Final Independent External Peer Review Report Westminster, East Garden Grove, California, Flood Risk Management Feasibility Study

Prepared by
Battelle Memorial Institute

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

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Executive Summary

PROJECT BACKGROUND AND PURPOSE

The U.S. Army Corps of Engineers (USACE) has undertaken a feasibility study to evaluate structural and non-structural Flood Risk Management (FRM) measures to reduce the risk of flooding in the Westminster Watershed in East Garden Grove, California. The study was scoped for completion in accordance with the SMART Planning Paradigm. The Alternatives Milestone was completed in February 2014 and the Tentatively Selected Plan (TSP) milestone was completed in July 2018. The non-Federal sponsor for the study is Orange County Public Works (OCPW).

The study area is contained within the Westminster Watershed in western Orange County, California. The watershed is approximately 74 square miles and lies on a flat coastal plain that is almost entirely urbanized. Cities in the watershed include Anaheim, Stanton, Cypress, Garden Grove, Westminster, Fountain Valley, Los Alamitos, Seal Beach, and Huntington Beach. The watershed is part of the former floodplain of the Santa Ana River (SAR), which historically meandered throughout the Westminster Watershed as far north as Anaheim Bay to as far south as Newport Bay. Channelization and large-scale flood control improvements have constrained the Santa Ana River to the main stem channel on the eastern border of the Westminster Watershed.

The feasibility study focuses on two channel systems located in the Westminster watershed: the East Garden Grove Wintersburg/Ocean View Channel and the Westminster/Bolsa Chica Channel and associated tributaries. The existing channel systems vary in length, geometry, channel lining, and width. The East Garden Grove Wintersburg Channel extends approximately 11 miles and begins upstream of Haster Basin (a.k.a. Twin Lakes Park) located in the City of Garden Grove and flows southwest through the cities of Santa Ana, Garden Grove, Westminster, and Huntington Beach before discharging into the Outer Bolsa Bay region of the Bolsa Chica Ecological Reserve. Stormwater from the channel passes through tide gates into Outer Bolsa Bay, then passes into Huntington Harbor, and ultimately into the Pacific Ocean. The Ocean View Channel extends approximately 4 miles and begins east of Mile Square Park in the City of Fountain Valley. The channel flows westerly through Mile Square Park to the City of Huntington Beach, where it discharges into the East Garden Grove Wintersburg channel at a point northeast of the intersection of Gothard Street and Warner Avenue.

The Westminster Channel extends approximately 8 miles and is located in the cities of Huntington Beach, Westminster, and Garden Grove, California. The channel begins at its confluence with Bolsa Chica Channel in Huntington Beach and extends in a northeasterly direction into Westminster and Garden Grove. The study will only include the most downstream segment of the Bolsa Chica Channel that extends from its confluence with the Westminster Channel at the Bolsa Chica Street/Edinger Avenue intersection downstream to the Huntington Harbor outlet.

Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. USACE is conducting an Independent External Peer Review (IEPR) of the Westminster, East Garden Grove, California, Flood Risk Management Feasibility Study (hereinafter: Westminster CA FS IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2018a). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate this IEPR. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2018a) 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 decision documents and the overall scope of the project, Battelle identified potential candidates for the Panel in the following key technical areas: plan formulation/ economics; environmental law compliance; hydrology and hydraulic (H&H) engineering; geotechnical engineering; and civil/cost engineering.

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 all the final candidates to independently confirm that they had no COIs, and Battelle made the final selection of the five-person Panel from this list.

The Panel received electronic versions of the decision documents (1,346 pages in total), along with a charge that solicited comments on specific sections of the documents to be reviewed. Following guidance provided in USACE (2018a) and OMB (2004), USACE prepared the charge questions, which were included in the draft and final Work Plans.

The USACE Project Delivery Team (PDT) briefed the Panel and Battelle during a kick-off meeting held via teleconference at 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.

IEPR panel members reviewed the decision documents individually and produced individual comments in response to the charge questions. 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, 15 Final Panel Comments were identified and documented. Of these, two were identified as having high significance, two were identified as having medium/high significance, 11 had a medium significance, and one had medium/low significance.

Battelle received public comments from USACE on the Westminster CA FS (consisting of approximately 17 public comments and 10 State and Federal Agency comments totaling 92 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 Westminster CA FS review documents. After completing its review, the Panel confirmed that no issues or concerns were identified other than those already covered in the 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, 2018a) in the Westminster CA FS 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 provides a detailed feasibility study, and the need for the project and its objectives are clearly outlined. The range of alternatives used in the study is appropriate for the drainage basin, and the affected environment section is thorough and establishes a baseline for analysis. However, the Panel identified many elements of the project where additional analyses are needed and some instances where the incorporation of updated or additional data into analyses is warranted. These concerns are described below in additional detail.

Environmental: The affected environmental section in the DIFR-DEIS/EIR is thorough, and the significance criteria used are sufficient for the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA). However, two significant concerns of the Panel are that neither the alternatives analysis nor the impact analyses are fully compliant with the requirements of the CEQA. The alternatives analysis in the DIFR-DEIS/EIR does not focus on an alternative's ability to reduce potentially significant environmental impacts as required by CEQA. Regarding impact analysis, the DIFR-DEIS/EIR does not appear to be in compliance with CEQA requirements for identification of potentially significant impacts and feasible mitigation measures. The approval of the selected plan by the CEQA lead agency, Orange County Public Works, and subsequent implementation is influenced by compliance with CEQA.

Engineering: The review documents are quite detailed, and the need for the project and its objectives are clear. The Panel, though, identified two additional significant concerns and several others. The DIFR-DEIS/EIR does not provide a quantitative, probability-based analysis of life safety risk or identify the residual risks that remain from a 1% annual chance exceedance (ACE) storm. Without a quantitative analysis of life safety risk, the proposed alternatives, including the TSP, are not well-substantiated and it is unclear what residual risks will remain after implementation of the TSP if a 1% ACE storm is experienced.

Other concerns include how changes to existing development type and density can affect future runoff, the fact that the flood mitigation plan does not adequately consider increasing flow capacity; and that mitigation alternatives do not incorporate the effects of climate change. Also, existing conditions for the Pacific Coast Highway floodwall are inadequately described and analyzed, and the addition of concrete- or sheetpile-lined channels may potentially cause scour and damage to unlined channels and soft bottom channels. Additionally, some analyses used outdated hydrological and meteorological data, and used the outdated hydrologic model HEC-1. The Panel also noted that it is unclear how the geotechnical data collected during the planning, engineering, and design (PED) phase of work will be used to assess the stability of existing channel structures and modify their design if necessary.

Plan Formulation/Economics: The alternatives considered in the study are appropriate for this drainage basin. However, the Panel notes future-without-project and future-with-project population and other socioeconomic projections are lacking, and the rationale for screening out measures is not well-developed. Consequently, a broad range of alternatives may have been dismissed due to possibly premature elimination. Also, the Moderate Channel Modification Plan is identical to the Minimum Modification Plan so effectively only two alternatives, the Minimum and Maximum Modification Plans, were evaluated.

Table ES-1. Overview of 15 Final Panel Comments Identified by the Westminster CA FS IEPR Panel

No.	Final Panel Comment
Significance – High	
1	The alternatives analysis in the DIFR-DEIS/EIR is not compliant with the requirements of the California Environmental Quality Act.
2	The impact analyses in the DIFR-DEIS/EIR are not compliant with the requirements of the California Environmental Quality Act.
Significance – Medium/High	
3	The documents do not provide a quantitative, probability-based analysis of life safety risk or identify the threshold for acceptable life safety risk.
4	The DIFR-DEIS/EIR does not describe the level of residual risks that will remain after implementation of the TSP if 1% ACE storms occur in the study area.
Significance – Medium	
5	The flood mitigation plan primarily focuses on increasing flow efficiency and inadequately considers increasing flow capacity.
6	The mitigation alternatives do not incorporate the effects of climate change.
7	The report and appendices use outdated hydrological and meteorological data in their analyses.
8	The DIFR-DEIS/EIR report and Appendix A are based on the outdated hydrologic model HEC-1.
9	Changes to existing development type and density can affect future runoff, which was not analyzed.

Table ES-1. Overview of 15 Final Panel Comments Identified by the Westminster CA FS IEPR Panel (continued)

No.	Final Panel Comment
Significance – Medium	
10	Existing conditions for the Pacific Coast Highway floodwall are inadequately described and analyzed.
11	The addition of concrete- or sheetpile-lined channels may potentially cause scour and damage to unlined channels and soft bottom channels.
12	Future-without-project and future-with-project population and other socioeconomic projections are lacking.
13	The rationale for screening out measures is not well-developed, and a broad range of alternatives may have been dismissed due to possibly premature elimination.
14	The Moderate Channel Modification Plan, one of three action plans under consideration, is identical to the Minimum Modification Plan; effectively only two alternatives, the Minimum and Maximum Modification Plans, were evaluated.
Significance – Medium/Low	
15	Although additional, site-specific geotechnical data will be collected during the PED phase of work, it is unclear how the data will be used to assess the static and dynamic stability of existing channel structures and modify their design if necessary.

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LIST OF ACRONYMS

ACE	Annual Chance Exceedance
ADM	Agency Decision Milestone
ALL	Annual Life Loss
CE/ICA	Cost Effectiveness/Incremental Cost Analysis
CEQA	California Environmental Quality Act
COI	Conflict of Interest
CPT	Cone Penetration Test
DIFR-DEIS/EIR	Draft Integrated Feasibility Report-Draft Environmental Impact Statement/Environmental Impact Report
DrChecks	Design Review and Checking System
DIFR	Draft Integrated Feasibility Report
EC	Engineer Circular
EIR	Environmental Impact Report
ER	Engineer Regulation
ERDC	Engineer Research and Development Center
FRM	Flood Risk Management
FS	Feasibility Study
FWOP	Future Without Project
FWP	Future With Project
H&H	Hydraulics and Hydrology
HEC-HMS	Hydrologic Engineering Center Hydrologic Modeling System
IEPR	Independent External Peer Review
IWR	Institute for Water Resources
NED	National Economic Development
NEPA	National Environmental Policy Act
OCPW	Orange County Public Works
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
PCH	Pacific Coast Highway
PDT	Project Delivery Team
PED	Planning, Engineering, and Design
SAR	Santa Ana River
TSP	Tentatively Selected Plan
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

1. INTRODUCTION

The U.S. Army Corps of Engineers (USACE) has undertaken a feasibility study to evaluate structural and non-structural Flood Risk Management (FRM) measures to reduce the risk of flooding in the Westminster Watershed in East Garden Grove, California. The study was scoped for completion in accordance with the SMART Planning Paradigm. The Alternatives Milestone was completed in February 2014 and the Tentatively Selected Plan (TSP) milestone was completed in July 2018. The non-Federal sponsor for the study is Orange County Public Works (OCPW).

The study area is contained within the Westminster Watershed in western Orange County, California. The watershed is approximately 74 square miles and lies on a flat coastal plain that is almost entirely urbanized. Cities in the watershed include Anaheim, Stanton, Cypress, Garden Grove, Westminster, Fountain Valley, Los Alamitos, Seal Beach, and Huntington Beach. The watershed is part of the former floodplain of the Santa Ana River (SAR), which historically meandered through out the Westminster Watershed as far north as Anaheim Bay to as far south as Newport Bay. Channelization and large-scale flood control improvements have constrained the Santa Ana River to the main stem channel on the eastern border of the Westminster Watershed.

The feasibility study focuses on two channel systems located in the Westminster watershed: the East Garden Grove Wintersburg/Ocean View Channel and the Westminster/Bolsa Chica Channel, and associated tributaries. The existing channel systems vary in length, geometry, channel lining, and width. The East Garden Grove Wintersburg Channel extends approximately 11 miles and begins upstream of Haster Basin (a.k.a. Twin Lakes Park) located in the City of Garden Grove and flows southwest through the cities of Santa Ana, Garden Grove, Westminster, and Huntington Beach before discharging into the Outer Bolsa Bay region of the Bolsa Chica Ecological Reserve. Stormwater from the channel passes through tide gates into Outer Bolsa Bay then passes into Huntington Harbor and ultimately into the Pacific Ocean. The Ocean View Channel extends approximately 4 miles and begins east of Mile Square Park in the City of Fountain Valley. The channel flows westerly through Mile Square Park to the City of Huntington Beach, where it discharges into the East Garden Grove Wintersburg channel at a point northeast of the intersection of Gothard Street and Warner Avenue.

The Westminster Channel extends approximately 8 miles and is located in the cities of Huntington Beach, Westminster, and Garden Grove, California. The channel begins at its confluence with Bolsa Chica Channel in Huntington Beach and extends in a northeasterly direction into Westminster and Garden Grove. The study will only include the most downstream segment of the Bolsa Chica Channel that extends from its confluence with the Westminster Channel at the Bolsa Chica Street/Edinger Avenue intersection downstream to the Huntington Harbor outlet.

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 Westminster, East Garden Grove, California, Flood Risk Management Feasibility Study (hereinafter: Westminster CA FS IEPR) in accordance with procedures described in the Department of the Army, USACE, Engineer Circular (EC) *Review Policy for Civil Works* (EC 1165-2-217) (USACE, 2018a) 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 Westminster CA FS IEPR documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted, including the schedule followed in executing the IEPR. 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 in the final Work Plan according to the schedule listed in Table A-1. Appendix D presents the organizational COI form that Battelle completed and submitted to the Institute for Water Resources (IWR) prior to the award of the Westminster CA FS IEPR.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review, as described in USACE (2018a).

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 Westminster CA FS was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC 1165-2-217). 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. The IEPR was completed in accordance with established due dates for milestones and deliverables as part of the final Work Plan; the due dates are based on the award/effective date and the receipt of review documents.

Battelle identified, screened, and selected five panel members to participate in the IEPR based on their expertise in the following disciplines: plan formulation/economics; environmental law compliance; hydrology and hydraulic (H&H) engineering; geotechnical engineering; and civil/cost engineering. The Panel reviewed the Westminster CA FS documents and produced 15 Final Panel Comments in response to 31 charge questions provided by USACE for the review. This charge included two overview questions and one public comment question added by Battelle. Battelle instructed the Panel to develop the Final Panel Comments using a standardized four-part structure:

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

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

Battelle reviewed all Final Panel Comments for accuracy, adherence to USACE guidance (EC 1165-2-217), 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, 2018a; p. D-4) in the Westminster CA FS IEPR review documents. The following summarizes the Panel's findings.

Based on the Panel's review, the report provides a detailed feasibility study, and the need for the project and its objectives are clearly outlined. The range of alternatives used in the study is appropriate for the drainage basin, and the affected environment section is thorough and establishes a baseline for analysis. However, the Panel identified many elements of the project where additional analyses are needed and some instances where the incorporation of updated or additional data into analyses is warranted. These concerns are described below in additional detail.

