found in many of the CPT soundings and boreholes. CPT tests for the inboard levee range from 30 to 44 feet in depth, while supplemental boreholes added and shown in the AMEC Geomatrix Exploration Location Map of Figure 1 (AMEC, 2010) and in the logs and soundings in this report indicate borehole depths of 9.5 to 45 feet. A review of these boreholes indicates lower strata appear to have medium stiff to stiff clay or medium dense to dense cohesionless materials. However, some CPT tests indicate low cone resistance with maximum depths of penetration of 26 to 29 feet. If boreholes and CPT soundings do not fully explore soil conditions at deeper depths, it is difficult to verify the accuracy of seismically induced liquefaction settlement.

Figure 1-1 (USACE, 2009) provides a map of the existing and new geotechnical data locations, however, only new geotechnical information is numbered, therefore it is not possible to correlate historic geotechnical data depths to the inboard levee system alternative and determine if sufficient information may be available at depths deeper than the 30 to 45 feet.

Significance – Medium

If loose or soft conditions exist beneath the penetration depths of CPT and boreholes presented, it is possible that additional settlement may occur that is not included in the liquefaction calculation estimates for the alternatives analysis.

Recommendations for Resolution

1. Discuss soil consistency and soil type at deeper depths based on available data and analyses (Appendix G).
2. Consider additional field geotechnical exploration to depths greater than the 9.5 to 45 feet presented in the boreholes and CPTs to confirm soil density and soil consistency and whether liquefaction-induced settlement or other issues with seismic events may be an issue.

Literature Cited:

AMEC Geomatrix, Inc. (2010). South San Francisco Bay Shoreline Study. Geotechnical Investigation of Inboard Levees. Draft Data Report.

USACE (2009). South San Francisco Bay Shoreline Study, F3 Milestone without Project. Appendix C, Geotechnical Investigation and Analysis. Department of the Army, U.S. Corps of Engineers, San Francisco District, Geo-Sciences Section.

Final Panel Comment 8

Borehole and cone penetrometer test data are provided to depths up to 45 feet, which is not sufficient to assess the concept-level design of foundations for tidal gate structures and bridges and to determine associated costs.

Basis for Comment

In Chapter 9, Section 9.2, the draft Integrated Document describes the USACE TSP (i.e. LPP), which consists of approximately 3.8 miles of an engineered inboard levee system providing more reliable risk from tidal floods. However, the foundation requirements and costs associated with bridge and tidal gate alternatives may not be accurately assessed in the TSP alternative. Structural components for the bridge and tidal gate alternatives will likely require pile foundations extending substantially deeper than the depths of boreholes and CPT data. It is the Panel's opinion that this may result in cost estimates for foundation structures that are not accurately reflected in the draft Integrated Document.

Appendix O, Geotechnical Investigation and Analysis, states (p. O-5) that the primary source of geotechnical information is a 2009 USACE study and that more than 650 SPT borings and 43 CPT soundings were reviewed as part of background research. To adjust for data gaps, this information was supplemented by additional geotechnical information consisting of 14 SPTs and 44 CPTs for the existing outboard levees and 20 SPTs and 58 CPTs for the inboard levees as part of this study. Appendix O presents a summary of the data available, analysis conducted, and recommendations for levee improvements, however, it does not provide the actual new and historic borehole and CPT logs.

Following a review of the draft Integrated Document, the Panel requested additional information since the document did not provide any of the boreholes, CPT data, laboratory tests, or original geotechnical reports used in preparing the narrative. The Panel was given two additional geotechnical reports: (1) a 689-page draft data report and geotechnical investigation of the inboard levees (AMEC, 2010), and (2) a 620-page geotechnical investigation and decision document (USACE, 2009) referencing the additional geotechnical data. Both of these documents contain more detailed information on the locations and depths of boreholes and CPT data available in the study area and some of these geotechnical data provide additional information for the TSP inboard levee system concept alternatives. The two geotechnical reports also contain some historic geotechnical data and new borehole and CPT logs.

Based on a review of these two references for data near the TSP inboard levee system, the majority of CPT data average 30 feet in depth, with several CPTs to 44 feet along the TSP inboard levee. In addition, the borehole logs for the TSP limits range from 9.5 to 45 feet. Several of the CPTs recorded low cone resistance from 26 to 29 feet.

Design of tidal gate structures and bridge foundations needs to account for potential down drag loads, lateral loads, and structural loads for compression and tension piles. This requires pile installation potentially much deeper than for the geotechnical information available. It is not clear from the documentation whether sufficient borehole and CPTs have been obtained to prepare concept-level foundation alternatives for these structures for the likely depth of pile installations required. Although some medium to stiff clays and medium dense sands were found underlying the soft Bay mud, it is unclear whether information has been gathered confirming soil consistency at deeper depths.

Significance – Medium

It is important to provide boreholes and CPT data extending to suitable depths so that foundation requirements and costs are analyzed in sufficient detail for the concept-level alternatives, particularly since deep pile foundations will likely be required to extend beyond the 30 to 45 feet of the depths investigated.

Recommendations for Resolution

1. Review available historic CPT and borehole data in the vicinity of the inboard levee system for the TSP, and determine whether enough information is available to accurately present concept alternatives and costs for this phase.
2. Consider performing additional boreholes and/or CPT data to deeper depths to inform the evaluation of alternatives for the bridge structure and tidal gate structures, if sufficient geotechnical information is not available; or revise the narrative in the draft Integrated Document if the additional geotechnical information is in fact available.

Literature Cited:

AMEC Geomatrix, Inc. (2010). South San Francisco Bay Shoreline Study. Geotechnical Investigation of Inboard Levees. Draft Data Report.

USACE (2009). South San Francisco Bay Shoreline Study, F3 Milestone without Project. Appendix C, Geotechnical Investigation and Analysis. Department of the Army, U.S. Corps of Engineers, San Francisco District, Geo-Sciences Section.

Final Panel Comment 9

Inconsistencies in wick drain spacing, location, and installation procedures are presented in the draft Integrated Document.

Basis for Comment

The Panel is in agreement that wick drains are necessary to accelerate settlement and increase strength during construction. However, calculations are not provided for the wick drain quantities, and the Panel could not determine the spacing used in the cost estimating or whether the quantities of wick drains are appropriate. Although wick drain spacing is shown in several places in the draft Integrated Document, there are inconsistencies in the narrative and plan set on wick drain spacing. For example:

- Appendix G, Civil Design (p. 16), states that "Wick drains will have a 4-foot mid-point spacing," and that wick drains will be required from Station 65+00 to 94+75. Table 8 places wick drains in Sec. 3 (station 65+00 to 94+75) and Sec. 4 (94+75 to 150+00). In addition, wick drains will be extended a minimum of 5 feet penetration beneath the soft Bay mud.
- Appendix O, Geotechnical (p. O-10), states that wick drain spacing of 5 to 7 feet may be used. Section 3.1.2 of this appendix indicates "…a quantitative value (i.e., time savings vs. cost of installation) for wick drains cannot be accurately specified before PED."
- Appendix G, Civil Design, Part 2, NED Plan Set, and Part ,3 LPP Plan Set, drawing D-07, indicates a 3-foot typical spacing on wick drains.

The draft Integrated Document indicates wick drain installations will be installed a minimum of 5 feet beneath the Bay mud, however, soil beneath this soft to very soft clay is stiff or hard. This may result in greater difficulty or damage to the function of the wick drain. It is the Panel's opinion it is appropriate to estimate a minimum of 5 feet additional installation throughout the proposed installation area as a conservative assumption. There is no benefit to installing wick drains in stiff impermeable clays since the settlement will be low and permeability will not result in a two-direction flow path and therefore will provide no benefit to the TSP (i.e. LPP)

Construction practices and instrumentation are a key component of the success of the levee construction. Use of piezometers, inclinometers, and physical surveys will be needed to ensure detrimental movement of levee fill does not occur during construction. Formation of mud waves or instability of the levee fill during construction may lead to "pinching off" wick drains, which would stop flow of water from soil and retard the consolidation and strengthening process. Careful monitoring of fill placement lifts should be performed to ensure pore pressures are minimized. This is probably the most critical issue with respect to successful construction of the levee system over Bay mud since estimated settlement durations may not be achieved during construction or may require reinstallation of additional wick drains to achieve success. Additionally, once Bay mud fails, the shear strength may likely reduce to 25 percent of the original peak undrained soil strength, resulting in more difficulty in construction.

Significance – Medium

The potential formation of mud waves or instability of the levee during construction may lead to failure of wick drains, which would affect the construction of the levee system over Bay mud, and may require the installation of additional wick drains.

Recommendations for Resolution

1. Revise the document narrative and plans to consistently depict the wick drain horizontal spacing required.
2. Discuss the likelihood that variable or revised spacing of wick drains will be considered during preconstruction engineering design (PED).
3. Discuss the potential for levee instability or mud wave formation during construction and how this may impact the success of wick drain installations.
4. Discuss the monitoring and construction procedures that will minimize potential for wick drain failures and costly reconstruction should mud waves or instability occur.

Literature Cited:

AMEC Geomatrix, Inc. (2010). South San Francisco Bay Shoreline Study. Geotechnical Investigation of Inboard Levees. Draft Data Report.

USACE (2009). South San Francisco Bay Shoreline Study, F3 Milestone without Project. Appendix C, Geotechnical Investigation and Analysis. Department of the Army, U.S. Corps of Engineers, San Francisco District, Geo-Sciences Section.

Final Panel Comment 10

The LERRD project requirements appear to be underestimated since the real estate analysis does not consider key design and construction details, including an overbuilt levee cross-section and the need for more staging and stockpiling area.

Basis for Comment

Based on the information presented in Appendix W, Real Estate Plan, and Appendix G, Civil Design (Parts 1, 2, and 3), the Lands, Easements, Rights-of-Way, Relocations, and Disposal Areas (LERRD) project requirements are understated and therefore underestimate probable project cost and schedule risk.

