Final Independent External Peer Review Report Prado Basin, Corona, California, Feasibility Report and Environmental Impact Statement

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
Ecosystem Restoration Planning Center of Expertise
St. Paul District

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Credit: Orange County Water District

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It can be done

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Executive Summary

PROJECT BACKGROUND AND PURPOSE

The United States Army Corps of Engineer (USACE) Prado Basin project area is approximately 25 miles southeast of Los Angeles, California. The project area is located within the Santa Ana River watershed and within the extent of the Santa Ana River Mainstem (SARM) Project. The project area encompasses the Prado Dam Basin, including approximately 4,500 acres of riparian habitat immediately upstream of the Prado Dam, and extends downstream of the dam for 7 miles along Reach 9 of the Santa Ana River to Weir Canyon Road. All features of the project would be located within this area and would not extend beyond Reach 9 of the Santa Ana River in the downstream direction.

The partners in this study, USACE's Civil Works Program and the Orange County Water District (OCWD), have responsibilities for management of the Santa Ana River to address a variety of public objectives for water resource management. The Prado Dam and flood control basin were constructed in 1941 to provide flood risk management for developed areas of Orange County. This major water control feature can be adapted and supplemented to address two water resource management objectives: ecosystem restoration and water conservation. Ecosystem restoration measures included in this study were developed and evaluated to restore the quality and function of aquatic, riparian, and transitional habitats within the study area. They address obstacles to regional wildlife movement for both terrestrial and aquatic species. The objectives for ecosystem restoration are to:

- improve hydraulic and fluvial geomorphic functions to promote habitat growth and wildlife connectivity to regionally significant core habitats at Prado Basin and associated main watercourses within the project area,
- restore riparian and riparian associated habitats suitable for native species within the project area, and
- reduce the presence and effects of non-native wildlife on habitat suitability and function for native wildlife species.

The water conservation measures included in this study are to increase water impoundment and storage at Prado Dam for controlled release to optimize aquifer recharge at OCWD facilities downstream in the Santa Ana River watershed. Water conservation measures would also allow OCWD to adjust the timing and flow rate of releases to increase the quantity of water provided to downstream intake structures. The study objective for water conservation is to increase supply for use by the OCWD and its member agencies, including providing for increased groundwater recharge at downstream facilities to address regional demand.

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 Prado Basin, Corona, California, Draft Integrated Feasibility Report and Environmental Impact Statement/Environmental Impact Report (DIFR-EIS/EIR) (hereinafter: Prado Basin 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 (2018). 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 (2018) 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: economist, Civil Works planner/environmental resources compliance (dual role), hydrology and hydraulics (H&H)/civil engineer (dual role), and geotechnical engineer. 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 four-person Panel from this list.

The Panel received electronic versions of the decision documents (2,065 pages in total), along with a charge that solicited comments on specific sections of the documents to be reviewed. Following guidance provided in USACE (2018) 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, eight Final Panel Comments were identified and documented. Of these, two were identified as having high significance, two had medium/high significance, two had medium significance, one had medium/low significance, and one had low significance.

Battelle received public comments from USACE on the Prado Basin (approximately 17 letters, totaling 105 pages of comments) and provided them to the IEPR panel members. The panel members were charged with determining if any information or concerns presented in the public comments raised any additional discipline-specific technical concerns with regard to the Prado Basin review documents. After

completing its review, the Panel confirmed that no additional 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, 2018) in the Prado Basin 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 project presents a well-integrated approach for addressing the problems of ecosystem degradation and water conservation. The report and appendices are well-written, detailed, comprehensive, and logically presented. However, the Panel found several engineering, hydraulic, and sediment-related factors that warrant additional analyses, and also found that long-term monitoring is not included for several project components.