Environmental: The affected environmental section in the DIFR-DEIS/EIR is thorough, and the significance criteria used are sufficient for the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA). However, two significant concerns of the Panel are that neither the alternatives analysis nor the impact analyses are fully compliant with the requirements of the CEQA. The alternatives analysis in the DIFR-DEIS/EIR does not focus on an alternative's ability to reduce potentially significant environmental impacts as required by CEQA. Regarding impact analysis, the DIFR-DEIS/EIR does not appear to be in compliance with CEQA requirements for identification of potentially significant impacts and feasible mitigation measures. The approval of the selected plan by the CEQA lead agency, Orange County Public Works, and subsequent implementation is influenced by compliance with CEQA.

Engineering: The review documents are quite detailed, and the need for the project and its objectives are clear. The Panel, though, identified two additional significant concerns and several others. The DIFR-DEIS/EIR does not provide a quantitative, probability-based analysis of life safety risk or identify the residual risks that remain from a 1% annual chance exceedance (ACE) storm. Without a quantitative analysis of life safety risk, the proposed alternatives, including the TSP, are not well-substantiated and it is unclear what residual risks will remain after implementation of the TSP if a 1% ACE storm is experienced.

Other concerns included how changes to existing development type and density can affect future runoff, the fact that the flood mitigation plan does not adequately consider increasing flow capacity; and that mitigation alternatives do not incorporate the effects of climate change. Also, existing conditions for the

Pacific Coast Highway floodwall are inadequately described and analyzed, and the addition of concrete- or sheetpile-lined channels may potentially cause scour and damage to unlined channels and soft bottom channels. Additionally, some analyses used outdated hydrological and meteorological data, and used the outdated hydrologic model HEC-1. The Panel also noted that it is unclear how the geotechnical data collected during the planning, engineering, and design (PED) phase of work will be used to assess the stability of existing channel structures and modify their design if necessary.

Plan Formulation/Economics: The alternatives considered in the study are appropriate for this drainage basin. However, the Panel notes future-without-project and future-with-project population and other socioeconomic projections are lacking, and the rationale for screening out measures is not well-developed. Consequently, a broad range of alternatives may have been dismissed due to possibly premature elimination. Also, the Moderate Channel Modification Plan is identical to the Minimum Modification Plan so effectively only two alternatives, the Minimum and Maximum Modification Plans, were evaluated.

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 alternatives analysis in the DIFR-DEIS/EIR is not fully compliant with the requirements of the California Environmental Quality Act.

Basis for Comment

The California Environmental Quality Act (CEQA) Guidelines (CEQA, 2018) present regulations for the implementation of CEQA and include requirements for Environmental Impact Reports (EIR). The purpose of an EIR is to identify the significant effects (also referred to interchangeably as "impacts" under CEQA) on the environment of a project, to identify alternatives to the project, and to indicate how those significant effects can be mitigated or avoided. To achieve this standard, all significant effects must be identified in the DIFR-DEIS/EIR, as well as mitigation measures and alternatives that would substantially lessen the significant effects on the environment. An EIR may be challenged in court for not achieving this standard or other deficiencies related to CEQA compliance.

CEQA requires that a public agency should not approve a project as proposed if there are feasible alternatives or mitigation measures available that would substantially lessen the significant effects on the environment, unless there are overriding considerations that outweigh the unavoidable adverse environmental effects (CEQA Guidelines, Section 15092). Prior to approving this project, the CEQA lead agency (i.e., Orange County Public Works) must certify that the EIR has been completed in compliance with CEQA (CEQA Guidelines, Section 15090). The Panel believes that the alternatives analysis in the DIFR-DEIS/EIR does not comply with CEQA requirements. Public comment letters on the DIFR-DEIS/EIR also suggest concerns about the completeness of the range of practicable alternatives and the alternatives analysis (Orange County Coastkeepers, Bolsa Chica Land Trust); public input is often assigned a large amount of importance in CEQA case law.

The CEQA alternatives development and screening process involves the identification and assessment of reasonable alternatives that have the potential for avoiding or minimizing the impacts of a proposed project. The alternatives analysis in the DIFR-DEIS/EIR does not focus on an alternative's ability to reduce potentially significant environmental impacts. CEQA Guidelines, Section 15126.6, states that an EIR must describe and analyze a range of reasonable alternatives to the project that (1) are potentially feasible, (2) would "feasibly attain most of the basic objectives of the project," and (3) would avoid or substantially lessen any of the project's significant effects. Alternatives should only be dismissed if they are infeasible, do not meet most of the objectives, and/or do not reduce or lessen any significant impacts. The Panel found that the DIFR-DEIS/EIR does not provide an analysis of these criteria for each potential alternative during the initial screening of measures, initial alternative analysis, or comparison of the final array of alternatives:

(1) **Potential Feasibility.** The initial screening of measures and initial alternative analysis dismiss measures/alternatives as infeasible. The standard under CEQA is to consider alternatives that are potentially feasible (not absolutely feasible, which is determined later in the CEQA process). Note that the California CEQA Guidelines require consideration of alternatives capable of eliminating or reducing significant environmental effects even though they may "impede to some degree the attainment of the project objectives, or would be more costly" (CEQA Guidelines, Section 15126.6[b]).

Final Panel Comment 1

(2) **Objectives.** The DIFR-DEIS/EIR does not say if the planning objectives are intended to be the CEQA objectives. CEQA objectives should be used to evaluate alternatives and to define a range of reasonable alternatives to the proposed project. The evaluation of alternatives should provide information on whether the alternatives could potentially feasibly accomplish most or all the basic objectives.

(3) **Comparison of Significant Impacts.** The DIFR-DEIS/EIR does not contain a comparison of potentially significant impacts for each resource topic among alternatives. A matrix/table can be used to compare impacts for each resource area in order to determine if any alternatives may avoid or lessen any potentially significant impacts of the proposed project. Also, an environmentally superior alternative under CEQA is not determined; the environmentally superior alternative is typically identified based on this comparison matrix.

Significance – High

The alternatives analysis in the DIFR-DEIS/EIR does not appear to be in full compliance with CEQA requirements, which could influence the approval and implementation of the recommended plan by the lead agency, Orange County Public Works, under CEQA.

Recommendations for Resolution

1. Provide an alternatives analysis in the DIFR-DEIS/EIR that fulfills CEQA requirements, including identification of:
   a. CEQA objectives
   b. a proposed project/action
   c. a reasonable range of potentially feasible alternatives.
2. After environmental impacts of the proposed project and alternatives are identified, provide a comparison of environmental impacts between the proposed project and each alternative to determine an Environmentally Superior Alternative.

Literature Cited

CEQA (2018). California Environmental Quality Act (CEQA) Guidelines (California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387 as of January 1, 2018. http://resources.ca.gov/ceqa/docs/2018_CEQA_Statutes_and_Guidelines.pdf

Final Panel Comment 2

The impact analysis in the DIFR-DEIS/EIR is not fully compliant with the requirements of the California Environmental Quality Act.

Basis for Comment

The CEQA Guidelines (CEQA, 2018) present regulations for the implementation of CEQA and include requirements for EIRs. One purpose of an EIR is to identify the significant effects (also referred to as "impacts" under CEQA) on the environment of a project. To achieve this standard, all significant effects must be identified in the DIFR-DEIS/EIR. An EIR may be challenged in court for not identifying all significant effects and other deficiencies related to CEQA compliance.

If "significant new information" emerges after the release of a draft EIR that changes the EIR "in a way that deprives the public of a meaningful opportunity to comment upon a substantial adverse environmental effect of a project or a feasible way to mitigate or avoid such an effect," CEQA Guidelines, Section 15088.5, requires the recirculation of a draft EIR, or one or more portions thereof. Section 15088.5 provides four examples of "significant new information" involving a disclosure showing that

1. A new significant environmental impact would result from the project or from a new mitigation measure proposed to be implemented.
2. A substantial increase in the severity of an environmental impact would result unless mitigation measures are adopted that reduce the impact to a level of insignificance.
3. A feasible project alternative or mitigation measure considerably different from others previously analyzed would clearly lessen the environmental impacts of the project, but the project's proponents decline to adopt it.
4. The draft EIR was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded.

Prior to approving this project, the CEQA lead agency (i.e., Orange County) must certify that the EIR has been completed in compliance with CEQA (CEQA Guidelines, Section 15090). The Panel believes that the impact analysis in the DIFR-DEIS/EIR does not comply fully with CEQA requirements.

An impact analysis in a draft EIR should disclose any potentially significant impacts on the environment from the project, identify any feasible mitigation measures that reduce significant impacts, and provide a significance conclusion for the impact. The Panel's concerns related to these aspects of the DIFR-DEIS/EIR's CEQA impact analysis are detailed below.

Environmental Commitments. Environmental "design features" are typically included as part of a project description and help to avoid or minimize environmental effects. Mitigation measures are special actions that are arguably not a part of the basic project; they are needed to limit the degree and magnitude of the project impacts or compensate for them.

The DIFR-DEIS/EIR relies heavily on Environmental Commitments as the bases for determining that various impacts would be less than significant. It appears to the Panel that the Environmental Commitments are intended to be "design measures." If so, the Panel believes that, while some of the

Final Panel Comment 2

Environmental Commitments are appropriately incorporated into the project description as design features, some appear to be functioning as mitigation measures that would be required to reduce potentially significant impacts to less than significant.

In many instances in the DIFR-DEIS/EIR, the Environmental Commitments are not specific or detailed enough to ensure a less-than-significant impact. Additionally, an explanation is not always included to demonstrate that the impact would be less than significant with the design measures in place or would be reduced to less than significant with the identified mitigation measures. In order to provide substantial evidence that impacts would be less than significant, mitigation measures should contain commitments to specific outcomes ("performance standards") to demonstrate that the impact will be reduced to less than significant.

Disclosure of Potential Impacts and Mitigation Measures. CEQA Guidelines (CEQA, 2018), Section 15064(d), states that the Lead Agency shall consider direct physical changes in the environment that may be caused by the project and reasonably foreseeable indirect physical changes in the environment that may be caused by the project. These physical changes (i.e., "impacts" or "effects") should be disclosed in the DIFR-DEIS/EIR and analyzed for their potential significance. The Panel does not believe that all potentially significant impacts or all feasible mitigation measures that could mitigate or avoid these significant effects are described and assessed for the project in the DIFR-DEIS/EIR. Public comment letters on the DIFR-DEIS/EIR also suggest concerns about potentially significant impacts that may not be disclosed (Orange County Coastkeepers, Bolsa Chica Land Trust); public input is often assigned a large amount of importance in CEQA case law.

The following examples from the DIFR-DEIS/EIR illustrate where additional potentially significant effects or mitigation measures might be considered:

- The Environmental Consequences section states in several places that additional studies would need to occur and that, depending on the results of the studies, additional mitigation measures may be identified at a future stage in the planning process. These studies might reveal new significant impacts that could occur which are not identified in the DIFR-DEIS/EIR; CEQA requires disclosure and analysis of significant impacts in the DIFR-DEIS/EIR. For example, the DIFR-DEIS/EIR (p. 177) states that surveys for eel grass will be conducted in the vicinity of the Warner Avenue Bridge. However, the DIFR-DEIS/EIR does not state the effects that could occur if eel grass is present. If potential effects on eelgrass would be significant, it should be disclosed as well as any feasible mitigation measures that would reduce impacts. An appropriate mitigation measure could include requirements to perform an eel grass survey before construction begins and, if detected, specific measures that minimize impacts.
- It does not appear that all areas where construction activities may occur (e.g., access roads, stockpiles, staging areas) were analyzed for potential effects in the DIFR-DEIS/EIR. Assuming impacts would only occur within the channels or downstream areas may not be correct. For example, the DIFR-DEIS/EIR describes (p. 209) that stockpiling of excavated materials may be temporarily stockpiled on adjacent parking and maintenance roads prior to loading and transport to off-site disposal. The DIFR-DEIS/EIR also states (p. 200) excavated sediment will be stockpiled within staging areas or along channel maintenance roads. Sediment stockpiling requires longer periods of time to drain prior to transport. These areas should be analyzed for potential impacts

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from erosion/sedimentation of excavated stockpiles and sediment stockpiles as well as potential impacts on stability and emergency access during construction.

- The current analysis in Section 5.8 of the DIFR-DEIS/EIR may be missing potentially significant impacts, such as alteration of habitat, injury, or mortality, on some special-status species. The potential for Federally listed species to occur is discussed (DIFR-DEIS/EIR, Section 2.7, Table 11), but the potential for the state-listed and other special-status species (as defined by CEQA Guidelines, Section 15380) is not discussed. There are 77 state-listed/other special-status species identified in Section 2.7 and listed in Appendix L. The potential for these species to occur based on known occurrence, range, and suitable habitat is not addressed; the Panel assumes all these species have some potential to occur in the project area. The analysis of the special-status species in Section 5.8 appears incomplete because it only discusses impacts on a small number of these special-status species with potential to occur in the area. Furthermore, Section 5.8 does not explain sufficiently how Environmental Commitments would reduce impacts (e.g., on nesting special-status birds).
- Section 5.8.3.2 of the DIFR-DEIS/EIR states that special-status plants do not occur in the immediate vicinity, but that if any are established, Environmental Commitments would avoid adverse or significant impacts. This analysis is missing the identification of a potentially significant impact on special-status plants if they were to occur. If special-status plants were in the project area, they could be removed, trampled, injured, or killed by construction activities, which would be a significant impact.
- The Panel assumes that Appendix M is intended to be a CEQA mitigation measure for the permanent loss of soft-bottom/wetland and upland with fringe wetland habitat. However, Section 5.8 of the DIFR-DEIS/EIR does not contain a specific mitigation measure stating this. The Panel understands that the mitigation details in Appendix M are not final; however, a mitigation measure could be written that commits to meeting a performance standard (e.g., no net loss of wetlands, compensatory mitigation as determined by the wildlife agencies).
- The analysis in Section 5.8 of the DIFR-DEIS/EIR concludes that implementation of Environmental Commitments would reduce impacts on special-status nesting bird species to less than significant. The commitment by BIO-5 to work outside the nesting season to the extent possible appears to be for only a small part of the project area (e.g., Reach 1 in CO5, Reach 23 in CO2) and only to the extent possible. If “take” is expected for Federally or state-listed species, the potential for injury, mortality, and/or habitat loss should be clearly disclosed and would likely be considered a significant impact, which may be reduced to less than significant with identification of mitigation measures. Impacts on nesting birds are not considered over the entire breeding season for all special-status nesting birds (in southern California, breeding can begin in January, or earlier for some raptors) and in all work areas where vegetation removal, noise, or human presence could disturb nesting birds. Work windows/timing to protect nesting birds in BIO-5 do not appear to be included in the construction phases shown in Appendix I, the General Conformity Analysis.
- Potential impacts on nesting birds protected by the Fish and Game Code Sections 3503 and 3503.5, are not disclosed in the DIFR-DEIS/EIR. Section 7.2.5 of the “Compliance with Applicable Laws, Policies, and Plans” chapter does not include Sections 3503 and 3503.5. Section 3503 of the Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 states that it is unlawful to take, possess, or destroy any raptors (i.e., species in the orders Falconiformes and Strigiformes), including their nests or eggs.