1. Temporary Work Area Easements (TWAE):
    a. In accordance with Appendix G, Civil Design, Part 1, Figure 15, and Appendix G, Civil Design, Part 3, Geotechnical Appendix (dated 5 Aug 2011, CESPN-ET-EG), the FRM levee cross-section will be overbuilt initially to allow for Bay mud consolidation. This overbuilt cross-section will be 2 to 5 feet higher than finish elevation and add ~6 to 15 feet to each side of the levee cross-section until consolidation is complete and any final grading can be performed. This increases the FRM TWAE by ~20 to 25%.
    b. The FRM levee drawings at Pond A18 indicate the centerline of the new levee coincident with the centerline of the old levee. If the intent of Appendices G and W is to provide a 30-foot wide work area on the land side of the levee toe (15 feet of Permanent Road Easement plus 15 feet of TWAE) to facilitate construction, then in locations where the centerline of the old levee is less than ~90 to 95 ft from the landside property line (91= ½ the levee crown width + (3x levee height) + 12 feet overbuilt footprint + 30 ft work area), therefore:
        i. the new levee cross-section must shift to the waterside to avoid having to purchase additional private LERRD, but resulting in a small decrease of final restoration acreage and an equal increased surplus of land at the landside levee toe, which may be so small as to have no practical use, resulting in the project being forced to purchase the rights permanently, or
        ii. additional landside LERRD must be purchased for TWAE along the WPCP South alignment and any impacts on drainage courses and the existing wetland area must be mitigated.
2. Flood Levee Permanent Easement (FLPE):
    Levee ramps, turnouts, and turnarounds left out of the Appendix G, Civil Design, analysis add an incremental FLPE increase of up to 10 to 15%.
3. Staging and access:
    a. The construction sequence will require a stockpile and processing area while the levee area is degraded and rebuilt to separate and treat the degraded material for reuse in the FRM levee (50%) and as either the bench or ecotone fill (50%). The work area may be continuous along the levee alignment or provide haul roads to the centralized processing area. This issue is exacerbated in Appendix W, Exhibit B, and Appendix G, Civil Design, Part 2 and Part 3, sheet G-3, which shows the potential staging area overlying former bio-solid drying beds. These drying beds were eliminated as a levee alignment, in part, due to potential contaminates in the dried sludge. The same concern should preclude their use for staging. This staging/stockpile/processing area, even if it occurs on a future bench or ecotone footprint, should increase the TWAE significantly.
    b. The new FRM levee between New Chicago Marsh and Pond A16 (Reach 2 and Reach 3) has

a constrained work area to avoid impacts on existing adjacent restoration areas. Accordingly, there will be little or no stockpile area adjacent to the FRM levee footprint. This will require moving the material degraded from the existing dike to other stockpile areas by either crossing the Union Pacific Railroad, via temporary bridge over Aviso Slough, or haul routes on the road serving the Don Edwards Environmental Education Center. These haul road allowances are missing in Appendix W.

c. The project will import 960,000 cubic yards of borrow from three non-Federal sponsor-owned project sites undergoing their own FRM improvements. This material is spoil from channel excavation at these other FRM sites and does not appear to have stockpiling capacity at those other project sites. If this incoming borrow material is available prior to need for Phase I construction, a stockpile area may be required to store the material. This stockpile area allowance is missing in Appendix W.

Significance – Medium

The Real Estate Plan as described does not align with key design and construction details of the project, which, if not appropriately addressed, could underestimate project cost and schedule risk.

Recommendations for Resolution

1. Verify pre-consolidation cross-section requirements for construction temporary work area (Civil Design group).
2. Estimate the staging, stockpiling, and process area required during construction and whether the required area would fit into the footprint required for the ecosystem restoration waterside bench (Civil Design group).
3. Estimate the available land on the dry side of A18 levee to determine whether additional LERRD or movement of levee centerline is required (Civil Design group).
4. Transmit findings from recommendations 1 to 3 from the Civil Design group to the Real Estate group.
5. Update Appendix W, Real Estate Plan, including cost estimates to include increased TWAE, FPLE, and staging areas.

Final Panel Comment 11

A cost-benefit analysis of capping mercury methylation hot spots in ponds planned for ecotone and levee construction as a mitigation measure is not provided, so it is not known whether this mitigation measure was considered.

Basis for Comment

The draft Integrated Document discusses the high levels of mercury and other environmentally toxic substances in the project area and study area ponds proposed for construction in several sections (pp. 3-89, 4-126, 4-136). The document also acknowledges the potential risk for re-suspension of existing mercury concentrations during construction, making these concentrations more readily available for bioaccumulation in fish and wildlife (Section 4.5.2) through the production of methylmercury (MeHg). The document references avoiding bioaccumulation of mercury in humans and wildlife over the 50-year study period as a primary planning constraint (p. S-16). Mitigation measures proposed to minimize mercury methylation during ecosystem restoration activities are based on South Bay Salt Pond Restoration Project (SBSPRP) guidance (SBSPRP, 2004) focused on control of salinity and dissolved oxygen in ponds undergoing in-pond restoration (berm breaching and starter channel construction) to control mercury methylation from bacterial action.

Appendix K, Mercury Technical Memorandum, of the SBSPRP Environmental Impact Statement/Report (EIS/EIR) identifies mercury “hot spots” in the Alviso Ponds complex and states that Ponds A7, A8, A11, A12, and A13 have elevated mercury levels in sediment that are, on average, 2 to 5 times higher than ambient levels in the San Francisco Bay (SBSPRP, 2004). Figure 3-5 in the memorandum shows Ponds A12 and A13 as mercury hot spots in terms of mercury concentrations in sampled pond sediments. The risk for high mercury levels in project area sediments is heightened by the introduction of urban storm water to the area from the Alviso Slough and Coyote Creek (SBSPRP, 2004).

The locations of the high mercury sediment levels in Ponds A12 and A13 generally overlap with proposed levee and ecotone construction associated with the TSP (i.e. LPP). This is consistent with statements regarding mercury contamination in the draft Integrated Document. The use of off-site clean fill material for capping of mercury-laden pond sediment to minimize mercury methylation is mentioned in the Mercury Technical Memorandum as a potential mitigation measure. However, the draft Integrated Document does not consider capping of mercury-laden sediments in Ponds A12 and A13 where ecotone and levee construction are proposed. The document discusses using some off-site fill material to construct the FRM levees and using excess off-site levee fill (if available) and on-site fill material to construct the ecotones. It does not discuss the potential capping of mercury hot spots prior to levee and ecotone construction as a potential mercury methylation avoidance and minimization measure.

Assessing the potential mercury methylation and subsequent fish and wildlife mercury bioaccumulation that may occur from construction of the proposed project is challenging, difficult to model, and, as noted in both the draft Integrated Document and the SBSPRP EIS/EIR, current scientific understanding of mercury pathways into aquatic organisms and through aquatic food webs is still evolving. However, capping of mercury hot spots is a potential mitigation measure that could avoid or minimize an increase of mercury methylation in the project area during construction, and it therefore seems reasonable to assess capping of mercury hot spots from a cost-benefit standpoint for the Tentative NED/NER plan and the LPP.

The draft Integrated Document assumes that there will be no long-term significant adverse impacts on local biological resources from mercury methylation and bioaccumulation resulting from project construction given preliminary post-construction mercury monitoring of other similar SBSPRP restoration projects, the existing limited understanding of mercury bioaccumulation in aquatic systems, and the mitigation measures proposed. Long-term monitoring of biological resources in the study area will help determine if this effect determination is correct.

Significance – Medium

A cost-benefit analysis of capping mercury hot spots in the ponds proposed for levee and ecotone construction could identify the full range of water quality and biological resource avoidance and minimization measures applicable to the project.

Recommendations for Resolution

1. Conduct a cost-benefit analysis of using off-site clean fill to cap mercury hot spots in Ponds A12, A13, and A18.
2. Consider capping of mercury hot spots with off-site clean fill in project construction contingency planning and cost estimating if the cost-benefit analysis determines capping would increase control of mercury methylation and dispersal, and avoid or minimize water quality and biological resource impacts in the project area beyond the proposed mitigation measures.

Literature Cited:

SBSPRP (2004). South Bay Salt Pond Restoration Project Final Environmental Impact Statement/Report. Volume 1. Appendix K, Mercury Technical Memorandum. Available online at: http://www.southbayrestoration.org/pdf_files/SBSP_EIR_Final/Appendix%20K%20Mercury%20TM%20Final%20EIS_R.pdf

Final Panel Comment 12

The Cost Effectiveness/Incremental Cost Analysis was conducted by grouping ponds based on construction phase; however, it appears that analyzing each pond as an independent management measure was not considered.

Basis for Comment

Based on the draft Integrated Document (Section 3.6, p. 3-39), ponds were grouped according to construction phases for purposes of conducting the Cost Effectiveness/Incremental Cost Analysis (CE/ICA). By grouping ponds by construction phase, some potential alternatives were never considered. As Ponds A9, A10, and A11 were grouped together, potential alternatives that include subsets of Ponds A9, A10, and A11 were not considered. Following USACE guidance in ER 1105-2-100 (USACE, 2000, p. E-154), all possible combinations of management measures and scales should be included in the CE/ICA.

Significance – Medium/Low

Identification and evaluation of all possible combinations of management measures and scales is needed to determine the NER component of the NED/NER plan and the LPP.

Recommendations for Resolution

1. Conduct a CE/ICA that analyzes restoration of each pond as an individual measure and incorporate the results into the final Integrated Document, Section 3.6.

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

Final Panel Comment 13

The discussion of the sediment budget does not specify the level of influence the Tentative NED/NER plan or the LPP may have on the overall sediment budget of the system.