Engineering: The project's integrated approach for sediment management does much to address both ecosystem degradation and water conservation problems. Two dam safety issues, though, are the Panel's primary concerns for this project. Liquefaction risk has not been addressed for the dam foundation during seismic shaking under existing conditions or for higher permanent pool elevations. In addition, dam safety assessments, including a dam breach analysis, associated with raising the pool elevation 7 feet during the flood season have not been performed. Both of these issues potentially affect the Dam Safety Action Classification (DSAC) of the Prado Dam and project implementation. Also, the Panel observed that no hydraulic analysis was performed to assess the potential increase in flood levels downstream of the dam associated with increased sedimentation and higher pool elevations. The Panel also found that information regarding the potential impacts from the proposed sediment storage stockpiles is inconsistent and incomplete.

Planning/Environmental: The plan formulation chapter of the report was very clear in formulating and describing the alternative plans, and the PDT followed the SMART Planning Process. The ecological model used (the Combined Habitat Assessment Protocol [CHAP]) incorporates a wide array of variables and derives a credible result, and the biological assessment is also well-done. The Panel notes, however, that the report does not sufficiently address the potential impacts to habitat if monitoring and maintenance do not extend beyond the first 10 years post-construction. Regarding downstream flood levels (noted above under "Engineering"), the environmental effects and attendant risk associated with potentially increased flood levels, and the process by which the DIFR-EIS/EIR will address Executive Order (EO) 11988 – Floodplain Management (FEMA, 1977), are not documented.

Economics: The report was well-written and used appropriate methods and models to identify the National Economic Development (NED) Plan, the National Ecosystem Restoration (NER) Plan, and the Regional Economic Development benefits. However, the water demand forecasts, based on aggregated projections by individual water retailers, are not independently verified. The Panel was unable to determine whether factors that impact per capita water use were incorporated into those forecasts.

Table ES-1. Overview of Eight Final Panel Comments Identified by the Prado Basin IEPR Panel.

No.	Final Panel Comment
Significance – High	
1	Dam safety issues arising from a potentially liquefiable dam foundation could halt or delay the Prado Dam project.
2	Dam safety risks associated with raising the pool elevation 7 feet during the flood season have not been assessed.
Significance – Medium/High	
3	Information regarding the impacts of the proposed sediment storage stockpiles appears to be inconsistent and incomplete.
4	No hydraulic analysis has been performed to assess the potential increase in flood levels downstream of the Prado Dam associated with increased downstream sedimentation, the sediment management program, or the higher pool elevation behind the dam during the rainy season.
Significance – Medium	
5	Information regarding sediment pumping, stockpile management, and re-entrainment operations is inconsistent and incomplete.
6	The DIFR-EIS/EIR does not assess the effects of channel degradation upstream of the dam beyond a 10-year horizon, nor does it provide for long-term monitoring of these effects.
Significance – Medium/Low	
7	The DIFR-EIS/EIR, including Appendix E, does not sufficiently address potential impacts to habitat if NER project monitoring and maintenance do not extend beyond the first 10 years post-construction.
Significance – Low	
8	The water demand forecasts, which were based on aggregated projections made by individual water retailers, are not independently verified.

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LIST OF ACRONYMS

ACF	Apalachicola-Chattahoochee-Flint
ADM	Agency Decision Milestone
AF	Acre-foot
AFY	Acre-feet per Year
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
CE/ICA	Cost Effectiveness/Incremental Cost Analysis
cfs	Cubic Feet per Second
CHAP	Combined Habitat Assessment Protocol
COI	Conflict of Interest
DIFR	Draft Integrated Feasibility Report
DrChecks	Design Review and Checking System
DSAC	Dam Safety Action Classification
EAP	Emergency Action Plan
EC	Engineer Circular
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EO	Executive Order
ER	Engineer Regulation
ERDC	Engineer Research and Development Center
ETL	Engineer Technical Letter
FEMA	Federal Emergency Management Agency
H&H	Hydrology and Hydraulics
HEC-HMS	Hydrologic Engineering Center-Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center-River Analysis System
HEC-ResSim	Hydrologic Engineering Center-Reservoir System Simulation
HTRW	Hazardous, Toxic, and Radioactive Waste
IEPR	Independent External Peer Review
IWR	Institute for Water Resources
NED	National Economic Development