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Typical violations include destruction of active nests as a result of vegetation removal or disturbance from construction or other activities that cause the adults to abandon the nest, resulting in loss of eggs and/or young. Destruction of birds, eggs, or nests protected under these sections would likely be considered a significant effect under CEQA and should be disclosed and feasible mitigation identified. For example, a nesting bird management plan could be required to detail protocols for work windows for vegetation removal, requirements for pre-construction nesting bird surveys, requirements for nest exclusion buffers, and requirements for potentially reducing buffer distances.

Impact Statements. Significance conclusions are not provided for all significance criteria. Each significance criterion for each impact evaluated should contain a CEQA impact conclusion: “no impact,” “less than significant impact,” “less than significant impact with mitigation,” or “significant impact” (which may be “significant and unavoidable” after adopting all feasible mitigation). The statement “less than significant with Environmental Commitments” stated in the DIFR-DEIS/EIR could be either “less than significant” or “less than significant with mitigation” depending on whether the Commitment is a design measure or mitigation measure, respectively. The DIFR-DEIS/EIR should clarify this and state the appropriate CEQA impact conclusion.

Significance – High

The DIFR-DEIS/EIR does not appear to be in compliance with CEQA requirements for identification of potentially significant impacts and feasible mitigation measures, which could influence the approval and implementation of the recommended plan by Orange County under CEQA.

Recommendations for Resolution

1. Under each significance criterion in the DIFR-DEIS/EIR, the following should be included:
   a) a discussion of the impacts that would/could occur if the alternative is implemented
   b) a discussion of how design features would avoid/minimize impacts (if any are incorporated into the project)
   c) state if the impact would be significant (after inclusion of design features, if applied)
   d) if the impact is significant, list the mitigation measure(s) to be implemented and describe how each would reduce the impact and
   e) state a final CEQA conclusion (e.g., “less than significant with mitigation”).
2. Bolster the discussion of potentially significant impacts and associated mitigation measures in the biological resources section including:
   a) a thorough and comprehensive discussion of the impacts on special-status species, including their habitat, and sensitive communities from the widening of the Outer Bolsa Bay channel, addition of floodwalls, replacement of tide gates, and channel modifications
   b) potential impacts due to construction disturbance, increased flow volumes, tidal changes, salinity and temperature changes, erosion, and loss of upland and soft bottom/wetland habitat and
   c) identification of appropriate mitigation measures that would reduce significant impacts.

Literature Cited

CEQA (2018). California Environmental Quality Act (CEQA) Guidelines (California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387 as of January 1, 2018. http://resources.ca.gov/ceqa/docs/2018_CEQA_Statutes_and_Guidelines.pdf

Fish and Game Code (1971). California Constitution, Fish and Game Code, Division 4, Part 2, Chapter 1, Section 3503. http://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=FGC&sectionNum=3503.

Fish and Game Code (1985). California Constitution, Fish and Game Code, Division 4, Part 2, Chapter 1, Section 3503.5. http://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=FGC&sectionNum=3503.5.

Final Panel Comment 3

The documents do not provide a quantitative, probability-based analysis of life safety risk or identify the threshold for acceptable life safety risk.

Basis for Comment

One of the main objectives of the proposed project is to reduce life safety risk associated with flooding caused by overtopping of the drainage channels (DIFR-DEIS/EIR p. 18). However, the documents do not provide any quantitative data about the probability of loss of life under storms of varying annual chance exceedance (ACE) values (20%, 10%, 5%, 2%, 1%, etc.) or identify the threshold for acceptable life safety risk.

The Draft Integrated Feasibility Report (DIFR-DEIS/EIR) states (p. 111),

> "Compatible nonstructural measures would be incorporated to lessen the life safety risk associated with flooding in the project area. Compatible nonstructural measures that were considered in the development of this alternative include development of a flood warning system and removal of impediments to flow."

This qualitative statement does not provide any information regarding the extent of life safety risk reduction or the level of acceptable risk. For existing dams, USACE uses a probability threshold for annual life loss (ALL) of 1 in 10,000 ($1x10^{-4}$) (USACE, 2014). The documents do not present an analysis to demonstrate that such a threshold, or the one more appropriate for flooding caused overtopping of channels, would be met. This is despite the fact that flooding of channels creates a substantial life safety risk. According to the DIFR-DEIS/EIR (p. 87), a deceased male was discovered in one of the flood control channels in January 2018 and another person was found dead in a rain-swollen channel in the City of Garden Grove on December 12, 2014.

Since the documents provided do not include a quantitative, probability-based analysis about life safety risk, the Panel believes that the proposed alternatives do not provide a sound basis for decision-making and do not address one of their main objectives. Furthermore, a flood warning system without a corresponding evacuation plan, complemented by an emergency response, may not be very effective. The DIFR-DEIS/EIR states (p. 100), "Local and county governing bodies are typically responsible for leading evacuation planning efforts." However, the Panel believes there needs to be close coordination between the officials responsible for the flood warning system and those responsible for evacuation planning and emergency response.

Significance – Medium/High

Without a quantitative, probability-based analysis of life safety risk, including the threshold for acceptable life safety risk, the proposed alternatives, including the TSP, are not well-substantiated and do not meet one of their intended objectives.

Recommendations for Resolution

1. Provide a quantitative, probability-based analysis of life safety risk for storms of varying magnitudes (20% ACE to 1% ACE).
2. Identify a threshold for acceptable life safety risk in accordance with the USACE guidance.

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3. Demonstrate that the proposed alternatives will meet the life safety risk threshold.
4. Clarify how the flood warning system will be coordinated with the agencies responsible for evacuation planning and emergency response.

Literature Cited

USACE (2014). Safety of Dams – Policy and Procedures, Engineer Regulation 1110-2-1156. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. March 31. https://www.publications.usace.army.mil/Portals/76/Publications/EngineerRegulations/ER_1110-2-1156.pdf

Final Panel Comment 4

The DIFR-DEIS/EIR does not describe the level of residual risks that will remain after implementation of the TSP if 1% ACE storms occur in the study area.

Basis for Comment

The stated need and objective of the project is to reduce the flood hazard risk and, consequently, the associated life safety risk. Assuming the data and models used for hydraulic analyses are appropriate (some of the data used are quite old), the TSP reduces flood risk to mostly 2% ACE.

Appendix A, Hydrology and Hydraulics, states (p. 11), "The storms of 04 December 1974 and 01 March 1983 were short duration, high intensity storms producing intense rainfall in excess of 1% ACE depths for several durations." If two storms in excess of 1% ACE occurred in the project area within the last 50 years, there is high probability that storms of 1% ACE, or higher, will occur during the period of performance. According to Section 1.7 of the DIFR-DEIS/EIR (p. 7), "one of OCPW's goals for this study is to provide flood damage risk reduction within the drainage channels of the Westminster watershed up to and including the 1% ACE storm event." However, the DIFR-DEIS/EIR specifically states (p. ES-iv), "the TSP does not meet the non-federal sponsor's objective of containing the 1% ACE storm event (100-year recurrence interval) within the conveyance channels and reducing the size of the mapped floodplain."

The Panel recognizes that any flood control plan has some residual risk, but it is unclear what residual risks will remain if a 1% ACE storm occurs in the study area.

Significance – Medium/High

Based on the past flood history in the project area as outlined in Appendix A (p. 11), reducing the flood hazard risk to primarily 2% ACE may result in unexpected levels of residual risk with respect to flooding during the 50-year period of performance, which could impact life safety in the project area.

Recommendation for Resolution

1. Identify in the DIFR-DEIS/EIR the anticipated level of residual risk that is expected for a 1% ACE with respect to flood hazard after TSP implementation.

Final Panel Comment 5

The flood mitigation plan primarily focuses on increasing flow efficiency and inadequately considers increasing flow capacity.

Basis for Comment

The TSP primarily focuses on increasing flow efficiency, not on increasing flow capacity, except reaches I and 23, which will receive maximum modifications. This results in uncertainty and risk regarding flooding during extreme precipitation events. Both efficiency (the ability of a channel to move water downstream freely) and capacity (the ability of a channel to accommodate a large volume of water during flooding) are important to account for extreme precipitation events, such as those of December 1974 and March 1983, and for sustainability, robustness, resiliency, and redundancy purposes.

While discussing the performance requirements of the mitigated channel system, the DIFR-DEIS/EIR states (p. 96), “Performance in this study is primarily tied to conveyance capacity in the study drainage channels and fragility of levees in the downstream sections of those channels.” Contrary to the TSP, this statement emphasizes conveyance capacity, not conveyance efficiency. Increasing capacity, in addition to efficiency, will add an element of redundancy to the TSP, thereby reducing uncertainty and risk associated with extreme flood events. The Panel believes that channel capacity can be increased by adding floodwalls to those trapezoidal reaches that have the maximum potential for flood hazard risk or by converting some trapezoidal reaches into rectangular reaches, where feasible.

Significance – Medium

Increasing efficiency alone, without any consideration of increasing capacity, will not sufficiently reduce the flood risk and uncertainty associated with extreme flood events.

Recommendations for Resolution

1. Add flood walls along trapezoidal channels in those reaches that are most at risk to flooding.
2. Convert some trapezoidal reaches into rectangular reaches, on a case-by-case basis, in addition to reaches 1 and 23.
3. Consider adding redundancy in addition to robustness and resiliency for the flood mitigation plan (TSP) to be sustainable.

Final Panel Comment 6

The mitigation alternatives do not incorporate the effects of climate change.

Basis for Comment

Climate change can result in extreme precipitation events and significant sea level rise during the remainder of the 21st century (California's Fourth Climate Change Assessment, 2019), which can have a major impact on the hydrologic conditions in the project area and the proposed mitigation measures. Yet the mitigation alternatives assume that the amount of precipitation in the project area during the 21st century will remain the same as during the last few decades of the 20th century (DIFR-DEIS/EIR, p. 44), ignoring the extreme precipitation events associated with climate change. However, contrary to the above assumption, the DIFR-DEIS/EIR does recognize that precipitation amounts may rise in the future:

- DIFR-DEIS/EIR (p. 43): "However, while the amount of precipitation is expected to be nearly the same, more will fall as rain instead of snow. Precipitation as rainfall shortens the chance to capture water compared to snow stored in the mountains, and increases in rainfall precipitation may therefore exacerbate flood risks."
- DIFR-DEIS/EIR (p. 43): "Large annual variations in winter rainfall and runoff, which are normal in California, create uncertainty surrounding potential increase in flooding as a result of climate change."
- DIFR-DEIS/EIR (p. 94): "Flooding will continue periodically and may increase based on the forecast conditions of climate change in Southern California. Therefore, there could be increased risk to public safety due to increased flooding associated with severe storm events."
- Appendix A (p. 51): "Future storm events in the California Region are predicted to increase in frequency and intensity compared to the recent past." Figure 7 of Appendix A shows an increasing trend of stream flow since 1948 for one of the streams in the area (San Diego Creek near Irvine), indicating the potential for increasing flow in the study channels later in the century. More importantly, the large amount of scatter in the data in Figure 7 points to the need for accommodating unexpectedly large flows associated with extreme events.

Despite these statements, Appendix A says (p. 53), "No adjustments due to climate change were made to Future Condition discharges for this analysis." The Panel believes that "No adjustment due to climate change" means not accounting for uncertainty and risk related to extreme precipitation events in the hydraulic analyses used in the study.

The mitigation alternatives also do not sufficiently consider the effect of anticipated sea level rise due to climate change. Hydraulic models make an adjustment of 0.61 foot to the downstream boundary condition to account for sea level rise in 2070 (Appendix A, p. 61). The DIFR-DEIS/EIR states (p. 43), "sea level rise could be 10-17 inches by 2050 and 31-69 inches by 2100." These figures represent a much higher level of uncertainty regarding sea level rise during the period of performance than is accounted for by a 0.61-foot adjustment.

Figure 10 of Appendix A (p. 61) shows three curves (low, intermediate, and high) for anticipated sea level rise from 2020 to 2100. However, the difference between intermediate sea level rise and the maximum sea level rise increases much more rapidly with increasing time than the difference between low and intermediate sea level rise. Based on the projected sea level rise curves in the figure, an

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adjustment of 0.61 foot (based on an intermediate curve) of sea level rise to downstream boundary condition may be an underestimate, not accounting for the larger amount of uncertainty regarding sea level rise because of climate change. Additionally, the economic impacts of sea level rise on mitigation alternatives is not well-documented.

Significance – Medium

The mitigation alternatives, and the hydraulic analyses they are based on, need to incorporate the effects of extreme precipitation events and sea level rise associated with climate to a sufficient extent in order to reduce the uncertainty and risk related to such events.

Recommendations for Resolution

1. Incorporate the effect of extreme precipitation events associated with climate change in order to reduce the uncertainty and risk posed by such events.
2. Incorporate a higher level of uncertainty related to sea level rise than is represented by the 0.61-foot adjustment currently used in the study, i.e., add a higher sea level rise to the boundary conditions of the hydraulic models.
3. Use up-to-date literature on climate change for more recent projections of future precipitation and sea level rise, such as the report cited below.
4. Document the economic impacts on mitigation alternatives due to sea level rise.

Literature Cited

State of California (2019). California's Fourth Climate Change Assessment. http://www.climateassessment.ca.gov/

Final Panel Comment 7

The report and appendices use outdated hydrological and meteorological data in their analyses.

Basis for Comment

It is the Panel's understanding that recent shifts in climatic patterns may indicate a trend to more intensive precipitation events, resulting in higher magnitude floods. The data used to determine the basis of the design are not up-to-date, creating uncertainty as to whether information is missing, which will affect selection, justification, or ability to implement the recommended alternative.

For example, Appendix A uses outdated meteorological data in hydraulic analysis, which could potentially influence the basis for the design and selection of alternatives, as documented below:

- Rainfall frequency analysis (Section 5.5.4, pp. 23-24) relies on data from prior to 1987. Inclusion of more intensive precipitation events in the last 30 years may improve the accuracy of the rainfall frequency analysis and hydraulic modeling results.
- Annual peak streamflow data for San Diego Creek (Section 6.1.3, Figure 7, p. 63) is dated prior to 1986, and frequency analysis uses data from prior to 1999. Inclusion of more recent floods in the last 20 years may provide more accurate hydraulic modeling results.
- Average wave setup (Section 7.1.1, p. 61) was hindcasted using data dated prior to 1985. The higher wave setup (in combination with other factors), based on more recent wave setup data, may indicate more prolonged flooding in the low-lying areas.
- Boundary conditions (Section 7.1.1, p. 61) use sea level rise of only 0.61 feet at the downstream boundary in hydraulic models. That is inconsistent with the sea level rise of 2 feet given in DIFR-DEIS/EIR Section 2.5.1 (p. 43, last paragraph), which is based on a more updated study. Changing the sea level rise from 0.61 feet to 2 feet (a value consistent with that used in the DIFR-DEIS/EIR) could significantly impact downstream boundary conditions in hydraulic modeling, resulting in prolonged flooding and possibly influencing the basis for the design and selection of alternatives.