Basis for Comment

Appendix E, Section 2.5.2, includes a discussion on the sediment budget for the Far South Bay for historical (1955-1990) and baseline (2017) conditions. The sediment budget for these two conditions was estimated using tributary sediment inflow data estimated by Scott (2009) and the bathymetric change calculations given by OBA (1992). Appendix E, Section 2.5.2 is missing the following key information:

- The portion of the sediment budget that was estimated and/or calculated (IEPR Panel concluded that it was the sediment exchange from Central Bay).
- How the baseline (2017) conditions were defined using bathymetric change calculations from 1992.
- Rationale for conducting the sediment budget analysis for the sea level rise rate of 0.12 inches per year, whereas Appendix E, Section 2.4.3, indicates that the observed relative sea level rise is 0.0811 inches per year.
- Data on subsidence in the area referenced in the tabular results (Appendix E, Table 15 for Historical and Baseline Conditions, and Appendix E, Table 21 for Future Conditions).
- General conclusions about the results of the sediment budget analysis and shift in the trends between the historical and baseline conditions.

Appendix E, Section 3.5.2, provides a discussion of future without-project conditions. As with the baseline conditions, this section lacks details on the procedures and results associated with the sediment budget analysis.

Appendix E, Section 4, addresses future with-project conditions, but does not include any discussion of the sediment budget analysis and the potential influences of the proposed project on the sediment budget of the Far South Bay system.

Significance – Medium/Low

A discussion of the potential influence of the Tentative NED/NER plan or the LPP on the sediment budget of the system would improve the completeness of the draft Integrated Document.

Recommendations for Resolution

1. Revise Section 2.5.2 of Appendix E to include more information about the sediment budget analysis for the historical (1955–1990) and baseline (2017) conditions to include:
    a. components that are estimated and/or calculated
    b. a discussion related to subsidence;
    c. general conclusions that can be made from the analysis.
2. Revise Section 2.4.3 of Appendix E to include additional information regarding the sediment budget analysis for future without-project conditions.
3. Incorporate the analysis and results of a sediment budget analysis for the with-project conditions.

Literature Cited:

Scott, S.H. (2009). South San Francisco Bay Shoreline Study, Sediment Transport and Fate from South Bay Streams. U.S. Army Corps of Engineers, ERDC, Coastal and Hydraulics Laboratory, Vicksburg, Mississippi.

OBA (1992). Sediment Budget Study for San Francisco Bay. Ogden Beeman & Associates and Ray B. Krone & Associates, Portland, Oregon

Final Panel Comment 14

There appears to be a potential scheduling conflict between the proposed in-water work construction period and plans to minimize project impacts on steelhead and nesting birds.

Basis for Comment

The draft Integrated Document lists AMM-ABR-1: Seasonal Restrictions as a primary avoidance and minimization measure to address potential impacts on Federally listed steelhead from construction activities. AMM-ABR-1 states (p. 4-205):

> "Construction activities in or directly adjacent to waters where CCC juvenile steelhead are likely to be present will be performed between June 1 and November 30. To protect juvenile steelhead, levee breaching will not occur between February 1 and May 31."

The draft Integrated Document states (p. 4-200):

> "Some juvenile steelhead might reside in San Francisco Bay for an extended period prior to ocean entry, while others may choose to never fully enter the ocean and rear to maturity in the estuary (NMFS 2009; Moyle 2002). NMFS (2009) reports that this type of extended or exclusive estuarine residence has been observed in the Russian River estuary; however, it is unknown whether CCC steelhead juveniles exhibit such an extended residence in San Francisco Bay."

As such, the Panel assumes that juvenile steelhead could occur near ecosystem restoration and levee construction activities for large portions of the year to carry out their life histories.

The draft Integrated Document also lists AMM-TRB-2: Seasonal Restrictions as a seasonal timing restriction to minimize construction impacts on nesting birds. AMM-TRB-2 states (p. 4-278):

> "Implement wet-season restrictions on construction for wildlife protection. To the extent feasible (i.e., if water quality protection can be provided), construction will be conducted outside the nesting season for birds (February 1 through August 31)."

The document does not provide a clear indication of whether the general distribution of steelhead and nesting birds may overlap during construction. If areas undergoing construction contain both juvenile steelhead and nesting birds, the combined seasonal construction restrictions would result in a construction window of two months (December and January). It is unclear to the Panel if there are construction areas that could contain or be near both juvenile steelhead and nesting birds and, if there is distribution overlap, whether these combined construction timing restriction measures were considered during construction scheduling, planning, and cost estimating.

Significance – Medium/Low

A clear assessment of the potential geographical range of juvenile steelhead and nesting birds during construction would strengthen the understanding of potential combined seasonal construction restrictions, as well as the feasibility of the proposed construction schedule and cost estimate if these species' ranges overlap.

Recommendations for Resolution

1. Provide a more detailed description of the potential geographical range of juvenile steelhead and nesting birds during each major construction element affecting their respective habitats.
2. Indicate if there will be combined construction timing restrictions for single construction actions or locations per AMM-ABR-1 and AMM-TRB-2 to minimize impacts on steelhead and nesting birds.
3. Integrate combined construction timing restrictions into the construction schedule and cost estimate if cumulative construction timing restrictions are expected to occur.

Final Panel Comment 15

A comprehensive plan for communicating residual risk and expected flood damages to the floodplain residents is not provided.

Basis for Comment

Residual risk is a critical issue for floodplain residents that should be carefully documented and communicated, as directed by ER 1105-2-100 (USACE, 2000; p. 3-11). The draft Integrated Document (Section 3.7, p. 3-46 ff and Section 9.8, p. 9-28 ff) includes detailed discussions of risk and uncertainty and residual risk related to flood risk management, sedimentation, public access, and future sea level change. The document notes that, while recognizing the uncertainty inherent in future projections, all FRM levee options provide an extremely high level of risk reduction.

Notwithstanding this high level of residual risk reduction, the Panel is concerned that some risk remains as all levees can fail or be overtopped and it is important that the public understand these risks.

Significance – Medium/Low

Communicating residual risk in the draft Integrated Document will more fully disclose the risks associated with the project.

Recommendations for Resolution

1. Develop and document in the final Integrated Document a comprehensive plan for communicating residual risk and expected flood damages to the floodplain residents.

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

Final Panel Comment 16

The description of levee access does not provide sufficient information to determine whether required operations and maintenance activities can be conducted.

Basis for Comment

The Panel finds that description of levee access for normal maintenance operations and flood fighting operations is incomplete, based on evidence presented in Appendix G, Civil Design, Parts 1, 2, and 3, as well as Appendix W, Real Estate Plan, and Cost Engineering documents. This omission affects the completeness and acceptability of the project, and could impact the cost estimate.

USACE EM1110-2-1913 (USACE, 2000) offers guidance on levees:

- Roads on top of levees should have ramps from the levee toe to levee crown provided at sufficient locations to permit vehicular traffic to access onto and from the levee. These levee ramps should be on both the landside and waterside of the levee. Location and spacing of ramps should be in accordance with local levee district. In addition, California DWR (2012) states that intervals between ramps should be “at reasonably close intervals.” No ramps are shown or indicated in the documents for later incorporation.
- Roads on top of levees should have turnouts every 2,500 feet to allow vehicles to pass. No turnouts are shown or indicated in the documents for later incorporation.
- Roads on top of levees should have turnarounds to allow vehicles to reverse their direction at all points where the levee dead ends and no ramp exists in the vicinity of the dead end. Lack of detail regarding ramps makes the need for turnarounds difficult to estimate.
- The levee toe should include permanent access from public roads to maintenance road end points and “reasonably close intervals.” No access to public roads is shown or indicated in the documents for later incorporation.

In addition:

- The U.S. Fish and Wildlife Service (USFWS) and the Santa Clara Valley Water District (SCVWD) will require access for normal maintenance operations and restoration activities over the levee and across the bench or ecotone to connect to existing salt dike roadways. No future ramps or access are shown or indicated in the documents for later incorporation.
- Normal maintenance operations and floodfighting operations will require a permanent levee toe maintenance road RR grade crossing. No RR grade crossing is shown or indicated in the documents for later incorporation.

Significance – Medium-Low

A concise description of levee access for maintenance and operations would improve the completeness of the draft Integrated Document.

Recommendations for Resolution

1. Include required and reasonable levee ramps, turnouts, and access roads needed for normal maintenance operations and floodfighting in Appendix G, Civil Design, Part 1; Section 2.1.1, Levee Design Considerations.
2. Correct quantities and cost estimate to incorporate increased costs and LERRDs requirements for levee access.

Literature Cited:

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http://www.water.ca.gov/floodsafe/leveedesign/ULDC_May2012.pdf

Final Panel Comment 17

It is unclear whether the models and assumptions for assessing life safety hazards has been addressed or if a life safety analysis has been completed.

Basis for Comment

Although potential economic and structural risks associated with flooding events are included in the draft Integrated Document and supporting materials, there is no discussion of life safety risks and the models and assumptions for assessing life safety hazards for the future with- and without-project alternatives that were screened. It is the Panel's opinion that the draft Integrated Document should acknowledge potential life safety issues from flooding associated with the flood risk management alternatives.

Significance – Low

For completeness, the decision document would benefit from a discussion of life safety risks associated with flooding and how they may impact the feasibility of the TSP (i.e. LPP).

Recommendations for Resolution

1. Document or acknowledge potential life safety risks associated with the future without-project and with-project conditions in the draft Integrated Document.

Final Panel Comment 18

Risks associated with the potential malfunction of the railroad closure structure during an extreme high water event or fluvial flood event are not addressed.

Basis for Comment

The Tentative NED/NER plan and the LPP documented in the draft Integrated Document include a floodgate closure structure at the Union Pacific Railroad tracks. The structure is part of the flood risk management feature of the proposed project that provides flood protection to Alviso from extreme high water tidal events.

There is an inherent risk associated with incorrect operation and/or malfunctioning of the proposed flood gate structure (OPW, 2009), but this risk is not addressed in the draft Integrated Document. The community of Alviso is at an elevation "at or below 5 feet NAVD 88, which is lower than mean higher high tides in the area" (Section S.8.2, p. S-10). The potential economic damages could be high if the gate malfunctions during an extreme high water tidal event or extreme flood event where fluvial flooding from Guadalupe River flows into the project site. Alviso could receive as much as 8 feet of water in the floodplain (Section S.8.2, p. S-10).

The risk associated with malfunctioning of the railroad closure structure is thus important information for the general public.