NEPA	National Environmental Policy Act
NER	National Ecosystem Restoration
NFIP	National Flood Insurance Program
NYSCC	New York State Canal Corporation
OCWD	Orange County Water District
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
PDT	Project Delivery Team
PED	Pre-construction Engineering and Design
PFM	Potential Failure Mode
PFMA	Potential Failure Mode Analysis
RCFCWCD	Riverside County Flood Control and Water Conservation District
RECONS	Regional ECONomic System
RMC	Risk Management Center
SAR	Safety Assurance Review
SARM	Santa Ana River Mainstem (Project)
TSP	Tentatively Selected Plan
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
WVA	Wetland Value Assessment

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1. INTRODUCTION

The United States Army Corps of Engineer (USACE) Prado Basin project area is approximately 25 miles southeast of Los Angeles, California. The project area is located within the Santa Ana River watershed and within the extent of the Santa Ana River Mainstem (SARM) Project. The project area encompasses the Prado Dam Basin, including approximately 4,500 acres of riparian habitat immediately upstream of the Prado Dam, and extends downstream of the dam for 7 miles along Reach 9 of the Santa Ana River to Weir Canyon Road. All features of the project would be located within this area and would not extend beyond Reach 9 of the Santa Ana River in the downstream direction.

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- improve hydraulic and fluvial geomorphic functions to promote habitat growth and wildlife connectivity to regionally significant core habitats at Prado Basin and associated main watercourses within the project area,
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The water conservation measures included in this study are to increase water impoundment and storage at Prado Dam for controlled release to optimize aquifer recharge at OCWD facilities downstream in the Santa Ana River watershed. Water conservation measures would also allow OCWD to adjust the timing and flow rate of releases to increase the quantity of water provided to downstream intake structures. The study objective for water conservation is to increase supply for use by the OCWD and its member agencies, including providing for increased groundwater recharge at downstream facilities to address regional demand.

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 Prado Basin, Corona, California, Draft Integrated Feasibility Report and Environmental Impact Statement/Environmental Impact Report (DIFR-EIS/EIR) (hereinafter: Prado Basin 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, 2018) 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 Prado Basin 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 Prado Basin 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 (2018).

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 Prado Basin DIFR-EIS/EIR 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 four panel members to participate in the IEPR based on their expertise in the following disciplines: economist, Civil Works planner/environmental resources compliance (dual role), hydrology and hydraulics (H&H)/civil engineer (dual role), and geotechnical engineer. The Panel reviewed the Prado Basin documents and produced eight Final Panel Comments in response to 25 charge questions provided by USACE for the review. This charge also included two overview questions added by Battelle, for a total of 27 questions. 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, 2018) in the Prado Basin IEPR review documents. The following summarizes the Panel's findings.

Based on the Panel's review, the project presents a well-integrated approach for addressing the problems of ecosystem degradation and water conservation. The report and appendices are well-written, detailed, comprehensive, and logically presented. However, the Panel found several engineering, hydraulic, and sediment-related factors that warrant additional analyses, and also found that long-term monitoring is not included for several project components.

Engineering: The project's integrated approach for sediment management does much to address both ecosystem degradation and water conservation problems. Two dam safety issues, though, are the Panel's primary concerns for this project. Liquefaction risk has not been addressed for the dam foundation during seismic shaking under existing conditions or for higher permanent pool elevations. In addition, dam safety assessments, including a dam breach analysis, associated with raising the pool elevation 7 feet during the flood season have not been performed. Both of these issues potentially affect the Dam Safety Action Classification (DSAC) of the Prado Dam and project implementation. Also, the Panel observed that no hydraulic analysis was performed to assess the potential increase in flood levels downstream of the dam associated with increased sedimentation and higher pool elevations. The Panel also found that information regarding the potential impacts from the proposed sediment storage stockpiles is inconsistent and incomplete.