Significance – Medium

The results of this analysis using outdated data could directly affect engineering design and selection of alternatives, thereby creating the potential for increased project uncertainty and risk

Recommendations for Resolution

1. Update the meteorological data using the most recent meteorological database (NOAA Atlas 14, Volume 6, California, updated 2014), and document/update hydrologic frequency analysis and supporting data using this atlas. Verify this hydrologic analysis across the watershed with the online NOAA Precipitation Data Server (updated 2017).
2. Since the USGS/Orange County gage on San Diego Creek does not have any flow data after 1999, use another stream-gage in the area with a longer record to estimate missing peak flow data at the San Diego gage after 1999. For example, use the USGS method to estimate flows from un-gaged watersheds by using another gage from the hydrologically similar watershed, such as the USGS gage 11078000 on Santa Ana River, just east of the study area, with 77 years of

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record (still operational) (https://waterwatch.usgs.gov/?m=real&r=ca), and adjust for the tributary watershed area at San Diego Creek. Note that the ratio of peak flows should be proportional to the ratio of corresponding drainage areas.

3. Use an updated meteorological and marine database to re-calculate wave hindcasting.
4. Update sea level rise of 0.61 feet, currently used as the downstream boundary condition in hydraulic models, to a sea level rise of 2 feet, consistent with the updated climate study (referenced in DIFR-DEIS/EIR Section 2.5.1).

Literature Cited:

NOAA Atlas 14 – Precipitation-Frequency Atlas of the United States, Volume 6, California. U.S. Department of Commerce, California, 2014. http://www.nws.noaa.gov/oh/hdsc/PF_documents/Atlas14_Volume6.pdf

NOAA's National Weather Service – Hydrometeorological Design Center Precipitation Frequency Data Server (PFDS). https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ca

Final Panel Comment 8

The DIFR-DEIS/EIR report and Appendix A are based on the outdated hydrologic model HEC-1.

Basis for Comment

Appendix A, Section 5.5, uses the HEC-1 model for rainfall/runoff model development. HEC-1 is an old hydrologic model and predecessor to the current Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) model, which has been in use for more than 20 years. There have been continuous software modeling updates by USACE's Hydrologic Engineering Center to ensure the accuracy of model outputs. Numerous updates to the model (currently HEC-HMS) in the last three decades raise concerns about the accuracy of hydrologic modeling results for the HEC-1 model as used in this project. The Panel asked USACE in the Mid-Review Questions why the HEC-1 model was not converted to the HEC-HMS model.

USACE responded (Westminster CA FS IEPR Mid-Review Questions – Part 1. Response to question 28**):**

"*Conversion to HEC-HMS was considered, but the current hydrology modeling also utilizes a program called LAPRE-1, which is a preprocessor for HEC-1 for coding Orange County's 24 hour precipitation. This preprocessor was developed for HEC-1 and does not currently work with HEC-HMS.*"

The Panel is concerned that this response provides reasoning of why the HEC-HMS model was not used; it does not provide scientific justification for sticking with the HEC-1 model. The Hydrologic Engineering Center has stopped using HEC-1 because of identified deficiencies. For example, even the very first version of the HEC-HMS model included calculation of channel physical properties, whereas in the HEC-1 model, the channel properties were calculated using a kinematic wave assumption (USACE, 2001). That difference alone is a concern for how channel design compares using the HEC-1 model versus the HEC-HMS model. Other HEC-HMS model updates in the last 20 years provided more options to calculate infiltration (USACE, 2018b). It is the Panel's opinion that incorporation of the newest HEC-HMS model could result in different hydraulic results (due to differences in calculations of channel conveyance and infiltration), which could, in turn, affect the results of the study and potentially the selection of the alternatives.

Significance – Medium

There is a concern that using outdated software could influence engineering design and selection of alternatives.

Recommendations for Resolution

1. Compare the modeling results of the HEC-1 model with those of the most recent HEC-HMS model to see whether advances in modeling and science in the last three decades affect hydrologic results.
2. Consider using the Riverside County Flood Conservation District HEC-HMS pre-processor (Riverside County, 2016) for pre-processing the data, run the most recent version of the HEC-HMS model, and compare simulation results with the results from the HEC-1 model. Check

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whether the updated HEC-HMS results are significantly different than the HEC-1 results, and whether they would affect study conclusions and the basis for the design.

Literature Cited:

Riverside County (2016). HEC-HMS Preprocessor User Manual and HEC-HMS Guidance Document, Version 1. Riverside County Flood Conservation District. July 2016. http://rcflood.org/Downloads/HECHMSPreprocessorUserManual.pdf

USACE (2001). Hydrologic Modeling System HEC-HMS – Differences between HEC-HMS and HEC1. U.S. Army Corps of Engineers Hydrologic Engineering Center. June 2001.

USACE (2018b). Hydrologic Modeling System HEC-HMS User's Manual, Version 4.3. U.S. Army Corps of Engineers Hydrologic Engineering Center. September 2018.

Final Panel Comment 9

Changes to existing development type and density can affect future runoff, which was not analyzed.

Basis for Comment

DIFR-DEIS/EIR, Appendix A, Sections 2.4 (p. 10) and 5.1, (p. 17) state that "Present and Future conditions are the same." Although the area has been fully developed as of 2018, there is no assurance that the level of development will remain the same for another 50 years. Most likely, many areas (currently single-family residential neighborhoods with lawns) could be converted to high-rise multi-story residential developments (usually 100 percent paved). The Panel understands that the assumption on development was made in consultation with Orange County and no other urban development plans were available.

The Panel is concerned that future conditions do not use hydrologic parameters associated with 100 percent impervious surfaces, usually assumed for fully urbanized areas. As a result, projected peak flows could be under-estimated and recommended flood protection measures could be under-designed.

Significance – Medium

There is a concern that in using less than fully developed conditions, the proposed design and selected alternative could result in a lower level of flood protection and increased flood risk in future.

Recommendations for Resolution

1. Assess future-without- and future-with-project hydrologic conditions taking into account future vertical development and increased population density.
2. Conduct sensitivity analysis on how projected changes in hydrologic conditions could result in changes in project performance and flood risk and uncertainty.

Final Panel Comment 10

Existing conditions for the Pacific Coast Highway floodwall are inadequately described and analyzed.

Basis for Comment

The DIFR-DEIS/EIR indicates both the TSP and the Locally Preferred Plan (LPP) will require inclusion of three interrelated downstream modifications due to the improved conveyance of floodwater from Channels C05 and C06 (DIFR-DEIS/EIR, pp. 245, 250). These downstream flood risk reduction measures include:

- A new tidal gate at the downstream end of Channel C05
- Constructing approximately 2,500 feet of 3-foot-high concrete floodwall along the Pacific Coast Highway (PCH)
- Improving flood conveyance by widening the channel at Warner Avenue and constructing a new, longer bridge.

The floodwall location and length are correctly shown in Figure 6 (Appendix B) and match the 2,500-foot length stated in both the TSP and LPP. Figures 35, 36, 44, and 45 (DIFR-DEIS/EIR) incorrectly depict the floodwall extending along PCH from the tide gate to Warner Avenue or roughly 4,500 feet in length. Based on the Panel's measurements (Google Earth Pro Imagery, Dec. 3, 2017), approximately 2,000 feet of the PCH is unprotected by a floodwall.

It is the Panel's understanding from responses to questions submitted to USACE during the Mid-Review Teleconference (Jan. 4, 2019) that the Chicago District will ascertain whether hindcast studies will be required for Outer Bolsa Basin to determine potential risk related to waves impacting the floodwall. USACE also stated there that "The PCH floodwall will be constructed, in part, above an existing vertical retaining wall structure in Outer Bolsa Bay where scour would not be an issue."

The DIFR-DEIS/EIR describes costs and concepts, however, the Panel believes that it does not consider or describe several key issues:

- The location, length, condition, and type of existing wall system adjacent to the new floodwall is not discussed in the DIFR-DEIS/EIR. These factors could affect the suitability of the proposed new floodwall to be constructed above the existing structure, creating potential risk and uncertainty not described in the DIFR-DEIS/EIR or considered in the evaluation of concepts or costs for the wall system. Should the existing wall system fail or become unstable, either during or after construction, the proposed floodwall could be at significant risk.
- A segment of the PCH will not have a new floodwall constructed between the end of the new PCH floodwall and Warner Avenue (Appendix B, Figure 6). Unless elevations are significantly different, the PCH could flood at the downstream end of the newly constructed floodwall system.
- Vortex scour typically occurs at transitions from hard to soft materials due to increased flood velocities or wave action. The Panel found the PCH floodwall transitions from a hard concrete surface to sediment and soil with no consideration of the potential for scour; this will increase risk and uncertainty.

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Significance – Medium

The incorrect depiction of length of floodwall; missing information on structures adjacent to the floodwall, and limited details and analysis combine to increase uncertainty in, and appropriateness of, the concept and project costs.

Recommendations for Resolution

1. Revise all DIFR-DEIS/EIR figures to show the limits of the proposed floodwall correctly.
2. Describe the existing wall system and provide information on the location, length, age, condition, type of wall system, and proximity to the new PCH floodwall. Consider adding a typical section to the DIFR-DEIS/EIR that shows both the new floodwall and the existing wall. Evaluate and describe the potential risks.
3. Evaluate the risk of flooding for the PCH between the downstream end of the proposed floodwall and the Warner Avenue Bridge if floodwall protection will only be extended partially along Outer Bolsa Basin. If this is not a risk, then support this position.
4. Include and identify any additional risks, measures required, initial costs, and maintenance costs associated with scour prevention at the transitional boundary from hard concrete surface to soft surface at the downstream end of the PCH floodwall. If transitional zones are required, describe the environmental impacts.

Literature Cited

Google Earth Pro Imagery, December 3, 2017.

Final Panel Comment 11

The addition of concrete- or sheetpile-lined channels may potentially cause scour and damage to unlined channels and soft bottom channels resulting in risk and uncertainty in the concepts and construction costs.

Basis for Comment

The DIFR-DEIS/EIR geotechnical appendix (Appendix G, p.14) indicates that most channel reaches will be converted to concrete-lined side slopes to eliminate channel wall erosion. It also states that "Erosion susceptibility of natural inverts is beyond the scope of this report and that scour analyses should be completed to ensure natural inverts and bridge supports are protected."

Figure 1b of Appendix B shows the existing channel conditions for all reaches and channels, and the Plan Formulation (Appendix H, Table 5-8, Ref. 3) presents the proposed TSP and LPP channel modifications. According to these tables and supporting figures, some reaches of the channels have walls and inverts lined with concrete, walls lined with sheetpile, and some reaches are left with natural inverts downstream.

Lining either the channel walls or channel walls and inverts results in increased conveyance and higher velocities, with the potential for both scour of the entire unlined channels and downstream scour of the unlined channels. The DIFR-DEIS/EIR states that scour analysis is necessary to evaluate inverts and bridge supports, but postpones the analysis to the design phase, which can lead to risk and uncertainty in the concepts and cost estimates. This may result in the need for additional concrete-lined channels at locations where only wall lining is proposed, as well as additional concrete-lined channels downstream. The Panel believes that, without this analysis, the DIFR-DEIS/EIR potentially provides inaccurate concepts and construction cost.

Significance – Medium

The significant risk of potential scour with the improvements proposed is not fully described in the DIFR-DEIS/EIR and should be evaluated to ensure concepts and costs are appropriate for channel reaches with natural inverts and unlined channels.

Recommendations for Resolution

1. Perform necessary scour calculations for all TSP and LPP unlined channel reaches.
2. Evaluate whether natural inverts are appropriate for increased velocities in each unlined reach to evaluate risk and uncertainty.
3. If necessary, modify unlined channels to provide scour protection and modify DIFR-DEIS/EIR concepts, costs, and maintenance costs as appropriate.

Final Panel Comment 12

Future-without-project and future-with-project population and other socioeconomic projections are lacking.

Basis for Comment

No future-without-project (FWOP) and future-with-project (FWP) population and other socioeconomic projections are presented in the DIFR-DEIS/EIR. The assumption is made in the DIFR-DEIS/EIR that because the project area is almost completely built out, the population and socioeconomic conditions will not change in the next 50 years. The Panel questions the basis for this assumption. According to the California Department of Finance (2018), the population of Orange County is projected to increase by 12 percent over the next 42 years. The DIFR-DEIS/EIR refers to vertical development (DIFR-DEIS/EIR, p. 93), presumably multi-family residences. But no discussion of the location of higher density development is presented in FWOP or FWP projections. The cumulative impacts analysis notes that two projects are under construction or planned with a combined 160 residences (DIFR-DEIS/EIR, p. 218), but this and similar growth is not reflected in the FWOP conditions.

Increases in the value of structures at risk due to higher density development affect both the flood risk in the FWOP alternative and flood risk reduction benefit in FWP alternatives. It is not clear in either the main report or Appendix C that the value of structures at risk or other property increases over the project life.

The life-safety impacts of flooding over the project life are also influenced by changes in population and population density. As no population projections are included in the review documents, the Panel cannot assess how or if such impacts were assessed. In addition to the above considerations, FWP and FWOP population projections and land use changes are a required part of the CEQA document that is included as part of the DIFR-DEIS/EIR. NEPA documentation requires projections of the ethnic composition of the population in order to evaluate environmental justice impacts. The DIFR-DEIS/EIR makes qualitative, but not quantitative, projections of population ethnic composition.

Significance Medium

The absence of population and land use projections prevents a quantitative evaluation of the difference between FWP and FWOP project impacts and a comparison of the benefits of the project alternatives, casting doubt on the selection of the preferred alternative.

Recommendation for Resolution

1. Add FWP and FWOP population and land use projections to the DIFR-DEIS/EIR.
2. Use projections as part of the evaluation of flood risk reduction benefits of proposed alternatives.
3. Integrate population projections and changes to the land use distribution as part of the evaluation of life-safety impacts of the FWP and FWOP project alternatives.
4. Include ethnic composition projections in the impact analysis.

Literature Cited

California Department of Finance (2018). Online at: http://www.dof.ca.gov/Forecasting/Demographics/Projections/

Final Panel Comment 13

The rationale for screening out measures is not well-developed, and a broad range of alternatives may have been dismissed due to possibly premature elimination.

Basis for Comment

The SMART Planning process used in the Westminster study "…utilizes risk informed decision making to make decisions earlier in the study process, using best available information and professional judgement" (DIFR-DEIS/EIR, p. Es-V). In accordance with SMART principles, 24 management measures were identified as part of the initial screening process. Of these, 14 were eliminated in the initial screening process (DIFR-DEIS/EIR, Table 20, p.107). The justification for screening out many of these measures is not fully explained in the documents. By rejecting many measures early in the planning process, the formulation of alternatives based on these measures was unduly limited.

For example, the option of removing the tide gates on CO5 was eliminated in favor of rebuilding them at a cost of $8.5 million (DIFR-DEIS/EIR, Table 26, p. 124). The DIFR-DEIS/EIR (p. 105) gives a rationale for this action as, "A new easement agreement would need to be negotiated between OCPW and the State of California if the tide gates were to be removed because their land rights are connected to the presence of the tide gates." It is not clear that this statement provides enough justification for eliminating the removal measure. The tide gate removal would presumably have a significant impact on downstream conditions in the project area and might affect the project capacity. This measure could thus have a significant impact on the alternatives evaluation and selection process.