Significance – Low

Inclusion of the risks associated with the potential malfunction of the railroad closure structure would provide a complete discussion of project risks.

Recommendations for Resolution

1. Discuss the risk associated with the potential malfunction of the railroad closure structure in the final version of the draft Integrated Document.
2. Include the following maps as part of the discussion of risk:
    a. Inundation extents for the gate remaining open during an extreme high water tidal event
    b. Inundation extents for the gate remaining closed during an extreme fluvial flood (0.2% annual chance event) on Guadalupe River.

Literature Cited:

OPW (2009). The Planning System and Flood Risk Management Guidelines for Planning Authorities, Technical Appendices. The Office of Public Works, Government of Ireland.

Final Panel Comment 19

It is not clear whether the purpose of the recreation features evaluated is to mitigate the loss of existing recreation or to add features to those that currently exist.

Basis for Comment

The draft Integrated Document states (Section 3.7.1, p. 3-49) that: "Recreation measures were incorporated into the final array of alternatives to provide additional recreation benefits associated with proposed ecosystem restoration features and to compensate for the loss of public access as the ponds in the USFWS-managed Refuge are breached and restored to tidal marsh. The recreation measures included in the final array are multi-use trails on top of the new proposed flood risk management levee with connection to the Bay Trails network, along with viewing platforms and benches, and trail upgrades to be made to an existing segment of the Bay Trails system along SR 237."

In evaluating recreation benefits, it is important to distinguish those recreation features that increase the supply of recreation from those that mitigate lost recreation because, following USACE guidance in ER 1105-2-100 (USACE, 2000, p. 3-30), NED benefits, based on willingness to pay, are generated by increasing the supply of recreation. The Panel cannot be certain which recreation measures are being proposed to compensate for lost recreation opportunities and which measures are being proposed to provide additional recreation benefits.

Significance – Low

Additional information describing the recreation measures proposed to compensate for lost recreation opportunities and the recreation measures proposed to provide additional recreation benefits will improve understanding of the purpose of the recreation features in the Tentative NED/NER plan and the LPP.

Recommendations for Resolution

1. Include a table in Section 3.7.1 of the final Integrated Document that lists the recreation features and associated costs, categorized by measures being proposed to compensate for lost recreation opportunities and measures that are being proposed to provide additional recreation benefits.

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APPENDIX A

IEPR Process for the South San Francisco 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 South San Francisco Bay Shoreline Interim Feasibility Study, Alviso Ponds and Santa Clara County, California Independent External Peer Review (hereinafter: South San Francisco IEPR). Due dates for milestones and deliverables are based on the award/effective date of August 7, 2015. The review documents were provided by U.S. Army Corps of Engineers (USACE) on January 8, 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. South San Francisco Complete IEPR Schedule

Task	Action	Due Date
1	Award/Effective Date	8/7/2014
	Review documents available	1/8/2015
	Public Comments Available	2/11/2015
	Battelle submits draft Work Plan[a]	12/16/2014
	USACE provides comments on draft Work Plan	1/7/2015
	Battelle submits final Work Plan[a]	1/28/2015
2	Battelle requests input from USACE on the conflict of interest (COI) questionnaire	12/3/2014
	USACE provides comments on COI questionnaire	12/5/2014
	Battelle submits list of selected panel members[a]	12/18/2014
	USACE confirms the panel members have no COI	1/6/2015
	Battelle completes subcontracts for panel members	1/13/2015
3	Battelle convenes kick-off meeting with USACE	12/10/2014
	Battelle sends review documents to panel members	1/28/2015
	Battelle convenes kick-off meeting with panel members	2/3/2015
	Battelle convenes kick-off meeting with USACE and panel members	2/3/2015
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	2/13/2015

Table A-1. South San Francisco Complete IEPR Schedule (continued)

Task	Action	Due Date
4	Panel members complete their individual reviews	2/19/2015
	Battelle provides panel members with talking points for Panel Review Teleconference	2/23/2015
	Battelle convenes Panel Review Teleconference	2/25/2015
	Battelle provides Final Panel Comment templates and instructions to panel members	2/26/2015
	Panel members provide draft Final Panel Comments to Battelle	3/5/2015
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	3/06/2015 - 3/12/2015
	Panel finalizes Final Panel Comments	3/13/2015
	Battelle sends public comments to panel members for review	3/5/2015
	Panel confirms no additional Final Panel Comment is necessary with regard to the public comments	3/17/2015
5	Battelle provides Final IEPR Report to panel members for review	3/17/2015
	Panel members provide comments on Final IEPR Report	3/19/2015
	Battelle submits Final IEPR Report to USACE[a]	**3/23/2015**
6[b]	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	3/25/2015
	Battelle convenes teleconference with USACE to review the Post-Final Panel Comment Response Process	3/25/2015
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process	3/25/2015
	USACE provides draft Project Delivery Team (PDT) Evaluator Responses to Battelle	4/8/2015
	Battelle provides the panel members the draft PDT Evaluator Responses	4/15/2015
	Panel members provide Battelle with draft BackCheck Responses	4/17/2015
	Agency Decision Milestone (ADM) Meeting	4/21/2015
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	4/22/2015
	Battelle convenes Comment-Response Teleconference with panel members and USACE	4/23/2015
	USACE inputs final PDT Evaluator Responses to DrChecks	4/24/2015
	Battelle provides final PDT Evaluator Responses to panel members	5/1/2015

Table A-1. South San Francisco Complete IEPR Schedule (continued)

Task	Action	Due Date
	Panel members provide Battelle with final BackCheck Responses	5/6/2015
6 [b]	Battelle inputs the Panel's final BackCheck Responses in DrChecks	5/11/2015
	Battelle submits pdf printout of DrChecks project file[a]	5/15/2015
	CWRB Meeting (Estimated Date)[c,d]	9/18/2015
	Contract End/Delivery Date [d]	8/7/2015

a Deliverable.

b Task 6 occurs after the submission of this report

c The 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.

d A time extention contract modification will be required to accomidate CWRB activities and project closeout activities.

At the beginning of the Period of Performance for the South San Francisco 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. In addition, 20 charge questions were provided by USACE and included in the draft and final Work Plans. Battelle added two questions that seek summary information from the IEPR Panel. The final charge also included 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 22 days of their subcontracts being finalized, all 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. The start of the Panel's review period was delayed due to the finalization of the charge questions. Battelle planned and facilitated a second kick-off meeting via teleconference during which USACE presented project details to the Panel. Before the meetings, the IEPR Panel received an electronic version of the final charge as well as the South San Francisco review documents and reference materials listed below. The documents and files in bold font were provided for review; other documents listed were provided for reference or supplemental information only.

- **Draft Integrated Interim Feasibility Study and Environmental Impact Statement/Report (Draft Integrated Document) (966 pages)**
- **Appendix E: Water Resources Engineering (124 pages)**
- **Appendix F: Tidal Flood Risk Analysis Summary Report – Sea Level Rise Analysis (74 pages)**
- **Appendix G: Civil Design (82 pages)**
- **Appendix O: Geotechnical (60 pages)**
- **Appendix Q: Biological Conditions Report (162 pages)**
- **Appendix W: Real Estate Plan (27 pages)**
- **Public Review Comments (14 pages)**
- Two Civil Design Documents (73 pages)

- USACE guidance *Civil Works Review* (EC 1165-2-214, 15 December 2012)
- Office of Management and Budget *Final Information Quality Bulletin for Peer Review* (December 16, 2004).
- Sea Level Rise/Climate Change References
    - ER 1100-2-8162, Incorporating Sea Level Change in Civil Works Programs (31 December 2013)
    - ETL 1100-2-1, Procedures to Evaluate SLR Change Impacts Responses Adaptation (30 June 2014)

About halfway through the review of the South San Francisco IEPR documents Battelle submitted 29 panel member questions to USACE, so that USACE could answer any questions the Panel had concerning either the review documents or the project. USACE was able to provide responses to all of the questions via email prior to the Panel completing its reivew.

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 additional documents requested by the Panel is provided below.

- Cost and Schedule Risk Analysis
- Decision Log
- Draft Integrated Document Appendix C Geotechnical Investigation and Analysis
- Draft Integrated Document Appendix E, Annex.
- Monitoring and Adaptive Management Plan for Ecosystem Restoration
- Draft CHAP Habitat Evaluation Analysis of Five Ecosystem Restoration Alternatives
- Draft Data Report Geotechnical Investigation of Inboard Levees
- Geotechnical Field Assessment of the San Francisco South Bay Dike System
- Southern Alameda and Santa Clara Counties Interim San Francisco Bay Shoreline Study (October 1988)
- South San Francisco Bay Shoreline Study – LPP POM Report
- South San Francisco Bay Shoreline Study – NED POM Report
- Risk Register

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 29 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 4-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 would 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 21 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 South San Francisco 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 member 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 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 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 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. During the Final Panel Comment development process, the Panel determined that four of the Final Panel Comments could be either dropped or merged into other Final Panel Comments. Additionally, one Final Panel Comment was split into three separate comments. Therefore, at the end of this process, 19 Final Panel Comments were prepared and assembled. 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 six separate public comment files, totaling 17 pages, on the South San Francisco Bay Shoreline Study from USACE on February 11, 2015. Battelle then sent the public comments to the panel members on March 5, 2015. The panel members were charged with responding to the following charge question.

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

The Panel provided individual responses and Battelle reviewed the comments to identify any new technical concerns that had not been previously identified during the initial IEPR. Upon review, Battelle determined and the Panel confirmed that no new issues or concerns were identified other than those already covered in their Final Panel Comments.

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APPENDIX B

Identification and Selection of IEPR Panel Members
for the South San Francisco Project

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B.1 Panel Identification

The candidates for the South San Francisco Bay Shoreline Interim Feasibility Study, Alviso Ponds and Santa Clara County, California (hereinafter: South San Francisco IEPR) Panel were evaluated based on their technical expertise in the following key areas: environmental planning, civil/cost engineering, hydrology and hydraulic coastal engineering, geotechnical engineering, and economic issues relevant to the project. These areas correspond to the technical content of the South San Francisco IEPR review documents and overall scope of the South San Francisco 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 five 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.