Planning/Environmental: The plan formulation chapter of the report was very clear in formulating and describing the alternative plans, and the Project Delivery Team (PDT) followed the SMART Planning Process. The ecological model used (the Combined Habitat Assessment Protocol [CHAP]) incorporates a wide array of variables and derives a credible result, and the biological assessment is also well-done. The Panel notes, however, that the report does not sufficiently address the potential impacts to habitat if monitoring and maintenance do not extend beyond the first 10 years post-construction. Regarding downstream flood levels (noted above under "Engineering"), the environmental effects and attendant risk associated with potentially increased flood levels, and the process by which the DIFR-EIS/EIR will address Executive Order (EO) 11988 – Floodplain Management (FEMA, 1977), are not documented.

Economics: The report was well-written and used appropriate methods and models to identify the National Economic Development (NED) Plan, the National Ecosystem Restoration (NER) Plan, and the Regional Economic Development benefits. However, the water demand forecasts, based on aggregated projections by individual water retailers, are not independently verified. The Panel was unable to determine whether factors that impact per capita water use were incorporated into those forecasts.

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

Dam safety issues arising from a potentially liquefiable dam foundation could halt or delay the Prado Dam project.

Basis for Comment

Prado Dam currently has a DSAC III safety rating due to deficiencies in the spillway and the potential for liquefaction of the dam foundation during seismic shaking. Unless a waiver is granted, changes to the reservoir operation cannot proceed until the dam has a DSAC IV rating. The DIFR-EIS/EIR indicates that the spillway deficiencies will be corrected by 2021, but it is unclear how the liquefaction risk is being addressed. The DIFR-EIS/EIR (p. 6-16) implies that the issue will be resolved by 2023, but the Geotechnical Appendix (Appendix M) indicates that no schedule currently exists for remediating the liquefaction issue. Furthermore, the planned change to the reservoir operation—maintaining the pool at a higher elevation for a prolonged period—can extend the time duration and spatial extent of the zone of saturation in the dam foundation and abutments, thereby increasing the risk of liquefaction. While the DIFR-EIS/EIR cites previous studies on the impacts of raising the conservation pool, it is not clear whether the possibility of an increased liquefaction risk was investigated.

Significance – High

Changes to the reservoir operation cannot proceed unless 1) the risk potential for liquefaction is resolved and the dam receives a DSAC IV rating, or 2) a waiver is granted.

Recommendations for Resolution

1. Resolve the discrepancy between the main body of the DIFR-EIS/EIR and the Geotechnical Appendix regarding the timetable for upgrading Prado Dam to a DSAC IV rating.
2. Demonstrate that raising the permanent conservation pool will not significantly increase liquefaction risk.

Final Panel Comment 2

Dam safety risks associated with raising the pool elevation 7 feet during the flood season have not been assessed.

Basis for Comment

The USACE Institute for Water Resources (IWR) Risk Management Center (RMC) has applied a DSAC III (Conditionally Unsafe) rating to Prado Dam. The Panel was charged with performing a Safety Assurance Review (SAR) for the Tentatively Selected Plan (TSP); however, no analyses were provided to perform the SAR.

The DIFR-EIS/EIR, Appendix M and Appendix N, indicate that 1) a DSAC III rating has been established; 2) a Potential Failure Mode Analysis (PFMA) must be performed; and 3) a dam breach analysis was developed. Appendix M and Appendix N also note that dam safety improvements unrelated to the Prado Dam project are under way; these improvements are anticipated to improve the DSAC rating from III to IV, although they would not address concerns regarding the potential for liquefaction of the dam's foundation. None of the documents provided indicate that a dam safety assessment has been performed, and a dam breach analysis was not provided.

The USACE regulation covering safety of dams, Engineer Regulation (ER) 1110-2-1156, outlines dam safety requirements (USACE, 2014). At a minimum, the effects of the TSP on the following aspects of dam safety need to be analyzed: Screening Portfolio Risk Assessment; Potential Failure Modes; Reservoir Design Flood with and without dam breach; Sunny Day dam breach; and F-N Curve.