Pump station improvements were eliminated because they were not "required to provide the necessary capacity in the study channels, however this measure will be reincorporated into the planning process if future modeling demonstrates a need" (DIFR-DEIS/EIR, p.104). This measure was screened out before its potential effect could be assessed.

The DIFR-DEIS/EIR includes the flood warning system measure, but eliminates the evacuation plan and emergency response measures. The DIFR-DEIS/EIR (p.104) states, "If the H&H modeling or traffic impacts analysis carried out during this study are determined to be beneficial, USACE will work with these local entities to make sure that the pertinent information is available and accessible for use." It is not clear when the benefits of these measures will be determined or how they might be integrated into the action plans.

Significance – Medium

By unduly limiting a complete range of measures, the DIFR-DEIS/EIR might not have formulated the full range of alternatives. It is possible the TSP selected without consideration of these alternatives is not the correct choice.

Recommendations for Resolution

1. Provide further rationale for eliminating the measures that were screened out.
2. Reconsider inclusion of one or more of the eliminated measures in the formulation of alternatives.
3. Consider reformulation of alternates based on the prematurely dismissed measures.
4. Clarify how and at what stage non-structural measures will be integrated into the action plans.

Final Panel Comment 14

The Moderate Channel Modification Plan, one of three action plans under consideration, is identical to the Minimum Modification Plan; effectively only two alternatives, the Minimum and Maximum Modification Plans were evaluated.

Basis for Comment

Initially, five action alternatives were considered for evaluation (DIFR-DEIS/EIR, p. 109):

1. Nonstructural alternative
2. Minimum channel modifications alternative
3. Maximum channel modifications alternative
4. Moderate channel modifications (hybrid) alternative
5. Diversion tunnel alternative.

The diversion tunnel alternative was eliminated because of excessive cost and other considerations. Some measures in the nonstructural alternative were included as elements of the remaining alternatives, but no nonstructural alternative was effectively considered. Of the remaining three alternatives, the moderate channel modifications (hybrid) alternative was found to be identical to the minimum channel modifications alternative once the incremental analysis of each reach was performed. Thus, effectively only two action alternatives were evaluated.

Significance – Medium

It is unclear whether two action alternatives constitute an evaluation of the full range of potential alternatives for meeting the project objectives.

Recommendations for Resolution

1. Consider broadening the range of alternatives evaluated.
2. Alternatively, add additional analysis to justify why the potentially feasible range of alternatives were limited to two action alternatives.

Final Panel Comment 15

Although additional, site-specific geotechnical data will be collected during the PED phase of work, it is unclear how the data will be used to assess the static and dynamic stability of existing channel structures and modify their design if necessary.

Basis for Comment

Site-specific geotechnical data – blow count values, cone penetration test (CPT) values, moisture density relationships, grain size distribution, Atterberg limits, unconfined compressive strength, shear strength parameters, and consolidation characteristics of soils – are not available for most of the reaches of the four drainage channels (Appendix G, pp. 9-10; Table 3)**.** Appendix B corroborates the limited availability of geotechnical data (p. 12).

Most of the study area is underlain by liquefiable and compressible soils (fine-grained saturated sands and silts, peat, soft organic silts, and clays) (Appendix G, p. 8; Table 3). The proximity of the study area to the Newport-Inglewood Fault Zone (DIFR-DEIS/EIR, Figure 13, p. 28) can cause seismically induced liquefaction, settlement, slope instability, lateral spreading, and fault rupturing, resulting in both lateral and vertical displacements (DIFR-DEIS/EIR, p. 134; Appendix G, pp. 12-14). The DIFR-DEIS/EIR states (p. 134), “The design and construction of the channels would meet or exceed applicable design standards for static or dynamic stability and seismic ground shaking, thereby minimizing the potential for significant damage.” This objective cannot be accomplished where problematic soils are encountered without site-specific data. Furthermore, nearly half or more of the trapezoidal channel reaches have already been concrete-lined (Appendix H, Tables 2 and 3, Figures 4-30), and concrete lining of other channel reaches appears to be in progress.

The Panel understands USACE will collect additional geotechnical data during the planning, engineering, and design (PED) phase of work. The Panel also recognizes that it may not be feasible to design channel lining to resist liquefaction. However, the Panel is unclear about how additional, site-specific geotechnical data collected during the PED phase will be used to assess (1) whether or not the existing concrete lining has been designed to avoid hazards associated with problematic soils and potential seismic activity and (2) whether it meets or exceeds the design standards, as stated in the report, and (3) whether it complies with the California Seismic Hazards Mapping Act.

According to the DIFR-DEIS/EIR (p. 135), “Construction of any of the Action Alternatives would not be located on a geologic unit or soil that is unstable, therefore there would be no impacts.” The Panel is unable to understand this statement. Problematic or unstable soils are present at all depths and throughout the study area. The channel lining must follow channel configuration and must be placed on the soils comprising the channel walls and channel invert, unless the above statement implies that unstable soils will be replaced by better quality soils. It is also unclear what measures would be used to remediate the existing concrete lining that may be underlain by an unstable geologic unit or soil.

Like geotechnical property data, site-specific data on the depth of the groundwater table and its seasonal fluctuations are lacking. According to Appendix G (p. 6), the average depth of groundwater table in the study area is within 10 feet below the ground surface. Table 1 (DIFR-DEIS/EIR, pp. 26-27) shows water table depths ranging from 3 feet to more than 7 feet. The average channel depth ranges from 8 feet to 12 feet (USACE, response to Panel’s question). Since this depth exceeds the depth to water table, there is a definite potential for uplift pressure on the concrete lining, including inverts, for many channel reaches, especially if the water table rises during rainy periods. The shallow water table

Final Panel Comment 15

suggests the need to provide drainage to maintain stability of the concrete lining, including the existing lining. However, site-specific, groundwater-depth data collected over an extended period, including the rainy season, are needed to evaluate stability with respect to uplift pressure and for provision of drainage facilities. In the Panel's opinion, uplift pressure calculations should represent the worst possible conditions with respect to water table depth that could arise during the period of performance.

The Panel is uncertain if data on the effect of concrete lining of all trapezoidal channels on groundwater recharge will be collected during the PED phase. The Panel believes that the impact of channel mitigation measures on an already overdrawn aquifer needs to be investigated during the PED phase.

Significance – Medium/Low

Site-specific geotechnical and groundwater data collected during the PED phase will be essential to design channel structures to meet the design standards. However, it is not clear how these additional data will be used to modify the design of existing channel structures, if necessary, or to avoid their placement on unstable soils.

Recommendations for Resolution

1. Collect site-specific geotechnical and groundwater data during the PED phase to evaluate the static and dynamic stability of channel structures, including stability against uplift pressure.
2. Assess the need for providing drainage along channel reaches where the groundwater table is at shallow depth (just below or above the inverts) or has the potential to rise during the rainy season.
3. Clarify how the existing channel lining will be modified based on additional site-specific data, if necessary, so that it meets the design standards for static and dynamic stability as well as stability with respect to uplift pressure.
4. Clarify the methodology to be used to ascertain that the existing concrete lining is not placed on an unstable geologic unit or soil. Also, clarify the mitigation measures to be used if unstable geologic materials are found to underlie the current concrete lining during the PED phase.

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APPENDIX A

IEPR Process for the Westminster CA FS Project

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

Table A-1 presents the major milestones and deliverables of the Westminster CA FS IEPR. Due dates for milestones and deliverables are based on the award/effective date listed in Table A-1. The review documents were provided by U.S. Army Corps of Engineers (USACE) on October 23, 2018. Note that the actions 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 April 2, 2019. The actual date for contract end will depend on the date that all activities for this IEPR are conducted and subsequently completed.

Table A-1. Major Milestones and Deliverables of the Westminster CA FS IEPR

Task	Action	Due Date
1	Award/Effective Date	11/13/2018
	Review documents available	10/23/2018
	Public comments available	12/7/2018
	Battelle submits draft Work Plan[a]	11/26/2018
	USACE provides comments on draft Work Plan	12/3/2018
	Battelle submits final Work Plan[a]	12/6/2018
2	Battelle submits list of selected panel members[a]	12/3/2018
	USACE confirms the panel members have no COI	12/6/2018
3	Battelle convenes kick-off meeting with USACE	12/7/2018
	Battelle convenes kick-off meeting with panel members	12/13/2018
	Battelle convenes kick-off meeting with USACE and panel members	12/13/2018
4	Panel members complete their individual reviews	1/9/2019
	Panel members provide draft Final Panel Comments to Battelle	1/18/2019
	Battelle sends public comments to panel members for review	1/3/2019
	Panel confirms no additional Final Panel Comment is necessary with regard to the public comments	1/18/2019
	Panel finalizes Final Panel Comments	1/23/2019
5	Battelle submits Final IEPR Report to USACE[a]	2/4/2019
6[b]	Battelle convenes Comment Response Teleconference with panel members and USACE	3/15/2019
	Battelle submits pdf printout of DrChecks project file[a]	4/2/2019
	Agency Decision Milestone (ADM) meeting[c]	2/4/2019
	Contract End/Delivery Date	11/30/2019

[a] *Deliverable.*
[b] *Task 6 occurs after the submission of this report.*
[c] *The ADM meeting was listed in the Performance Work Statement under Task 3, but was relocated in this schedule to reflect the chronological order of activities.*

At the beginning of the Period of Performance for the Westminster CA FS 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., terminology to use, access to DrChecks, etc.). Any revisions to the schedule were submitted as part of the final Work Plan. The final charge consisted of 31 charge questions provided by USACE, two overview questions, and one public comment question added by Battelle (all questions were included in the draft and final Work Plans), and general guidance for the Panel on the conduct of the peer review (provided in Appendix C of this final report).

Prior to beginning their review and after their subcontracts were finalized, all the members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel. 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 review documents and reference/supplemental materials listed in Table A-2.

Table A-2. Documents to Be Reviewed and Provided as Reference/Supplemental Information

Review Documents	No. of Review Pages
Main Integrated Report and EIS	304
Appendix A: H&H	83
Appendix A: H&H Plates	20
Appendix B: Civil Engineering	230
Appendix C: Cost Engineering	74
Appendix D: Real Estate	40
Appendix E: Economics	66
Appendix F: HTRW	57
Appendix G: Geotechnical	141
Appendix G: Tunnel Addendum	2
Appendix H: Plan Formulation	44
Appendix I: General Conformity Analysis	17
Appendix J: Coordination	81
Appendix K: USFWS Planning Aid Letter	19

Table A-2. Documents to Be Reviewed and Provided as Reference/Supplemental Information (cont.)

Review Documents	No. of Review Pages
Appendix L: Environmental	112
Appendix M: Mitigation	22
Appendix N: Coastal Consistency Determination	34
Total Pages of Review Documents	**1346**
Supplemental Information [a]	
Public Comments [b]	100
Report Summary	71
TSP Slide Deck	34
Project "Placemat"	2
Total Pages of Supplemental Documents	**207**

[a] *Supporting documentation only. These documents are not for Panel review and should be used as information sources only. They are not included in the total page count.*
[b] *USACE will submit public comments to Battelle upon their availability according to the schedule in Table A-1. Battelle will in turn submit the comments to the IEPR Panel for review.*

In addition to the materials provided in Table A-2, the panel members were provided the following USACE guidance documents.

- USACE guidance, *Review Policy for Civil Works* (EC 1165-2-217), February 20, 2018
- Office of Management and Budget, *Final Information Quality Bulletin for Peer Review,* December 16, 2004.

About halfway through the review, Battelle submitted 55 panel member questions to USACE. USACE was able to provide written responses to all the questions prior to the end of the review.

In addition, in the process of the review, USACE provided a document at the request of panel members. This document was provided to Battelle and then sent to the Panel as additional information only and was not part of the official review. The additional document requested by the Panel is provided below.

- Westminster Feasibility Study, Preliminary Draft Baseline Conditions Report (May 2007).

A.2 Review of Individual Comments

The Panel was instructed to address the charge questions/discussion points within a charge question response form 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 into a preliminary list of overall comments and discussion points. Each panel member's individual comments were shared with the full Panel.

A.3 IEPR Panel Teleconference

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

A.4 Preparation of Final Panel Comments

Following the teleconference, Battelle distributed 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 Westminster CA FS 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 a summary email detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.

- Directive to the Lead: Each lead was encouraged to communicate directly with the other panel members as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.

- Format for Final Panel Comments: Each Final Panel Comment was presented as part of a four-part structure:
    1. Comment Statement (succinct summary statement of concern)
    2. Basis for Comment (details regarding the concern)
    3. Significance (high, medium/high, medium, medium/low, and low; see description below)
    4. Recommendation(s) for Resolution (see description below).

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

1. **High:** There is a fundamental issue within study documents or data that will influence the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
2. **Medium/High:** There is a fundamental issue within study documents or data that has a strong probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
3. **Medium:** There is a fundamental issue within study documents or data that has a low probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
4. **Medium/Low:** There is missing, incomplete, or inconsistent technical or scientific information that affects the clarity, understanding, or completeness of the study documents, and there is uncertainty whether the missing information will affect the selection of, justification of, or ability to implement the recommended plan.
5. **Low:** There is a minor technical or scientific discrepancy or inconsistency that affects the clarity, understanding, or completeness of the study documents but does not influence the selection of, justification of, or ability to implement the recommended plan.

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

Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. At the end of this process, 15 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 full text of the Final Panel Comments is presented in Section 4.2 of the main report.

A.5 Conduct of the Public Comment Review

Following the schedule in Table A-1, Battelle received a PDF file containing 92 pages of public comments on the Westminster CA FS (approximately 17 public comments and 10 State and Federal Agency comments) from USACE. Battelle then sent the public comments to the panel members in addition to the following charge question:

1. **Do the public comments raise any additional discipline-specific technical concerns with regard to the overall report?**

The Panel produced individual comments in response to the charge question. Each panel member's individual comments for the public comment review were shared with the full Panel. 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 issues or concerns were identified other than those already covered in the Final Panel Comments. However, the Panel noted that some of the issues raised in the public comments were similar to concerns raised in the IEPR Final Panel

Comments, particularly concerns about incorporating affects associated with climate change, concerns about the completeness of practicable alternatives and the alternatives analysis, and considerations regarding the requirements of the California Environmental Quality Act (CEQA).

A.6 Final IEPR Report

After concluding the review and preparation of the Final Panel Comments, Battelle prepared a final IEPR report (this document) on the overall IEPR process and the IEPR panel members' findings. Each panel member and Battelle technical and editorial reviewers reviewed the IEPR report prior to submission to USACE for acceptance.

A.7 Comment Response Process

As part of Task 6, Battelle will enter the 15 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.