1. Previous and/or current involvement by you or your firm in the South San Francisco Bay Shoreline Interim Feasibility Study, Alviso Ponds and Santa Clara County, California, including technical appendices.

2. Previous and/or current involvement by you or your firm[1] in flood control and/or ecosystem restoration projects in the South San Francisco Bay area in Northern California.

3. Previous and/or current involvement by you or your firm[1] in the South San Francisco Bay Shoreline Interim Feasibility Study, Alviso Ponds and Santa Clara County, California, including technical appendices (or related projects).

4. Previous and/or current involvement by you or your firm[1] in the conceptual or actual design, construction, or operation and maintenance in the South San Francisco Bay Shoreline Interim Feasibility Study, Alviso Ponds and Santa Clara County, California, including technical appendices (or related projects).

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[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."

5. Current employment by the U.S. Army Corps of Engineers (USACE).

6. Previous and/or current involvement with paid or unpaid expert testimony related to the South San Francisco Bay Shoreline Interim Feasibility Study, Alviso Ponds and Santa Clara County, California, including technical appendices (or related projects).

7. Previous and/or current employment or affiliation with members of the cooperating agencies, local sponsors or stakeholders: U.S. Fish and Wildlife Service, Santa Clara Valley Water District, California State Coastal Conservancy, City of San Jose, Moffett Federal Airfield, Cargill, Inc. (for pay or *pro bono*).

8. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to South San Francisco Bay area in Northern California.

9. 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, ERDC, etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the San Francisco District.

10. Previous or current involvement with the development or testing of models that will be used for, or in support of the South San Francisco Bay Shoreline Interim Feasibility Study, Alviso Ponds and Santa Clara County, California, including technical appendices.

11. Current firm[1] involvement with other USACE projects, specifically those projects/contracts that are with the San Francisco 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 San Francisco District. Please explain.

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

13. ***Any*** previous employment by USACE as a contractor (either as an individual or through your firm[1]) within the last 10 years, notably if those projects/contracts are with the San Francisco District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.

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

15. Pending, current, or future financial interests in South San Francisco Bay Shoreline Interim Feasibility Study, Alviso Ponds and Santa Clara County, California, related contracts/awards from USACE.

16. A significant portion (i.e., greater than 50%) of personal or firm[1] revenues within the last three years from USACE contracts.

17. A significant portion (i.e., greater than 50%) of personal or firm[1] revenues within the last three years from contracts with the non-Federal sponsor (California State Coastal Conservancy and the Santa Clara Valley Water District).

18. Any publicly documented statement (including, for example, advocating for or discouraging against) related to South San Francisco Bay Shoreline Interim Feasibility Study, Alviso Ponds and Santa Clara County, California.

19. Participation in relevant prior and/or current Federal studies relevant to this project and/or South San Francisco Bay Shoreline Interim Feasibility Study, Alviso Ponds and Santa Clara County, California.

20. Previous and/or current participation in prior non-Federal studies relevant to this project and/or South San Francisco Bay Shoreline Interim Feasibility Study, Alviso Ponds and Santa Clara County, California.

21. 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?

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 five 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.

An overview of the credentials of the final five members of the Panel and their qualifications in relation to the technical evaluation criteria is presented in Table B-1. More detailed biographical information regarding each panel member and his area of technical expertise is presented in Section B.3.

Table B-1. South San Francisco IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Burns	Myers	Brozek	Bahner	Hartley
Economics/Plan Formulation					
Minimum 15 years of experience in economics	X				
Familiarity with large, complex Civil Works projects with high public and interagency interests	X				
Experience in flood risk management and ecosystem restoration on the West Coast	X				
Direct experience working for or with USACE, highly preferred but not required	X				
Familiarity with USACE flood risk management analysis and economic benefit calculations, including use of standard USACE computer programs including Hydraulic Engineering Center Flood Damage Reduction (HEC-FDA)	X				
Experience with the National Economic Development and National Environmental Restoration analysis procedures, particularly as they relate to flood risk management and ecosystem restoration.	X				
High familiarity with USACE plan formulation process, procedures, and standards as it relates to flood risk management and ecosystem restoration.	X				
Minimum of 5 years of experience directly dealing with the USACE six-step planning process, which is governed by ER 1105-2-100, Planning Guidance Notebook	X				
M.S. degree or higher in economics	X				
Environmental					
Minimum 10 years of experience in ecology or biology		X			
Familiarity with large, complex Civil Works projects with high public and interagency interests		X			
Experience in ecosystem restoration on the West Coast		X			
Experience directly related to:					
National Environmental Policy Act (NEPA) compliance		X			
environmental laws and statutes (e.g. the Clean Water Act, Coordination Act, Endangered Species Acts)		X			

Table B-1. South San Francisco IEPR Panel: Technical Criteria and Areas of Expertise (continued)

Technical Criterion	Burns	Myers	Brozek	Bahner	Hartley
habitat evaluation procedures		X			
landscape evolution modeling		X			
Experience with ecological processes and quality indicators associated with:					
estuarine habitat		X			
ecosystem restoration planning procedures		X			
monitoring and adaptive management		X			
combined habitat assessment protocol (CHAP) model		X			
Experience with California Environmental Quality Act requirements, desired but not required		X			
M.S. degree or higher in related field		X			
Civil/Cost Engineering					
Minimum 15 years of experience in civil engineering			X		
Familiarity with large, complex Civil Works projects with high public and interagency interests			X		
Experience in the West Coast region			X		
Demonstrated experience with structural measures for flood risk management (e.g., levees, flood walls, tide gates, pump stations, water control structures)			X		
Demonstrated experience with ecosystem restoration measures (e.g., levee breaches, water control structures, pond bottom grading, starter channel excavation, berm construction, managed pond design)			X		
Demonstrated experience with recreation measures (e.g., information signs and kiosks, trails and trail access points lighting and signage, surface and drainage improvements, watercraft launch sites viewing platforms).			X		
Familiarity with Micro-Computer Aided Cost Estimating System Second Generation (MCACES-II) software			X		
Familiarity with unit costs associated with flood risk management			X		
Familiarity with unit costs associated with ecosystem restoration project features			X		
Ability to address the USACE Safety Assurance Review (SAR) aspects of projects (ER 1110-2-1150)			X		

Table B-1. South San Francisco IEPR Panel: Technical Criteria and Areas of Expertise continued)

Technical Criterion	Burns	Myers	Brozek	Bahner	Hartley
B.S. degree or higher in engineering			X		
Registered Professional Engineer			X		
Hydrology and Hydraulic (H&H) Coastal Engineering					
Minimum 15 years of experience hydrologic and hydraulic and coastal engineering in the West Coast region				X	
Familiarity with large, complex Civil Works projects with high public and interagency interests				X	
Familiarity with:					
risk and uncertainty analysis				X	
fluvial flood processes				X	
tidal flood processes (e.g. wind, wave, surge)				X	
sediment transport				X	
levee overtopping and breaching				X	
flood mapping				X	
model calibration and verification				X	
sea level rise				X	
Knowledge of the Hydraulic Engineering Center (HEC) models				X	
Knowledge of:					
STeady State Spectral Wave STWAVE				X	
FLO-2D				X	
UnTrim				X	
Ability to address the USACE Safety Assurance Review (SAR) aspects of projects				X	
M.S. degree or higher engineering				X	
Registered Professional Engineer				X	
Geotechnical Engineering					
Minimum 15 years of experience in geotechnical engineering					X
Familiarity with large, complex Civil Works projects with high public and interagency interests					X

Table B-1. South San Francisco IEPR Panel: Technical Criteria and Areas of Expertise (continued)

Technical Criterion	Burns	Myers	Brozek	Bahner	Hartley
Demonstrated experience in performing geotechnical evaluation and geo-civil design for flood risk management projects in the West Coast region					X
Familiarity with and demonstrated experience related to Corps of Engineers geotechnical practices associated with:					
levee and floodwall design					X
construction					X
soil engineering					X
ecosystem restorations					X
Expertise in fluvial processes and geomorphology					X
Experience in geotechnical risk analysis, specifically, the application of probabilistic methods to geotechnical aspects of levees					X
Ability to address the USACE Safety Assurance Review (SAR) aspects of projects					X
M.S. degree or higher in engineering					X
Registered Professional Engineer					X

B.3 Panel Member Qualifications

John Burns

Role: Economics and plan formulation experience and expertise.
Affiliation: CDM-Smith

Mr. Burns is an expert in Federal water resources project policy, planning, and economics for CDM-Smith, Inc. He earned his M.A. in economics from Michigan State University in 1972 and has more than 40 years of experience in planning and economic analysis. He has 28 years of experience working for USACE Jacksonville District, the South Atlantic Division, and HQUSACE, as well as 14 years as a water resource consultant and economist. He draws on his experience as one of the Federal government's preeminent experts in Federal water resources project planning and financing to provide expert analysis of water resources problems.

Mr. Burns is experienced and knowledgeable in large, complex Civil Works projects with high public and interagency interests. He was the national manager for USACE's planning program for large-scale water resources projects, responsible for execution of USACE's $140 million General Investigations Program, and for identifying areas requiring new policy direction. He provided expert assistance and policy direction to subordinate offices, helping them resolve complex issues and ensuring that engineering, economic, and environmental analyses guiding navigation, flood damage reduction, ecosystem restoration, and other multi-purpose water resources investments and project operational changes were developed to meet the changing needs and priorities of the nation.