Significance – High

Without an analysis of the dam safety risks associated with implementing the TSP, the risk and uncertainty associated with raising the pool elevation 7 feet during the flood season cannot be assessed.

Recommendations for Resolution

Depending upon the status of the dam safety analyses that have been performed or that are anticipated, one of the following actions is recommended.

1. Perform the required dam safety analyses for the TSP and include them in the documentation, along with any required mitigation measures deemed necessary, to retain or ensure a DSAC IV rating.
2. If dam safety analyses have been performed, and mitigation measures have been developed for the TSP by the RMC or others to retain or ensure a DSAC IV classification, include those analyses and mitigation measures in the documentation.
3. If dam safety analyses have not been performed for the TSP, provide a detailed description of the dam safety analyses that will be performed during preconstruction engineering and design (PED) to satisfy the requirements of ER 1110-2-1156, including any mitigation measures found necessary to ensure a DSAC IV classification.

Literature Cited

USACE (2014). Safety of Dams—Policies and Procedures. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Regulation (ER) 1110-2-1156. March 31.

Final Panel Comment 3

Information regarding the impacts of the proposed sediment storage stockpiles appears to be inconsistent and incomplete.

Basis for Comment

In the DIFR-EIS/EIR, the Geology, Seismology, Soils and Minerals section of Table ES-4, under Operations Impacts, indicates that operation activities would not increase the risk of ground rupture and other potential impacts. This appears to be inconsistent with a statement in the Geotechnical Appendix (Appendix M, p. 37) indicating that large stockpiles could induce settlement at the dam and spillway. In Table ES-4, ground settlement is not included as a risk source, but it could create loss of freeboard in the dam and impair the functionality of the spillway. Additionally, the effects of upstream sediment removal and storage near the crest of the dam on the reservoir stage-storage curve do not appear to have been evaluated. Finally, there is no discussion about soil and erosion control measures, turf establishment, or control of runoff.

Significance – Medium/High

Potential settlement of the dam or spillway induced by placement of the stockpiles could require significant modifications to the TSP.

Recommendations for Resolution

1. Evaluate the potential for stockpile placement near the dam for inducing loss of freeboard in the dam or impairing the functionality of the spillway.
2. Evaluate the effects of the upstream sediment removal and storage near the crest of the dam on the reservoir stage-storage curve.
3. Discuss how stormwater runoff at the sediment storage sites would be managed and how dust would be controlled.

Final Panel Comment 4

No hydraulic analysis has been performed to assess the potential increase in flood levels downstream of the Prado Dam associated with increased downstream sedimentation, the sediment management program, or the higher pool elevation behind the dam during the rainy season.

Basis for Comment

The Prado Dam was constructed in 1941 to provide flood risk management for developed areas of Orange County. Between 1970 and 2025, the average inflow to Prado Dam has increased from 50,000 acre-feet per year (AFY) to 325,000 AFY, and the Reservoir Design Flood has increased from 289,000 cubic feet per second (cfs) to 689,000 cfs. Approximately 25,000 acre-feet (AF) of flood storage has been lost to sedimentation between 1941 and 2008, and flood storage loss continues at a rate of 600 AF per year. This data shows that the project's flood risk management objectives are already challenged by baseline conditions.

Adverse effects of the TSP on flood risk management may be induced by several factors, including (but not limited to) increased sedimentation downstream of the dam; loss of flood storage in the upstream reservoir associated with the sediment management program; and the raised pool elevation during the rainy season that may increase the outflow hydrograph.