APPENDIX B

Identification and Selection of IEPR Panel Members for the Westminster CA FS Project

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B.1 Panel Identification

The candidates for the Westminster, East Garden Grove, California, Flood Risk Management Feasibility Study (hereinafter: Westminster CA FS IEPR) Panel were evaluated based on their technical expertise in the following key areas: plan formulation/economics; environmental law compliance; hydrology and hydraulic (H&H) engineering; geotechnical engineering; and civil/cost engineering. These areas correspond to the technical content of the review documents and overall scope of the Westminster CA FS 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.

Candidates were screened for the following potential exclusion criteria or conflicts of interest (COIs). These COI questions were intended to serve as a means of disclosure in order to better characterize a candidate's employment history and background. Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. Guidance in OMB (2004, p. 18) states,

> "…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."

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the **Westminster CA FS**
1. Previous and/or current involvement by you or your firm in the Westminster - East Garden Grove, California, Flood Risk Management Feasibility Study (Westminster CA FS) and related projects.
2. Previous and/or current involvement by you or your firm in flood control and the Westminster, California area.
3. Previous and/or current involvement by you or your firm in the conceptual or actual design, construction, or operation and maintenance (O&M) of any projects in the Westminster CA FS related projects.
4. Current employment by the U.S. Army Corps of Engineers (USACE).

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the **Westminster CA FS**
5. Previous and/or current involvement with paid or unpaid expert testimony related to Westminster CA FS.
6. Previous and/or current employment or affiliation with members of the cooperating agencies or local sponsors OR the non-Federal sponsors or any of the following cooperating Federal, State, County, local and regional agencies, environmental organizations, and interested groups *(for pay or pro bono):* • Orange County Public Works • Orange County Flood Control District • California Department of Fish and Wildlife • Bolsa Chica Ecological Reserve • Bolsa Chica Conservancy • Amigos de Bolsa Chica • California State Lands Commission • Orange County Coastkeeper • Surfrider Foundation
7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to Westminster, California area.
8. Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, Engineer Research and Development Center [ERDC], etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Los Angeles District.
9. Previous or current involvement with the development or testing of models that will be used for, or in support of the Westminster CA FS project.
10. Current firm involvement with other USACE projects, specifically those projects/contracts that are with the Los Angeles 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 Los Angeles District. Please explain.
11. Any previous employment by USACE as a direct employee, notably if employment was with the Los Angeles District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
12. Any previous employment by USACE as a contractor (either as an individual or through your firm) within the last 10 years, notably if those projects/contracts are with the Los Angeles District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the **Westminster CA FS**
13. Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning flood management, and include the client/agency and duration of review (approximate dates).
14. Pending, current, or future financial interests in contracts/awards from USACE related to the Westminster CA FS project.
15. Significant portion of your personal or office's revenues within the last three years came from USACE contracts.
16. Significant portion of your personal or office's revenues within the last three years came from Orange County Public Works contracts.
17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to the Westminster CA FS project.
18. Participation in relevant prior and/or current Federal studies related to the Westminster CA FS project.
19. Previous and/or current participation in prior non-Federal studies related to the Westminster CA FS project.
20. Has your research or analysis been evaluated as part of the Westminster CA FS project?
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? If so, please describe.

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. The term "firm" in a screening question referred to any joint venture in which a firm was involved. It applied to whether that firm serves as a prime or as a subcontractor to a prime. Candidates were asked to clarify the relationship in the screening questions.

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. Table B-1 provides information on each panel member's affiliation, location, education, and overall years of experience. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. USACE was given the list of candidate panel members, but Battelle selected the final Panel.

Table B-1. Westminster CA FS IEPR Panel: Summary of Panel Members

Name	Affiliation	Location	Education	P.E.	Exp. (yrs)
Plan Formulation/Economics					
Marvin Feldman	Resource Decisions	San Francisco, CA	Ph.D., Natural Resource Economics	N/A	38
Environmental Law Compliance					
Lara Rachowicz	Ascent Environmental, Inc.	Berkeley, CA	Ph.D., Ecology	N/A	20
Hydrology and Hydraulic Engineering					
Felix Kristanovich	Ramboll	Seattle, WA	Ph.D., Civil Engineering	Yes	30+
Geotechnical Engineering					
Abdul Shakoor	Independent Consultant	Kent, OH	Ph.D., Engineering Geology	N/A	45+
Civil/Cost Engineering					
Michael Hartley	PND Engineers, Inc.	Seattle, WA	M.S., Civil/Geotechnical Engineering	Yes	39

Table B-2 presents an overview of the credentials of the final five members of the Panel and their qualifications in relation to the technical evaluation criteria. More detailed biographical information on the panel members and their areas of technical expertise is given in Section B.3.

Table B-2. Westminster CA FS IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Feldman	Rachowicz	Kristanovich	Shakoor	Hartley
Plan Formulation/Economist					
Minimum 15 years of demonstrated experience in economics, with a master's degree or higher in economics	X				
Familiarity with USACE plan formulation processes, procedures, and standards as they relate to flood risk management civil works projects	X				
Minimum 5 years of directly dealing with the USACE six-step panning process and policies, which are governed by ER 1105-2-100, Planning Guidance Notebook	X				

Table B-2. Westminster CA FS IEPR Panel: Technical Criteria and Areas of Expertise (cont.)

Technical Criterion	Feldman	Rachowicz	Kristanovich	Shakoor	Hartley
Experience related to regional economic development, and ability to evaluate traditional National Economic Development (NED) plan benefits associated with flood risk management projects	X				
Experience with analysis of demographics, land use, recreations analysis, flood damage assessments using USACE Engineering Center (HEC) economic modeling computer software, including HEC Flood Damage Analysis (FDA)	X				
Use of RECONS model to address regional economic development associated with a project; experience with other social effects (OSE) associated with flood risk, as well as a benefit from reduction in flood risk; and economic justification of projects in accordance with current USACE policy is preferred	X				
Environmental Law Compliance					
Minimum 15 years of experience directly related to water resource environmental evaluation or review		X			
Minimum Master's degree or higher in a related field		X			
At least 10 years of experience in evaluating and conducting National Environmental Policy Act (NEPA) impact assessments, including cumulative effects analyses for complex, multi-objective public works projects with competing trade-offs and environmental mitigation needs		X			
Familiarity and experience with United States Fish and Wildlife Service Habitat Evaluation Procedure (HEP) (USWFS, 1980), the Habitat Equivalency Analysis (HEA), Endangered Species Act (ESA), Clean Water Act, Marine Mammals Protection Act, and essential fish habitat (EFH)		X			
Active participation in related professional societies is encouraged		X			
Hydrology and Hydraulics Geologist					
Minimum 15 years of experience in hydrologic and hydraulic engineering			X		
Experience with all aspects of hydrology and hydraulic engineering with an emphasis on flood risk management projects			X		
Proficiency in USACE or equivalent type of models including the Hydraulic Engineering Center River Analysis System (HECRAS), GEO-RAS, HEC-HMS, and FLO-2D and associated one-dimensional models, floodplain mapping, hydrologic statistics, sediment transport analysis, levees and floodwalls, channel stability analysis, risk and uncertainty analysis, non-structural solutions, and a number of other closely associated technical subjects			X		

Table B-2. Westminster CA FS IEPR Panel: Technical Criteria and Areas of Expertise (cont.)

Technical Criterion	Feldman	Rachowicz	Kristanovich	Shakoor	Hartley
Geotechnical Engineer					
Registered professional engineer (waived by USACE due to years of experience)				X	
Minimum of 10 years of experience in geotechnical engineering				X	
Master's degree or higher in engineering				X	
Experience in foundation investigations for various management measures associated with flood risk management, or related projects				X	
Familiarity with sampling and laboratory testing, embankment stability and seepage analyses, planning analysis, and a number of other closely associated technical subjects				X	
Civil/Cost Engineer					
Registered professional engineer					X
Minimum of 10 years of experience in civil engineering with an emphasis on design of large civil works projects as well as non-structural flood risk management measures, or a professor from academia with a master's degree or higher in engineering					X
Must have experience in designing grading plans and levees, levee stability, levee and bank projection removal or modification, along with culvert design and modifications					X

B.3 Panel Member Qualifications

Detailed biographical information on each panel members' credentials and qualifications and areas of technical expertise are summarized in the following paragraphs.

Name	**Marvin Feldman, Ph.D.**
Role	**Plan Formulation/Economist**
Affiliation	**Resource Decisions**

Dr. Feldman, an independent consultant and principal economist at Resource Decisions, has more than 38 years of experience in water resource and environmental economics. He earned an M.S. in water resource management in 1969 and a Ph.D. in natural resource economics in 1979 from the University of Wisconsin.

Dr. Feldman is experienced in the evaluation and conduct of complex multi-objective public works projects with high public and interagency interests, including flood risk analysis. As a senior economist at Dames & Moore under contract to the U.S. Department of Energy, he worked on developing a multi-attributable site selection model for evaluating risks of alternative sites for the Preliminary Nevada Highlevel Nuclear Waste Siting Analysis. For the Smith Lake Improvement and Stakeholder Association (SLISA), Alabama, he provided economic evaluation of alternative costs and benefits of municipal and industrial, navigation, recreation, and hydroelectric water uses and non-power evaluations for recreation, property values flood control, navigation, and erosion control to support SLISA's negotiations with the Federal Energy Regulatory Commission and Alabama Power. For the Alaska Department of Natural Resources, he applied risk/cost/benefit analysis to environmental protection methods for petroleum exploration in the Beaufort Sea. As a member of IEPR teams (under contract to Battelle), he reviewed flood Civil Works planning and economic issues related to the Ala Wai Canal in Hawaii, Mamaroneck River in Connecticut, and Moose Creek in Alaska. Dr. Feldman is familiar with the USACE plan formulation process, procedures, and standards as they relate to flood risk management and has more than 10 years of demonstrable experience dealing directly with the USACE Six-Step Planning Process, governed by Engineer Regulation (ER) 1105-2-100, Planning Guidance Notebook. Most notably, he applied the Six-Step Process to his work on the USACE/Bureau of Reclamation Central Arizona Water Control Study.

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

Dr. Feldman has a strong working knowledge of USACE economic benefit calculations. Throughout his career, he has conducted studies requiring economic benefit analysis for flood risk management. For example, he evaluated the state-of-the-art municipal and industrial water conservation benefit evaluation techniques for the California Urban Water Conservation Council (CUWCC) and identified promising methods for application by CUWCC member water agencies in evaluating their conservation options. His advanced expertise and extensive experience in flood damage analysis and risk and decision analysis is reflected in his work on such studies as the Smith Lake-Black Warrior River (Alabama) benefit-cost analysis of lake levels, studies of cost-benefit tradeoffs for the North Fork of the Feather River (Pacific Gas and Electric, California), and an economic analysis of agricultural diversion alternatives for the Glenn-Colusa Irrigation District (California).

Dr. Feldman has worked with numerous socioeconomic impact models including IMPLAN and REMI as well as the earlier RIMS models. He has completed projects utilizing socioeconomic impact models for oil

and gas companies, the California Environmental Protection Agency, and the Alaska Power Authority. He is generally familiar with the RECONS model.

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

Name	**Lara Rachowicz, Ph.D.**
Role	**Environmental Law Compliance**
Affiliation	**Ascent Environmental, Inc.**

Dr. Lara Rachowicz, a consultant at Ascent Environmental, Inc., holds a Ph.D. in ecology from the Department of Integrative Biology at the University of California, Berkeley. She has 20 years of technical and project management experience in ecology throughout California. As an environmental consultant, she manages and supports the preparation of Environmental Impact Statements (EISs), Environmental Impact Reports (EIRs), and other environmental documents required under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) for large infrastructure projects and resource management programs. She evaluates environmental impacts and plans mitigation and monitoring programs; supports project permitting under the Endangered Species Act (ESA) and Clean Water Act (CWA), and the negotiation of mitigation agreements; and manages construction, compliance, and mitigation activities. She also has experience in the Migratory Bird Treaty Act, Marine Mammal Protection Act, and the Magnusson-Stevens Fishery Conservation and Management Act for designated Essential Fish Habitat. Dr. Rachowicz has been involved with the Ecological Society of America and the Declining Amphibian Populations Task Force, and has given several presentations about her research at meetings of these professional organizations. She is also involved with the Association of Environmental Professionals (AEP), and she regularly attends professional trainings about CEQA, NEPA, state and Federal Endangered Species Act, and Clean Water Act updates.

Dr. Rachowicz manages and provides senior technical reviews and quality assurance of NEPA and CEQA documents and environmental permit applications. She works on proposed energy infrastructure projects (e.g., electrical transmission systems, pipeline facilities, and renewable energy facilities), transportation infrastructure projects (e.g., rail facilities), and resource management programs (e.g., restoration of aquatic ecosystems, fire fuel management programs). Ascent Environmental, Inc. is currently preparing a CEQA/NEPA document and environmental permit applications for geotechnical investigations for the California High-Speed Rail San Jose to Merced Project Section. Dr. Rachowicz recently conducted a senior technical review of the biological resource analysis section, which evaluated impacts from activities on a variety of sensitive resources in the greenfield area of Pacheco Pass, including within critical habitat designated under the ESA. She developed a mitigation strategy to reduce impacts on sensitive species, including California red-legged frog and California tiger salamander, in

support of the project's ESA compliance, and wrote an associated Biological Assessment for submittal to the U.S. Fish and Wildlife Service (USFWS). She also provided permitting support for compliance with the Clean Water Act for impacts to waters of the U.S.

For four years, Dr. Rachowicz served as the project manager of a third-party EIR for a natural gas turbine replacement project on behalf of the California Public Utilities Commission (CPUC), which involved the installation of new electric-driven compressors, a new compressor station, a new substation, over 25 miles of new fiber optic cable, and replacement of more than eight miles of existing transmission line in southern California. For this multijurisdictional project, she managed oversight of the Southern California Gas Company's and Southern California Edison's compliance with Final EIR mitigation commitments during project construction. She ensured that all conditions of approval were met through her proactive approach in coordinating with the utilities and regulatory agencies (e.g., USFWS, CDFW). Through her detailed and persistent management of the Mitigation Monitoring and Reporting Program, she assisted the CPUC in fulfilling its responsibility of holding project applicants to a high standard of compliance. In addition, she provided a senior technical review of the biological resources section of the EIR and helped develop mitigation measures to reduce impacts on golden eagles, sensitive riparian vegetation, coastal California gnatcatchers, and USFWS-designated critical habitat for coastal California gnatcatchers

Dr. Rachowicz served as deputy project manager and senior ecologist of a third-party CEQA environmental document on behalf of the CPUC, which involved the proposed construction of an approximately 45-mile-long natural gas pipeline in southern California. She worked closely with the lead agency to ensure document compliance with NEPA and CEQA and served as an effective liaison to other permitting agencies for this controversial project, including USACE, USFWS, and United States Marine Corps. She oversaw a large group of technical experts from multiple disciplines, supervised the alternatives and cumulative analysis, developed a template for the document that incorporated NEPA and CEQA requirements, provided QA/QC review of the biological resources section, and worked with an engineering team to develop the CEQA objectives. Her attention to detail and understanding of NEPA and CEQA requirements helped develop a comprehensive draft document that contained a legally defensible environmental analysis, on behalf of the CPUC.