Mr. Burns has expertise and a fundamental understanding of USACE flood risk management formulation, analysis, and economic benefit calculations. He has expertise in economic analysis for flood risk management, specifically with acceptable methodologies for estimating damages. As an economist, planner, and program manager for USACE from 1972 to 2000, he developed an excellent understanding of the economics of flood risk reduction and Principles and Guidelines (P&G) requirements. Throughout his career as a USACE economist and planner, Mr. Burns participated in the formulation, evaluation, and review of numerous structural and non-structural flood control projects. For example, Mr. Burns was the economics reviewer for studies in Metro Atlanta, Georgia; Petersburg and Moorefield, West Virginia; Duck Creek, Ohio; Buena Vista, Virginia; Napa Valley, California; and American River, California. Mr. Burns is familiar with the Hydrologic Engineering Center's Flood Damage Reduction Analysis (HEC-FDA) and the use of HEC-FDA with its sample data files. Most recently, he served as the economics and plan formulation independent external peer reviewer for the Delta Islands, California Feasibility Study/Environmental Impact Statement (FSEIS) and the Skagit River Basin Flood Risk Management General Investigation, Skagit County, Washington; both studies used HEC-FDA to evaluate flood risk management alternatives.

Mr. Burns has experience with the formulation and evaluation of ecosystem restoration projects. He has extensive experience in Civil Works projects related to ecosystem restoration projects and with USACE guidance for analyzing ecosystem restoration projects both as a practitioner and as a reviewer. Relevant studies include study manager for the Small Diversion at Convent/Blind River, Louisiana Coastal Area, Louisiana through CDM, the technical planning and economic assistance through Dawson & Associates for the Lower Passaic River Restoration Project. Additionally, in his role as the Chief of the Planning Management Branch in HQUSACE, he provided managerial oversight for all USACE feasibility studies, including the following ecosystem restoration projects: Comprehensive Everglades Restoration, Florida; Hamilton Army Airfield Wetland Restoration, California; Rio Salado, Salt River, Phoenix, and Tempe, Arizona; and Tres Rios, Arizona. Mr. Burns has also served as the economics and plan formulation independent external peer reviewer for the Jamaica Bay, Marine Park, and Plum Beach, New York environmental restoration study; the Delta Islands, California FSEIS; and the Skagit River Basin Flood Risk Management General Investigation, Skagit County, Washington.

In summary, Mr. Burns has an excellent understanding of National Economic Development and National Environmental Restoration analysis procedures for flood risk management and ecosystem restoration projects from years of experience working as an economist, planner, and program manager for USACE and the private sector. He has extensive experience in dealing with the USACE six-step planning process and the Planning Guidance Notebook. He is a former member of the American Economic Association and previously participated in American Association of Port Authorities and National Association of Flood & Stormwater Management Agencies Conferences.

Stuart Myers

Role: Environmental experience and expertise.
Affiliation: Mason, Bruce & Girard, Inc.

Mr. Myers is a senior environmental scientist with Mason, Bruce & Girard, Inc. (MB&G). He has more than 17 years of experience conducting and managing environmental studies and compliance activities for a variety of water resource projects throughout the Pacific Northwest. He earned his M.S. in geography from Portland State University in 2001 and has a B.S. in environmental studies from the University of Oregon. His professional work experience and academic background is grounded in both

physical and biological sciences as they relate to watershed processes, landscape evolution, and estuarine processes. His career as an environmental consultant has provided him with an opportunity to support and manage environmental studies and compliance activities for multiple high-profile, large, and complex Civil Works projects ranging from regionally significant transportation projects and programs, public and private utility projects, and nationally significant water resource projects.

Mr. Myers has managed small-scale and large-scale upland and aquatic projects that addressed restoration of multiple functions and values with the goal of complete ecosystem uplift. He is the Program Manager for the Oregon Department of Transportation's (ODOT) Oregon Transportation Investment Act (OTIA) III Wetland and Biology Mitigation Monitoring Program. This program involves monitoring, maintenance, and reporting activities for up to 200 biological and wetland mitigation/restoration sites throughout Oregon, with many mitigation sites located in wetland, riparian, and estuarine environments. Mr. Myers has broad experience in fluvial habitat restoration relative to improving fish habitat and fish passage. As a member of Oregon's Fish Passage Task Force, he has reviewed and guided multiple projects focused on restoring fish passage and improving habitat connectivity.

Mr. Myers has developed a thorough understanding of the various local, state, and Federal environmental regulations that govern water resource projects in the region and has successfully guided projects through the National Environmental Policy Act (NEPA) compliance process from initial purpose and need statement development and internal/external coping through development of final NEPA documents and decision records. He is familiar with the resources that may be affected by the project alternatives in this study area. Having served as environmental project manager on more than 60 water resource and infrastructure projects, he has detailed understanding of the various multidisciplinary environmental, cultural, and social issues that are common to these projects and how to achieve regulatory compliance as well as build stakeholder consensus.

Mr. Myers has expertise in the nuances and requirements of the Federal environmental regulations affecting Civil Works projects on the West Coast of the U.S., including the Clean Water Act (Sections 401 and 404); Rivers and Harbors Act (Sections 9 and 10); National Environmental Policy Act; State Environmental Policy Act (Washington); Endangered Species Act (state and Federal); Federal Power Act; Fish and Wildlife Coordination Act; Migratory Bird Treaty Act; Bald and Golden Eagle Protection Act; and the Marine Mammal Protection Act.

Mr. Myers has conducted and managed multiple habitat evaluation efforts ranging from in-stream habitat and fish studies to upland studies focused on vegetation dynamics and wildlife habitat. He has supported wildlife habitat rating and impact assessments using the Habitat Evaluation Protocol (HEP) process by providing senior review of HEP analyses and reports. He has also used habitat evaluation models to assess net benefits for migratory fish resulting from inter-basin fish passage mitigation projects. His academic background in physical geography and experience as a consultant has provided him with a thorough understanding of landscape evolution and tools for modeling landscape changes and trajectories over multiple temporal and spatial scales.

Mr. Myers is experienced in evaluating and rating the quality of salmonid and tidal wetland habitat in estuarine environments. As a member of the Oregon Fish Passage Task Force he has reviewed and approved estuarine restoration projects aimed at restoring estuarine salmonid habitat, fish passage (e.g., the removal of tide gates and dikes), and tidal influences. As the Program Manager for ODOT's OTIA III Wetland and Biology Mitigation Monitoring Program, he conducts annual site monitoring to ensure sites are meeting their specific regulatory restoration and mitigation requirements, including wetland creation

and maintenance, native vegetation establishment, weed control, in-stream habitat uplift, and fish passage improvements. In addition, Mr. Myers is also responsible for the management and maintenance of these restoration sites.

Mr. Myers has provided support and quality control of habitat and landscape evaluation modeling efforts using HEP and combined habitat assessment protocol (CHAP) to evaluate baseline conditions, track inherent habitat value, habitat composition, and potential species use in focal areas. His experience with the California Environmental Quality Act (CEQA) requirements includes performing secondary quality assurance/quality control reviews of the natural resources sections of CEQA documents.

Philip Brozek, P.E.

Role: Civil and cost engineering experience and expertise.
Affiliation: Brozek and Associates

Mr. Brozek is a principal with Brozek & Associates with 32 years of experience as a practicing professional engineer in California. In his current position Mr. Brozek provides analysis and consultation to governments, non-profits, and private business in the development and review of project plans to implement a wide range of desired outcomes for capital, natural resource conservation, and infrastructure projects. 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, 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 has very extensive experience regarding the USACE project implementation process gained through over 30 years of service at the USACE Sacramento District in diverse roles, including construction Resident Engineer, engineering design section chief, and Senior Project Manager. Mr. Brozek has presented material to the Society of American Military Engineers on the subject of USACE Planning Modernization ‘lessons-learned’ as well as presentations on USACE Civil Works process and implementation to state agencies and regional planning agency boards.

Mr. Brozek served as a Civil Works Senior Project Manager for 11 years with the USACE Sacramento District. During his tenure as Senior Project Manager Mr. Brozek was responsible for managing the planning, design, and construction of structural flood control projects and environmental restoration projects. These responsibilities included performance of both quantity control and independent quality assurance reviews for the projects indicated below.

Restoration projects included the $3.5 billion multi-agency restoration effort of the Lake Tahoe Basin, separable elements of the South Sacramento Streams Group and San Lorenzo River projects, and portions of the Glenn-Colusa Irrigation District Gradient Control Facility on the Sacramento River. Restoration measures included:

- The reestablishment of sustainable stream bed gradients and overflow floodplains, reestablishment of native plants, improvement of habitat for fish and other aquatic species, and improvement of habitat for avian and other riparian zone species in the stream corridor restoring on at least seven small stream projects (e.g., Incline Creek, Third Creek, Blackwood Creek, Upper Truckee River).

- Broad area floodplain restoration on a 300-acre parcel urban buffer zone on the South Sacramento Streams Group that included grading and alteration of several existing ponds to sustain varying habitats by managing seasonal pond water depth, construction of water control structures including small dams, outlet gates, and overflow weirs.
- Broad area upland post-wildfire restoration to protect down slope aquatic resources on Angora Watershed.
- Co-architect on watershed-scale approach to aquatic invasive species management for the 500-square mile Lake Tahoe watershed, including basic and applied scientific research, monitoring plans, and integrated management and operation plans.
- Fish passage facilities and post-project monitoring on the Glenn Colusa Gradient facility.

Mr. Brozek was also was a guiding force in implementing a Federal/state/local interagency collaborative approach that recognized and successfully teamed with non-governmental organizations, academic institutions, and the broader public in balancing restoration, public access, sustainability, and readiness policy on both project and program implementation for the Lake Tahoe watershed restoration.

Structural Flood Control projects included

- The South Sacramento Stream Group flood control project that incorporated levees, flood walls, pumping stations, and utility relocations balanced with public recreational access.
- The San Lorenzo River flood control project that incorporated levees, flood walls, pump stations, and utility relocations balanced with public recreational access. This project also attempted to resolve the issue of managing river mount bars and means to breach them as part of an operational strategy or to predict and take advantage of natural processes to breach the river bar.
- The Yuba River General Reevaluation Study including levees and utility/infrastructure upgrades and relocations.
- The Glenn-Colusa Irrigation District Gradient Control Facility on the Sacramento River incorporating river channel grading, flow control structures, and designed overbank flow areas.