Dr. Rachowicz was the lead biologist on several other third-party EIRs for large energy infrastructure projects on behalf of the CPUC in southern California and California's central valley. These biological impacts analyses required extensive coordination with CDFW, USFWS, and the National Marine Fisheries Service. She collaborated with these agencies to develop feasible mitigation measures and strategies to reduce potential impacts on several special-status species, including the Federally endangered southern California steelhead distinct population segment, Federally threatened coastal California gnatcatcher. Dr. Rachowicz and several colleagues from the University of California-Berkeley assisted in the development of a population model for the southern San Joaquin River fall-run chinook salmon. The team summarized, evaluated, and analyzed field data and constructed and calibrated a salmon population model used to evaluate the efficacy of salmon management strategies.

In addition to her environmental consulting work, Dr. Rachowicz's research and Federal resource management experience has focused on threats to vulnerable wildlife populations, primarily amphibian and avian species. Her Ph.D. research focused on the epidemiology and ecology of an infectious chytrid fungus on threatened frogs in California's Sierra Nevada. In addition, she evaluated at-sea sampling regimes for an endangered seabird, the marbled murrelet.

With the National Park Service (NPS), Dr. Rachowicz was the lead manager and biologist responsible for overseeing the monitoring of regionally significant water bird populations on Alcatraz Island, including populations of western gull, California gull, Brandt's cormorant, pelagic cormorant, pigeon guillemot, snowy egret, and black-crowned night heron. Lara contributed to the NPS NEPA process by evaluating actions and projects whose proponents were seeking a Categorical Exclusion, developing natural resource guidance for projects with a Categorical Exclusion, and monitoring projects to assure compliance with the guidelines. She assisted the NPS in maintaining compliance with the Federal ESA, Migratory Bird Treaty Act, Marine Mammal Protection Act, and Magnusson-Stevens Fishery Conservation and Management Act for designated essential fish habitat. She also developed and implemented guidelines to restrict visitor and staff access to priority bird nesting areas, as well as to remove bird nests in priority visitor areas, initiated and developed research priorities and proposals, and developed and provided training for citizen science and docent programs.

As an Aquatic Ecologist with NPS, Dr. Rachowicz was the lead biologist and manager responsible for the aquatic ecosystem monitoring and restoration program in Yosemite National Park. The program focused on amphibians, including the mountain yellow-legged frog, foothill yellow-legged frog, Pacific tree frog, and Yosemite toad. Responsible for initiating the park's NEPA process for an aquatic ecosystem plan that focused on the protection and restoration of threatened and endangered amphibian species, she managed the scoping and alternative development processes, supervised field technicians, supervised the removal of non-native amphibian species, and prepared publications and grant proposals.

Name	**Felix Kristanovich, Ph.D., P.E., CFM**
Role	**Hydrology and Hydraulics Engineer**
Affiliation	**Ramboll**

Dr. Felix Kristanovich has 30 years of experience in hydrologic and hydraulic engineering, including flood risk management and numerical modeling. He holds a Ph.D. in civil engineering from Louisiana State University and an M.S. from CALTECH. He is a registered professional civil engineer (civil) (P.E.) in California, Oregon, Washington, Idaho, and Alaska, and a certified floodplain manager (CFM).

A senior water resources engineer, Dr. Kristanovich has extensive experience in hydraulic, hydrologic, and water quality engineering. He is expert in developing models for watersheds and streamflow systems and sediment transport. He has broad expertise in the use of:

- Hydrologic models developed by USACE: HEC-HMS, its GIS support tool GeoHMS, its predecessor HEC-1, Watershed Analysis Tool (HEC-WAT), and HEC-ResSim
- Hydrologic models developed by other agencies: HSPF (EPA and USGS), SWAT, SWMM (EPA), MIKE11
- Hydraulic and sediment transport models developed by USACE: HEC-RAS, its predecessors HEC-2, HEC-6 (1-dimensional sediment transport model), GIS support tool Geo-HECRAS, reservoir system simulation tool HEC-Res-Sim, and real time simulation tool (HEC-RTS)
- Floodplain mapping -based models, including HEC-RAS (2-dimensional), SRH-2D, FLO-2D models

- Sediment transport analysis models: HEC-RAS and HEC-6 models, RMA/SED-2D models, EFDC sediment transport/water quality model, CEQUAL-W2 reservoir/sediment transport model
- Hydrologic statistical evaluations using USGS NSS (National Streamflow Statistics) and its online version StreamStats; flood frequency analysis using PeakFQ tool; and VB programming in Excel for customized applications
- Engineering design using USACE Engineer Manual EM 1110-2-1601, Hydraulic Design of Flood Control Channels, to assess (a) channel stability analysis and riprap protection design and (b) hydraulic design of flood protection walls, levees, and in-stream hydraulic structures
- Design of biotechnical protection using bioengineering methods (with vegetation) to stabilize slopes and enhance in-stream fish habitat (i.e., using Washington Department Fish of Wildlife Integrated Stream Protection Guidelines, and USACE guidelines for installation of Engineering Log Jams in river systems)
- Design of shoreline protection structures using Coastal Engineering Design Analysis Software (CEDAS), including application of ACES, DYNLET, NEMOS, SBEACH, GENESIS, RCPWAVE, and SPWAVE. He has designed shoreline protection against wind waves, ship waves, and river currents.

Dr. Kristanovich has managed or led streamflow restoration projects in the Pacific Northwest and California and has conducted numerous hydrologic evaluations of watersheds and streamflow systems in the United States and overseas. He has also incorporated impacts of changing climate in hydrologic modeling of high-elevation watersheds by modeling the effects of changed temperature, precipitation, and other meteorological variables on snowmelt and glacier runoff, as in a hydrologic study of the River Rioni watershed in the Republic of Georgia. He has conducted modeling work on numerous streamflow restoration projects (Skagit River Delta, Nisqually Wildlife Refuge, Chinook River/Estuary, Black River, and Goldsborough Creek in Washington) and numerous wetland mitigation sites and rivers in California. He has performed flood insurance studies for FEMA via LOMR, CLOMR, and LOMA processes, and prepared dam design documents in compliance with the Department of Ecology Dam Safety.

As a coastal engineer, Dr. Kristanovich has assessed dredging and hydraulic modeling at numerous international ports: construction of a port in Dhamra, India, port expansion and relocation at Port of Poti on the Black Sea (Republic of Georgia), and dredging and modeling at several Brazilian ports. Using CEDAS software, he has designed shoreline protection against wind-waves, ship-waves and river currents on the Columbia and Willamette rivers, and along shorelines at different Puget Sound harbors. He has also evaluated and provided calculations to estimate flooding risk under different sea level rising scenarios for City of Ventura in Ventura County, California.

Dr. Kristanovich is actively involved in the American Water Resources Association (AWRA). He helped organized the 2005 and 2009 AWRA national conferences in Seattle, the 2013 conference in Portland, Oregon, and numerous AWRA-Washington conferences in Washington State. He has organized several professional award events and served as Acting Secretary, Acting Treasurer, and the President of the AWRA Washington State Section. Dr. Kristanovich is a member of the Seattle Section of the American Society of Civil Engineers and of the Northwest Regional Floodplain Manager Association.

Name	**Abdul Shakoor, Ph.D., P.G., CPG**
Role	**Geotechnical Engineer**
Affiliation	**Independent Consultant**

Dr. Shakoor is an emeritus professor of engineering geology at Kent State University and an independent consultant. He earned a Ph.D. in engineering geology from Purdue University in 1982. He is a registered professional geologist (P.G.) in Pennsylvania and a certified professional geologist (CPG.) by the American Institute of Professional Geologists. He has more than 45 years of academic and practical experience in physical geology, structural geology, engineering geology, environmental geology, soil mechanics, rock mechanics, rock slope stability, foundation engineering, geohydrology, and remote sensing.

Dr. Shakoor's primary research focuses on the engineering behavior of weak rocks (shales, claystones, mudstones, etc.), stability of slopes in both soils and rocks, evaluation of construction materials, influence of geologic characteristics on engineering properties/behavior of soils and rocks, and environmental hazards such as lakeshore erosion, mine subsidence, and structural damage due to expansive soils and blasting operations. His research in these areas involves extensive field and laboratory studies with a number of his research projects regularly conducted in collaboration with local engineering firms or government organizations, such as the Ohio Department of Transportation, state geological surveys, the National Park Service, and the US Environmental Protection Agency. Since his advanced engineering geology course focuses on rock mass classification systems, dams, and tunnels, he is very familiar with dam hydraulics, failure mode analysis, risk assessment, risk reduction measures, empirical methods for evaluating erodibility of soils and rocks, especially spillway erodibility, drilling and logging techniques, and pressure testing. He is well versed in rock and soil property use for evaluating their erodibility potential.

Dr. Shakoor is familiar with all applicable USACE guidance criteria, including USACE dam safety guidance and procedures. He is familiar with the probability-based analysis currently used by USACE and has working knowledge of all applicable USACE design criteria and related documents. Having served as an engineering geology expert on IEPR panels for the Dover, Bolivar, and Mohawk Dams (Ohio), Zoar Levee and Diversion Dam (Ohio), Bluestone Dam (West Virginia), the Lake Isabella Dam (California), the Center Hill Dam (Tennessee), and the Joe Pool Dam (Texas), he has gained considerable experience in failure mode analysis (embankment and foundation), risk assessment of spillway, risk assessment for embankment dams and levees, and the evaluation of risk reduction measures for dam safety projects.

He is very familiar with empirical and one-dimensional (1D) spillway erosion techniques, calculation of material strength values (Headcut Erodibility Index), exploration techniques, and in-situ and laboratory rock and soil testing. Examples include reviews of Lake Isabella and Bluestone dams. Dr. Shakoor is familiar with empirical methodologies (streampower vs. erodibility index), 1D (SITES, WINDAMB), and case studies related to erosion of materials at spillways. He is proficient in calculating erodibility index values for rock and soil from field, drilling, and laboratory testing results that relate to rock (rock strength, RQD measurements, rock joint description and orientation) and soil (blow counts, gradations, plasticity data). He evaluated and conducted similar work for Lake Isabella and Bluestone dams. Dr. Shakoor is thoroughly familiar with rock and soil drilling techniques, as well as pressure testing and downhole camera-geophysical techniques. He teaches these techniques in several of his courses (engineering geology, advanced engineering geology, and rock slope stability).

Name	Michael Hartley, M.S., P.E.
Role	Civil/Cost Engineer
Affiliation	PND Engineers, Inc.

Mr. Hartley is a past senior vice president of PND Engineers, Inc. and currently provides consulting services as a senior civil and geotechnical engineer through PND Engineers, Inc. He earned an A.A. degree in surveying technology in 1973 and an M.S. in civil engineering specializing in geotechnical engineering in 1979. He is a registered professional engineer in Washington and Alaska. Mr. Hartley has 39 years of experience in civil, structural, coastal, and geotechnical engineering services for projects throughout the United States and internationally in Russia, Iraq, Canada, Brazil, and Panama. His geotechnical civil and geotechnical engineering experience includes reconnaissance, studies, and design for marine infrastructure, levees, dams, buildings, roads, trails, bridges, breakwaters, and dredging projects. Mr. Hartley has also served as an expert witness and is recognized in Federal court as an expert in civil, coastal, and geotechnical engineering.

Mr. Hartley is knowledgeable and experienced in the analysis, design, and construction of embankment dams and levees, including rehabilitation of these structures. Since 1979 he has been active in the evaluation of seepage and piping potential failures modes in the foundations of embankment dams and levees. He has knowledge and experience in the evaluation of backward erosion piping (BEP) potential failure modes in the foundations of embankment dams and levees, and in the development, design, and construction remediation alternatives for correcting BEP issues. Studies have involved many intermediate and high head earth fill dams and levees.

Mr. Hartley has performed many dam safety inspections for cities, counties, boroughs, and government agencies meeting the requirements of Federal Energy Regulatory Commission (FERC), and the State of Alaska Dam Safety Division of Department of Natural Resources requirements in Alaska and the Department of Ecology requirements in Washington State. He has also performed dam design or rehabilitation assessment for concrete gravity, concrete arch, earth dams and levees, and tailings dams. This has included many challenging projects such as the design of a 1,000-foot-long, 30-foot head earth fill dam and 1.5 miles of stream diversion adjacent to a 350-foot open pit mine. The dam was constructed in temperatures down to -30 degrees Fahrenheit. He previously served as a senior geotechnical engineer responsible for quality assurance, oversight, and training of personnel in flow net, seepage, and piping analysis at PND and provided training for culvert design and dam safety evaluation. He recently assisted in quality assurance (QA) for slope stability, piping, and seepage analysis, and recommended a geotechnical monitoring plan in the design of three football-size cofferdams constructed in New Orleans for the Permanent Canal Closures and Pumps project (PCCP) using USACE guidelines. He also recently conducted civil and geotechnical peer reviews for Zoar Levee, Dover Dam in Ohio, and Moose Creek Dam in Alaska that also included evaluation of BEP for the Huntington District.

Mr. Hartley is experienced in the development, design, and construction of remediation alternatives for correcting seepage and piping issues and has evaluated various dam and levee structures for remediation using hydromax panels, clay cores, sheetpile, and other techniques to mitigate piping and seepage issues. He has served on numerous panels as a geotechnical engineer expert involving large high-head dams, performing peer review of proposed seepage corrections. Relevant design modifications include Campbell Lake Dam safety studies and design of rehabilitation measures using sheetpile. He is

experienced in both failure mode analysis and risk assessment of embankment dams and using risk-based procedures, most recently having reviewed the risk assessment for levees in Mt. Vernon and Burlington. He evaluated the procedures used by two separate geotechnical firms for levee stability assessments as part of the USACE Skagit River, Washington IEPR.

Mr. Hartley has experience in the evaluation of risk reduction measures for dam safety assurance projects, reflected in his efforts in support of USACE IEPR dam safety assurance projects for the Dover, Bluestone, and Bolivar Dams, as well as other construction-phase review services. He has testified in Federal court on risk-based assessment analysis and is very familiar with probabilistic methods of geotechnical assessment of levees, recently performing an IEPR review for the Skagit river levee system in Washington State. Other relevant projects include Sherwood Estates Dam, Squaw Harbor Dam, Lyon Lake Dam, Upper Petersburg Creek Dam, Cabin Creek Dam, Campbell Lake Dam, Valdez Creek Dam, Moose Creek Dam and levee assessment for Skagit County. He is very familiar with USACE dam safety guidance and has used USACE publications in the design, risk-based assessment, and review of flood control dam and levee reviews and cofferdam design. For example, he has worked on USACE peer reviews of the Backslope Armoring Manual for the New Orleans District and the recently completed cofferdam design for the PCCP project for USACE New Orleans District. He is also familiar with all applicable USACE design criteria and USACE engineering manuals and has used these in the design of projects and in the peer review of designs by others. Examples include the West Bank Levee designs peer review for WBV 12, 14f.2, and 18 levees, and the geotechnical design analysis QA analysis and geotechnical monitoring plan development for the PCCP cofferdams in New Orleans.