Mr. Brozek served as a Section Chief for Environmental Design for more than seven years with the USACE Sacramento District. During his tenure as Design Chief, Mr. Brozek was responsible for conducting technical and policy reviews for several Phase I Environmental Site Assessments to evaluate potential or existing environmental contamination liabilities for projects during feasibility studies. These projects included rural levee systems (Merced Stream Group Project) and urban industrialized areas (Old Sacramento waterfront, one of several Sacramento River studies).

Mr. Brozek is experienced in the planning, design, and construction of recreation measures including bike/hiking paths with interpretive signage and wayfaring signing for the South Sacramento Streams Group project in the Sacramento Valley, San Lorenzo River (Santa Cruz, California) and several stream restoration projects on in the Lake Tahoe Basin (e.g., Upper Truckee River, Lake Forest Stream and Meadow, Incline Creek, Third Creek).

While a USACE Construction Engineer and Resident Engineer (1981-1991) and USACE Senior Project Manager (1998-2009), Mr. Brozek conducted reviews of project cost estimates using MCACES II (and predecessor software) as part of project review for planning, design, and construction documents. He is familiar with the development of flood risk unit costs including cubic yard unit price for embankments, square yard unit cost for floodwalls, and values for construction and O&M real estate easements. Mr.

Brozek has direct experience with rapidly changing bidding environments and understands that unit costs are extremely site- and time-dependent, and that values assumed in studies must be examined against the current and projected bidding environment. Mr. Brozek is also familiar with the development of unit costs associated with ecosystem restoration project features including the costs of landscape-scale contouring and establishment of drainage patterns, control structures to manage seasonal water levels earth, plant propagation, and post-construction plant maintenance and monitoring. Mr. Brozek recognizes the importance of properly quantifying the project contingency factor especially in this era of risk-based USACE decisions under Planning Modernization/SMART Planning.

Mr. Brozek has consulted for USACE Sacramento on the implementation of Agency Technical Reviews and Type II IEPRs in accordance with EC1165-2-209/214 and is capable of addressing the USACE Safety Assurance Review (SAR) aspects of projects.

Chris Bahner, P.E.

Role: Hydrologic, hydraulic, and coastal engineering experience and expertise.
Affiliation: WEST Consultants, Inc.

Mr. Bahner is a hydraulic engineer with WEST Consultants, Inc. with over 20 years of experience, including more than eight years for 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 I-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 is experienced with risk and uncertainty analysis and was the lead hydraulic engineer in preparing a risk analysis process for evaluating system-wide hydraulic impacts and applying the process for proposed modifications to the Sacramento River Flood Control Project. He also completed a technical review of the risk evaluation for FEMA levee certification of the Natomas levee system; developed LifeSIM models for evaluating the loss of life associated with failure of the Natomas, Elk Grove, St. Paul, Omaha Metro East, and Metro East St. Louis levee systems; and developed HEC-FIA models to evaluate the consequences associated with failure of the Elk Grove, Omaha Metro East, and Metro East St. Louis levee systems, and Everett Dam.

Mr. Bahner has performed fluvial flood processes and/or geomorphology evaluations for various projects, including the Lower Las Vegas Wash Project, the Murrieta Creek Flood Control and Restoration Project, the Mill Creek Geomorphic Assessment, the City of Montesano Wastewater Treatment Plant Emergency Protection Project, the Bradwood Landing Proposed LNG Facility on the Lower Columbia River, and the fluvial performance evaluation of several bridge replacements in Oregon.

Mr. Bahner has worked on projects that included tidal flood processes, including the tidal scour evaluation of several bridges in Oregon, the Bradwood Landing Proposed LNG Facility on the Lower Columbia River, the Morganza to the Gulf Hurricane Project, the Kentucky Slough Tidal Gate Modification, a

hydraulic conditions investigation along lower Klaskanine River, and the Moses Point to Elim, Alaska Road Repair Project.

In addition, Mr. Bahner has worked on several studies that focus on sediment transport. These projects include the Bradwood Landing Proposed LNG Facility on the Lower Columbia River, the Lower Las Vegas Wash Project, the Cochiti Reservoir Operation Modification Evaluation, the Sediment Transport Analysis of the Columbia River Between Grand Coulee Dam and U.S. Border, the San Luis Rey River Flood Control Project, and the Murrieta Creek Flood Control and Restoration Project. He has also worked on developing Standard Operating Procedures (SOP) for evaluating and modeling of levee breaches for the USACE Modeling, Mapping, and Consequence production center, and developed several HEC-RAS unsteady models that included levee overtopping and breaching.

Mr. Bahner has experience in the mapping of flood inundation boundaries. These projects include the Clarence Cannon Dam breach evaluation, levee breach evaluations for several large levee systems, a FEMA Flood Insurance Study (FIS) of lower Las Vegas Wash Project and Salmon River, and the Morganza to the Gulf Hurricane Project.

Mr. Bahner has contributed to several studies that involved the calibration and verification of hydraulic and hydrologic models, including the Morganza to the Gulf Hurricane Project, Des Lacs HEC-HMS models, the Cochiti Reservoir Operation Modification Evaluation Study, the Investigation of Hydraulic Conditions along the Lower Klaskanine River, the Bradwood Landing Proposed LNG Facility on the Lower Columbia River, and the Mill Creek Quarry Pond Modification study.

He is familiar with USACE guidance for incorporating sea level rise through his work on the Morganza to the Gulf Hurricane Project, and the IEPR for Napa River Pond 8 restoration project for the lower Napa River.

Mr. Bahner has worked with the HEC suite of software throughout his entire career. Specifically, he is experienced with HEC-1, HEC-2, HEC-5, HEC-RAS, HEC-FIA, HEC-FDA, HEC-SSP, HEC-IFH, HEC-HMS, HEC-6, HEC-FFA, HEC-GeoRAS, HEC-GeoHMS, and HEC-UNET. Mr. Bahner is also familiar with STAVE, FLO-2D, UnTrim models, as well as other 1-dimensional hydraulic and sediment transport models. He is capable of addressing the USACE Safety Assurance Review (SAR) aspects of projects.

Michael Hartley, P.E.

Role: Geotechnical engineering experience and expertise.
Affiliation: PND Engineers, Inc.

Mr. Hartley is a senior vice president of PND Engineers, Inc. He earned his M.S. in civil engineering in 1979 from Oregon State University. He is a registered professional engineer in Alaska, Washington, and Oregon. Mr. Hartley has more than 35 years of experience providing civil, coastal, and geotechnical engineering services for projects throughout the United States and overseas. He has managed more than 200 geotechnical investigations, including a significant number of projects in which settlement of foundations, dams, and levee systems could be impacted where in situ (naturally occurring soils) consisted of soft cohesive colluviums and alluvial soils. He is recognized in the Federal court system as an expert in coastal engineering, civil engineering, and geotechnical engineering.

Mr. Hartley has served as project manager, principal-in-charge, and engineer of record on many large, complex public projects. Example projects include serving as principal-in-charge and geotechnical

engineer for a $45 million cruise ship pier, onshore ground transportation system, and geotechnical studies for marina and offshore pile-supported pedestrian promenade. He has provided geotechnical assessment and design of dams and participated in large dam project studies and designs in Alaska, including hydroelectric projects for Susitna Dam, Bradley Lake Dam, and Terror Lake Dam, as well as periodic safety inspections conducted for the Alaska Department of Natural Resources, Dam Safety Division, and the Federal Energy Regulatory Commission.

Mr. Hartley is experienced in performing geotechnical evaluation and geo-civil design for flood risk management projects in the West Coast region, such as the evaluation of levee condition for Snohomish County, Washington, and the evaluation of bank stability and design modifications for the Snohomish River trail. He also served as the geotechnical engineering expert for the IEPR of the Skagit River Basin Flood Risk Management General Investigation, Skagit County, Washington, which involved ecosystem restoration. He has worked on building projects, parking facilities requiring waterproofing, drainage, bioswales, and detention basins including the On-Call Design Services for the U.S. Department of Agriculture Forest Service projects in Northern California in the Shasta Trinity and Six Rivers National Forests.

He is familiar with, and has demonstrated experience related to, USACE geotechnical practices, and has recently assisted in the geotechnical evaluation of three pump station cofferdam designs in New Orleans. Additionally, Mr. Hartley served as the geotechnical engineering expert on the IEPR review of the Levee Backslope Armoring Design Manual for New Orleans, and performed IEPR review of three earthen levees for the West Bank levee system in New Orleans. He provided construction inspection support for the offshore bulkhead and fill project in Umm Qasr, Iraq. He also evaluated construction practices used for the design and construction of the Nome breakwater in Alaska.

Mr. Hartley has designed more than 800 miles of road throughout his career, and as such is familiar and used a wide variety of engineering manuals (EMs) in performance of projects for USACE, U.S. Army, U.S. Navy, and various agencies. Many projects, such as the Umm Qasr, Iraq sheet pile dock, a geotechnical investigation for more than 40 miles of security fence for Fort Richardson Army base in Anchorage, and the IEPR of the Skagit River Basin Flood Risk Management General Investigation, Skagit County, Washington, have been performed using USACE EM documentation and guidelines. Specific examples of USACE EMs that Mr. Hartley is familiar with include, but are not limited to, EM 1110-2-1614; EM 1110-1-1804; EM 1110-2-1901 EM 1110-2-1902; EM 1110-1-1904 EM 1110-1-1905; and EM 1110-2-1913.

Mr. Hartley's experience with ecosystem restoration projects includes the design of a 350-foot deep open pit mine, instrumentation, and rehabilitation of the Valdez Creek Stream in Alaska that won the Governor's award for environmentally sensitive design. He recently provided geotechnical assessment and seismic liquefaction and lateral spreading analysis of the Alameda Point Waste remediation and waste isolation cleanup project for the USEPA and U.S. Navy involving use of an OPEN CELL™ bulkhead for containment.

Mr. Hartley has worked on many riverine and coastal projects that required evaluation of scour, fluvial processes, wave assessment, and geomorphology. He has testified in Federal court on risk-based assessment analysis and is very familiar with probabilistic methods of geotechnical assessment of levees. Mr. Hartley is fully capable of performing SAR review and recently performed SARs during the IEPR of the Skagit River Basin Flood Risk Management General Investigation, Skagit County, Washington.