Mr. Hartley has extensive design experience in developing construction costs, construction methods, sequencing, and schedules for dams, levees, rural and urban roads and highways, airports, and bridges. The following projects demonstrate this experience. He provided geotechnical, civil design, and cost engineering for the DeLong Mountain Regional Transportation System with more than 50 miles of road design in ice-rich to massive permafrost. He participated in the concept study development of a $1.8 billion project for the San Francisco Airport Authority. He was Principal-in-Charge, Project Manager, and lead civil and geotechnical engineer for a $50 million expansion of road infrastructure, parking, marina modifications, and a cruise ship terminal in Ketchikan, Alaska. He was Project Manager and lead civil designer for 11 miles of road rehabilitation and geotechnical engineer for 45 miles of road rehabilitation design of the Dalton Highway in Alaska for the Alaska Department of Transportation. He was responsible for road design, road decommissioning, and fish passage structure design at hundreds of projects in Washington, Oregon, California, and Alaska as part of many indefinite delivery contracts for the USDA Forest Service. He was also involved in evaluating constructability issues for a proposed $44 million port facility at the Umm Qasr Naval Base in Iraq as part of a design-build project for USACE. Finally, he has been the lead designer on many bank erosion and stabilization projects, including emergency designs following bank failures.

APPENDIX C

Final Charge for the Westminster CA FS IEPR

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Charge Questions and Guidance to the Panel Members for the Independent External Peer Review (IEPR) of the Westminster, East Garden Grove, California, Flood Risk Management Feasibility Study

This is the final Charge to the Panel for the Westminster CA FS IEPR. This final Charge was submitted to USACE as part of the final Work Plan, originally submitted on December 6, 2018. The dates and page counts in this document have not been updated to match actual changes made throughout the project.

BACKGROUND

The project is a General Investigations study undertaken to evaluate structural and non-structural Flood Risk Management (FRM) measures to reduce the risk of flooding in the Westminster Watershed. The Westminster feasibility study is being conducted in accordance with the study resolution adopted by the Committee on Public Works, House of Representatives on May 8, 1964, which reads as follows:

> "Resolved by the Committee on Public Works of the House of Representatives, United States, that the Board of Engineers for Rivers and Harbors is hereby requested to review the reports on (a) San Gabriel River and Tributaries, published as House Document No. 838, 76th Congress, 3d Session; (b) Santa Ana River and Tributaries, published as House Document No. 135, 81st Congress, 1st Session; and (c) the project authorized by the Flood Control Act of 1936 for the protection of the metropolitan area in Orange County, with a view to determining the advisability of modification of the authorized projects in the interest of flood control and related purposes."

The study has been re-scoped for completion in accordance with the SMART Planning Paradigm. The Alternatives Milestone was completed in February 2014. The Tentatively Selected Plan (TSP) milestone was completed in July 2018. The non-Federal sponsor for the study is Orange County Public Works (OCPW). The study area is contained within the Westminster Watershed in western Orange County, California. The watershed is approximately 74 square miles and lies on a flat coastal plain that is almost entirely urbanized. Cities in the watershed include Anaheim, Stanton, Cypress, Garden Grove, Westminster, Fountain Valley, Los Alamitos, Seal Beach, and Huntington Beach. The watershed is part of the former floodplain of the Santa Ana River (SAR), which historically meandered throughout the Westminster Watershed as far north as Anaheim Bay to as far south as Newport Bay. Channelization and large-scale flood control improvements have constrained the Santa Ana River to the main stem channel on the eastern border of the Westminster Watershed.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Westminster, East Garden Grove, California, Flood Risk Management Feasibility Study (hereinafter: Westminster CA FS IEPR) in accordance with the Department of the Army, U.S. Army Corps of Engineers (USACE), Water Resources Policies and Authorities' *Review Policy for Civil Works* (Engineer Circular [EC] 1165-2-217, dated February 20, 2018), and the Office of Management and Budget's (OMB'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 and environmental assumptions and projections, project evaluation data, economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in evaluation of economic or environmental impacts, and any biological opinions" (EC 1165-2-217; p. 39) for the decision 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) who meet the technical criteria and areas of expertise required for and relevant to the project.

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 1165-2-217 (p.41), 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. The review assignments for the panel members may vary slightly according to discipline.

Review Documents	No. of Review Pages	Subject Matter Experts				
		Plan Formulation/ Economist	Environmental Law Compliance	H&H Engineer	Geotechnical Engineer	Civil/ Cost Engineer
Main Integrated Report and EIS	304	304	304	304	304	304
Appendix A: H&H	83			83		
Appendix A: H&H Plates	20			20		
Appendix B: Civil Engineering	230					230
Appendix C: Cost Engineering	74	74				74
Appendix D: Real Estate	40	40	40			
Appendix E: Economics	66	66				
Appendix F: HTRW	57		57		57	57
Appendix G: Geotechnical	141				141	
Appendix G: Tunnel Addendum	2				2	
Appendix H: Plan Formulation	44	44	44	44	44	44
Appendix I: General Conformity Analysis	17		17			

Review Documents	No. of Review Pages	Subject Matter Experts				
		Plan Formulation/ Economist	Environmental Law Compliance	H&H Engineer	Geotechnical Engineer	Civil/ Cost Engineer
Appendix J: Coordination	81		81			
Appendix K: USFWS Planning Aid Letter	19		19			
Appendix L: Environmental	112		112			
Appendix M: Mitigation	22	22	22	22	22	22
Appendix N: Coastal Consistency Determination	34		34			
Total Pages of Review Documents	**1346**	**550**	**730**	**473**	**570**	**731**
Supplemental Information						
Public Comments[a]	100	100	100	100	100	100
Report Summary	71	71	71	71	71	71
TSP Slide Deck	34	34	34	34	34	34
Project "Placemat"	2	2	2	2	2	2
Total Pages of Supplemental Documents	**207**	**207**	**207**	**207**	**207**	**207**

[a] USACE will provide public comments to Battelle who will in turn send them to the IEPR Panel.

Documents for Reference

- USACE guidance *Review Policy for Civil Works* (EC 1165-2-217, February 20, 2018)
- USACE guidance Engineering and Design, DrChecks (ER 1110-1-8159, May 10, 2011)
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (Memorandum M-05-03, December 16, 2004)
- Foundations of SMART Planning
- Feasibility Study Milestones (PB 2017-01)
- SMART – Planning Overview
- Planning Modernization Fact Sheet.

SCHEDULE & DELIVERABLES

This schedule may change due to circumstances out of Battelle's control such as changes to USACE's project schedule and unforeseen changes to panel member and USACE availability. As part of each task, the panel member will prepare deliverables by the dates indicated in the table (or as directed by Battelle). All deliverables will be submitted in an electronic format compatible with MS Word (Office 2003).

Task	Action	Due Date
Attend Meetings and Begin Peer Review	Subcontractors complete mandatory Operations Security (OPSEC) training	1/12/2019
	Battelle sends review documents to panel members	12/14/2018
	Battelle convenes kick-off meeting with panel members	12/14/2018
	Battelle convenes kick-off meeting with USACE and panel members	12/14/2018
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	12/27/2018
Prepare Final Panel Comments and Review Public Comments	Panel members complete their individual reviews	1/9/2019
	Battelle provides talking points for Panel Review Teleconference to panel members	1/10/2019
	Battelle convenes Panel Review Teleconference	1/11/2019
	Battelle provides Final Panel Comment templates and instructions to panel members	1/11/2019
	Panel members provide draft Final Panel Comments to Battelle	1/18/2019
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	1/19/2019-1/28/2019
	Panel finalizes Final Panel Comments	1/29/2019
Prepare Final Panel Comments and Review Public Comments	Battelle receives public comments from USACE	12/7/2018
	Battelle sends public comments to Panel	1/10/2019
	Panel completes its review of public comments	1/15/2019
	Battelle and Panel review the Panel's responses to the charge question regarding the public comments	1/16/2019
	Panel drafts Final Panel Comment for public comments, if necessary	1/24/2019
	Panel finalizes Final Panel Comment regarding public comments, if necessary	1/28/2019
Review Final IEPR Report	Battelle provides Final IEPR Report to panel members for review	1/30/2019
	Panel members provide comments on Final IEPR Report	1/31/2019
	***Battelle submits Final IEPR Report to USACE**	**2/4/2019**
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	2/11/2019
Comment/Response Process	Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	2/13/2019
	Battelle convenes teleconference with USACE to review the Comment Response process	2/13/2019
	Battelle convenes teleconference with Panel to review the Comment Response process	2/13/2019
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	2/28/2019

Task	Action	Due Date
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	3/6/2019
	USACE PCX provides draft PDT Evaluator Responses to Battelle	3/7/2019
	Battelle provides draft PDT Evaluator Responses to panel members	3/11/2019
	Panel members provide draft BackCheck Responses to Battelle	3/14/2019
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	3/15/2019
	Battelle convenes Comment Response Teleconference with panel members and USACE	3/18/2019
	USACE inputs final PDT Evaluator Responses to DrChecks	3/25/2019
	Battelle provides final PDT Evaluator Responses to panel members	3/26/2019
	Panel members provide final BackCheck Responses to Battelle	3/29/2019
	Battelle inputs panel members' final BackCheck Responses to DrChecks	4/1/2019
	*Battelle submits pdf printout of DrChecks project file	4/2/2019
ADM	Agency Decision Milestone (ADM) Meeting	1/31/2019
	Contract End/Delivery Date	11/30/2019

* Deliverables

** Battelle will provide public comments to panel members after they have completed their individual reviews of the project documents to ensure that the public comment review does not bias the Panel's review of the project documents.

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the decision 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 decision documents. Please focus your review on the review materials assigned to your discipline/area of expertise and technical knowledge. Some sections have no questions associated with them; however, you may still 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 that the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-217).

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 (Jonathan Koplos; koplos@battelle.org) or Program Manager (Lynn McLeod; mcleod@battelle.org) for requests or additional information.
3. In case of media contact, notify the Battelle Program Manager, Lynn McLeod (mcleod@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 the Project Manager, no later than 10 pm ET by the date listed in the schedule above.

Independent External Peer Review of the Westminster, East Garden Grove, California, Flood Risk Management Feasibility Study

Charge Questions and Relevant Sections as Supplied by USACE

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

The objective of the IEPR is to obtain an independent evaluation of whether the interpretations of analysis and conclusions based on analysis are reasonable for the subject study. The IEPR panel is requested to offer a broad evaluation of the overall study decision document in addition to addressing the specific technical and scientific questions included in the charge. The Panel has the flexibility to bring important issues to the attention of decision makers, including positive feedback or issues outside those specific areas outlined in the charge.

The panel review is to focus on scientific and technical matters, leaving policy determinations for USACE and the Army. The Panel should not make recommendations on whether a particular alternative should be implemented or present findings that become “directives” in that they call for modifications or additional studies or suggest new conclusions and recommendations. In such circumstances the Panel may have assumed the role of advisors as well as reviewers, thus introducing bias and potential conflict in their ability to provide objective review.

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

Broad Evaluation Charge Questions

1. Is the need for and intent of the decision document clearly stated?

2. Does the decision document adequately address the stated need and intent relative to scientific and technical information?

Given the need for and intent of the decision document, assess the adequacy and acceptability of the following:

3. Project evaluation data used in the study analyses

4. Economic, environmental, and engineering assumptions that underlie the study analyses

5. Economic, environmental, and engineering methodologies, analyses, and projections

6. Models used in the evaluation of existing and future without-project conditions and of economic or environmental impacts of alternatives

7. Methods for integrating risk and uncertainty

8. Formulation of alternative plans and the range of alternative plans considered

9. Quality and quantity of the surveys, investigations, and engineering sufficient for conceptual design of alternative plans.

10. Overall assessment of significant environmental impacts and any biological analyses.

Further:

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

12. Assess the considered and tentatively selected alternatives from the perspective of systems, including systemic aspects being considered from a temporal perspective, including the potential effects of climate change.

For the Tentatively Selected Plan, assess whether:

13. The models used to assess life safety hazards are appropriate.

14. The assumptions made for the life safety hazards are appropriate

15. 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

16. 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.

Specific Technical and Scientific Charge Questions

Plan Formulation/EIS:

17. Comment on whether you agree or disagree with how the preferred alternative was formulated and selected. Comment on the plan formulation. Does it meet the study objectives and avoid violating the study constraints?

18. Do you agree with the general analyses of the existing social, financial, and natural resources within the study area?

19. For your particular area of expertise, provide an in-depth review of whether the analyses of the existing social, financial, and natural resources within the project area are sufficient to support the estimate of the impacts of the array of alternatives.

20. Given your area of expertise, does the EIS appropriately address the existing conditions of all resources pertinent to the study?

21. Was a reasonably complete array of possible measures considered in the development of alternatives?

22. Are the scope and detail of the potential adverse effects that may arise as a result of project implementation sufficiently described and supported?

23. Have the short- and long-term impacts associated with the alternatives been adequately discussed and evaluated?

24. Are cumulative impacts adequately described and discussed? If not, please explain.

Economics:

25. Are the methods and assumptions utilized in the incremental analysis clearly stated and reasonable?

26. Are the justifications for restricting the Locally Preferred Plan (LPP) only to the footprint of the apparent National Economic Development (NED) plan clearly stated and reasonable?

27. Is the discussion and documentation related to the traffic impact analysis complete and clearly stated?

Hydrology and Hydraulic Analysis:

28. Has the appropriate level of hydrology and hydraulic analysis been completed to properly evaluate and compare each of the plans?

Battelle Summary Charge Questions to the Panel Members[1]

Summary Questions

29. 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.

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

Public Comment Questions

31. Do the public comments raise any additional discipline-specific technical concerns with regard to the overall report?

[1] Questions 29 through 31 are Battelle-supplied questions and should not be construed or considered part of the list of USACE-supplied questions. These questions were delineated in a separate appendix in the final Work Plan submitted to USACE.

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APPENDIX D

Conflict of Interest Form

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David Kaplan
USACE, Institute for Water Resources
October 26, 2018
C-2

Conflicts of Interest Questionnaire

Independent External Peer Review

Westminster - East Garden Grove, California, Flood Risk Management Feasibility Study

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

NAME OF FIRM: **Battelle Memorial Institute Corporate Operations**
REPRESENTATIVE'S NAME: **Courtney Brooks**
TELEPHONE: **614-424-5623**
ADDRESS: **505 King Avenue, Columbus, Ohio 43201**
EMAIL ADDRESS: **brooksc1@battelle.org**

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

II. INTEREST IN STUDY AREA OR OUTCOME. Does your firm have any interests or holdings in the study area, or any stake in the outcome or recommendations of the study, or any affiliation with the local sponsor? **No** Yes (if yes, briefly describe):

III. REVIEWERS. Do you anticipate that all expert reviewers on this task order will be selected from outside your firm? No **Yes** (if no, briefly describe the difficulty in identifying outside reviewers):

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

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

No additional information to report.

Courtney M. Brooks

Courtney Brooks

October 26, 2018

Date

Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this proposal

BATTELLE

It can be done