APPENDIX C

Final Charge to the IEPR Submitted to USACE on January 28, 2015 for the South San Francisco Project

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CHARGE QUESTIONS AND GUIDANCE TO THE PANEL MEMBERS FOR THE IEPR OF THE SOUTH SAN FRANCISCO BAY SHORELINE INTERIM FEASIBILITY STUDY, ALVISO PONDS AND SANTA CLARA COUNTY, CALIFORNIA

BACKGROUND

The purpose of the Feasibility Study is to document the feasibility of a combined flood risk management and ecosystem restoration project. It is a study being conducted in response to the resolution adopted by the Committee on Transportation and Infrastructure of the U.S. House of Representatives on July 24, 2002, for the South San Francisco Bay Shoreline Study (Shoreline Study), California (Docket 2697) and the Water Resources Development Act (WRDA) of 2007, Section 4027. South San Francisco Bay Shoreline, California.

The Shoreline Study encompasses shoreline and floodplain areas, three groups of former salt-production ponds, and other parcels that represent additional opportunities for flood risk management and/or ecosystem restoration benefits along South San Francisco Bay in Northern California. The Shoreline Study area extends from the Ravenswood Ponds in San Mateo and State Route (SR) 92 in the city of Hayward south along both sides of the bay to its southern end, and includes adjacent areas that may be flooded by the bay and/or that may offer opportunities for restoration of tidal and related habitats. Due to the complexity of the hydrology, hydraulics, and combined flood risk management and ecosystem restoration components, and anticipated Federal and non-Federal funding availability, the study has been divided into several interim feasibility studies. The geographic areas specific to each of the anticipated interim feasibility studies are named “Ravenswood Ponds and San Mateo County,” “Alviso Ponds and Santa Clara County,” “Alameda County Cargill Ponds,” and “Eden Landing.” The Alviso Ponds and Santa Clara County area is the focus of this interim feasibility study and is described below.

The Alviso Ponds and Santa Clara County Interim Feasibility Study area consists of 25 ponds in the Alviso pond complex on the shores of the South Bay in the cities of Fremont, San Jose, Sunnyvale, and Mountain View, located in Santa Clara and Alameda counties. Substantial adjacent areas that may need flood risk management, or that may be affected by flood risk management or ecosystem restoration measures, are also included in the study area. These areas include the Palo Alto/Mountain View Sub-Area (south of San Francisquito Creek), the Alviso Ponds (owned by the U.S. Fish and Wildlife Service [USFWS]), Pond A4 (owned by the Santa Clara Valley Water District [SCVWD]), Pond A18 (owned by the City of San Jose), and Moffett Federal Airfield. The study area is bordered by South San Francisco Bay and the operational salt ponds (owned by the USFWS and operated by Cargill, Inc. [Cargill]) situated in Alameda County to the north and San Francisquito Creek on the west. To the south and east, the study area extends beyond the salt ponds to include all lands subject to inundation from a 0.2-percent tidal flooding event under predicted future conditions with sea level rise (also known as the 500-year flood). These additional lands are primarily urbanized areas in the cities of Palo Alto, Mountain View, Sunnyvale, and San Jose to the south, and urbanized lands in the city of Fremont to the east. This interim feasibility study will focus on flood risk management and ecosystem restoration within Santa Clara County and southern Alameda County. Flood risk management for San Francisquito Creek is being studied under

separate authorization. In March 2011, the study partners concluded a study "reset" process, which resulted in an agreement to focus first on the "Economic Impact Area 11," or EIA 11, which includes Ponds A9-A18 and adjacent shoreline areas. The without-project flood risk analysis identified this area as being in greatest risk of flooding due to future sea level rise. Of all the EIAs, it also represented the greatest potential for ecosystem restoration benefits.

The Feasibility Study evaluated a variety of flood risk management and ecosystem restoration measures, including levee construction, flood wall construction, tidal marsh restoration, structural and non-structural pond management options, and non-structural flood risk management measures. For the Feasibility Study, there are public safety concerns related to the dense development of Silicon Valley immediately adjacent to the former salt evaporation ponds. There is a high level of complexity in analyzing and managing the risk of flooding in an area immediately adjacent to San Francisco Bay, which has 15 local streams running through it. This complexity is heightened by the potential effects of global climate change. There is significant interagency interest in the Study because the single largest landowner in the study area is the Federal government: the USFWS's Don Edwards San Francisco Bay National Wildlife Refuge and the National Aeronautics and Space Administration's (NASA's) Moffett Federal Airfield.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the South San Francisco Bay Shoreline Interim Feasibility Study, Alviso Ponds and Santa Clara County, California (hereinafter: South San Francisco IEPR) in accordance with the Department of the Army, U.S. Army Corps of Engineers (USACE), Water Resources Policies and Authorities' *Civil Works Review* (Engineer Circular [EC] 1165-2-214, 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 South San Francisco IEPR 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 environmental planning, civil/cost engineering, hydrology and hydraulic coastal engineering, geotechnical engineering, and economic issues relevant to the project. They will also have experience applying their subject matter expertise to flood risk management and ecosystem restoration.

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:

Review Document	Economist/ Planner	Environmental	Civil/ Cost Engineer	Hydrology & Hydraulic Coastal Engineer	Geotechnical Engineer
Feasibility Report and Environmental Impact Statement (EIS) (966 pages)	966	966	966	966	966
Appendix E: Water Resources Engineering (124 pages)				124	
Appendix F: Tidal Flood Risk Analysis Summary Report – Sea Level Rise Analysis (74 pages)	74	74	74	74	74
Appendix G: Civil Design (82 pages)			82		
Appendix O: Geotechnical (60 pages)					162
Appendix Q: Biological Conditions Report (162 pages)		30			
Appendix W: Real Estate Plan (27 pages)	27		27		
Public Review Comments (50 pages)	50	50	50	50	50
Total Number of Review Pages (Out of 1545 pages)	**1117**	**1120**	**1199**	**1214**	**1252**

Documents for Reference

- USACE guidance *Civil Works Review* (EC 1165-2-214, 15 December 2012)
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004)
- Sea Level Rise/Climate Change References

- ER 1100-2-8162, Incorporating Sea Level Change in Civil Works Programs (31 December 2013)
- ETL 1100-2-1, Procedures to Evaluate SLR Change Impacts Responses Adaptation (30 June 2014)

SCHEDULE

This final schedule is based on the January 8, 2015 receipt of the final review documents.

Task	Action	Due Date
Conduct Peer Review	Battelle sends review documents to panel members	1/28/2015
	Battelle convenes kick-off meeting with panel members	2/3/2015
	Battelle convenes kick-off meeting with USACE and panel members	2/3/2015
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	2/10/2015
	Panel members complete their individual reviews	2/17/2015
Prepare Final Panel Comments and Final IEPR Report	Battelle provides panel members with talking points for Panel Review Teleconference	2/23/2015
	Battelle convenes Panel Review Teleconference	2/24/2015
	Battelle provides Final Panel Comment templates and instructions to panel members	2/25/2015
	Panel members provide draft Final Panel Comments to Battelle	3/4/2015
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	3/5/2015 - 3/12/2015
	Panel finalizes Final Panel Comments	3/13/2015
	Battelle provides Final IEPR Report to panel members for review	3/17/2015
	Panel members provide comments on Final IEPR Report	3/19/2015
	Battelle submits Final IEPR Report to USACE	3/23/2015
Comment/ Response Process	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	3/25/2015
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process	3/25/2015
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to Planning Center of Expertise (PCX) for review.	4/8/2015
	Battelle provides the panel members the draft PDT Evaluator Responses	4/17/2015
	Panel members provide Battelle with draft BackCheck Responses	4/22/2015
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	4/23/2015
	Battelle convenes Comment-Response Teleconference with panel members and USACE	4/24/2015

Task	Action	Due Date
	USACE inputs final PDT Evaluator Responses to DrChecks	5/1/2015
	Battelle provides final PDT Evaluator Responses to panel members	5/6/2015
	Panel members provide Battelle with final BackCheck Responses	5/11/2015
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	5/15/2015
	Battelle submits pdf printout of DrChecks project file*	5/15/2015
Agency Decision Milestone (ADM) Meeting	Agency Decision Milestone (ADM) Meeting	4/21/2015
Civil Works Review Board (CWRB)	Panel prepares slides for CWRB	5/22/2015
	Panel reviews slides for CWRB	9/7/2015
	Civil Works Review Board (CWRB) Meeting	9/18/2015

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the South San Francisco IEPR 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 South San Francisco IEPR 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 (Julian DiGialleonardo, digialleonardoj@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 Julian DiGialleonardo, digialleonardoj@battelle.org, no later than February 17, 2015, 10 pm ET.

IEPR of the South San Francisco Bay Shoreline Interim Feasibility Study, Alviso Ponds and Santa Clara County, California

CHARGE QUESTIONS AND RELEVANT SECTIONS AS SUPPLIED BY USACE

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 , and
10. Given the need for and intent of the decision document, assess the adequacy and acceptability of the overall assessment of significant environmental impacts and any biological analyses.
11. Given the need for and intent of the decision document, evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.
12. Given the need for and intent of the decision document, evaluate if the assumptions for and analysis of the potential effects of climate change are reasonable and adequate to support decision making.
13. Given the need for and intent of the decision document, assess the considered and recommended alternatives from the perspective of systems. This includes (but is not limited to)

aspects such as the hydraulic and hydrologic effects throughout a watershed, or the impacts on resources used by transiting migratory species.

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

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

16. 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.

17. 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.

18. 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.

19. Assess whether the risk based economic evaluation of without project damages, with project benefits for flood risk management alternatives, and residual risk is reasonable.

SUMMARY QUESTIONS AS SUPPLIED BY BATTELLE

20. 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.

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

Public Comment Questions

22. Does information provided or do concerns raised by the public identify any additional discipline-specific technical issues with regard to the overall report?

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