Information provided in the DIFR-EIS/EIR, Appendix K and Appendix N, indicates the potential for adverse effects due to these factors, but Appendix K and Appendix N do not provide a hydraulic analysis that assesses adverse effects or the recommended mitigation measures that would be implemented to address those adverse effects. The DIFR-EIS/EIR makes a commitment to conducting investigations and design work during PED to ensure that the final designs of the TSP would not adversely affect the flood risk management provided by the SARM Project. Potential adverse effects noted include:

1. Appendix N (Figures 12-15) shows deposition of between 5 and 10 feet in the channel downstream of the dam; however, the effects on flood levels are not explained.
2. Appendix K (Plates 17 and 18) shows that sediment storage sites A and B (which together total 9,300 AF) would reduce flood storage below El 587.3 to some extent, but these effects on downstream flooding are not assessed.
3. Appendix N, Section 7.2, notes that if the Buffer Pool is not evacuated prior to a major storm, there would be some impact on flood control. The Buffer Pool contains 10,500 AF of storage, representing 1.3% of the total. Section 7.2 (p. 16) also states "…One of the major premises of the water conservation study is that modifications to the operating plan for water conservation at Prado Dam will not have any significant impact on flood control, i.e., will not significantly decrease the level-of-protection afforded by the dam….One of the worst and most remote scenarios which could impact on flood control would be to have no advanced warning (no forecast) of [a reservoir design flood] at Prado Dam when water is being held to the top of the Buffer Pool."

The Riverside County Flood Control and Water Conservation District (RCFCWCD), in its public comments 2, 3, and 4, also cited 1) maintenance concerns pertaining to sedimentation downstream of the dam, and 2) flooding concerns associated with construction of the Entrainment Groin Forebay and Bio Engineered Entrainment Groin, and floodplain filling upstream of the dam. The RCFCWCD also

Final Panel Comment 4

noted that project features could significantly impact the FEMA-mapped floodplain, increasing flood hazards to four local National Flood Insurance Program (NFIP)-enrolled communities responsible for regulating floodplain development. This information would 1) clarify the TSP's effects on flood risk management, 2) provide the necessary supporting information to confirm the statement in the DIFR-EIS/EIR (p. 10-8) that the project is in compliance with EO 11988 – Floodplain Management, and 3) allow the four local communities to remain in compliance with NFIP requirements.

Significance – Medium/High

A full assessment of the effects of the TSP and a description of mitigation of any adverse effects identified will ensure that the TSP will not adversely affect flood levels upstream and downstream of the dam.

Recommendations for Resolution

1. Perform a hydraulic analysis, incorporating all of the flood risk management impacts of the project, to identify the increases in upstream and downstream flood levels resulting from implementing the TSP.
2. Analyze the potential effects on base flood levels of reintroducing sediment into Reach 9 of the Lower Santa Ana River.
3. Summarize the floodplain analysis for the base flood in the DIFR-EIS/EIR.
4. If adverse effects on flood levels upstream and downstream of the dam are identified, incorporate mitigation measures into the TSP to mitigate the effects.

Final Panel Comment 5

Information regarding sediment pumping, stockpile management, and re-entrainment operations is inconsistent and incomplete.

Basis for Comment

The DIFR-EIS/EIR (p. 7-4) indicates that sediment from the basin would be pumped around the Auxiliary Dike, while the Geotechnical Appendix (Appendix M, p. 47) indicates that it may be routed over the Auxiliary Dike. A pressurized pipeline over an embankment can entail considerably more risk than one routed around the embankment. Additionally, the water level during the pumping of sediment can significantly affect the level of hazard. If no standing water acts on the dike during pumping, the hazard would be much less.

Appendix M (p. 6) also indicates that the slurry pipeline is 10,000 feet long and 12 inches in diameter. The DIFR-EIS/EIR (p. 7-4) states that the two slurry pipelines will be 2,600 feet long and 24 inches in diameter. These statements are inconsistent. No head loss and pumping calculations are presented in the documentation.

Appendix M (p. 39) states that the re-entrainment work area would place a significant amount of water near the existing flood control structure (the dam) and that this could negatively impact the spillway performance and increase seepage. In addition, Appendix M (pp. 38-39) questions whether a consistent supply of water is available for re-entrainment of sediments; however, no analyses are provided to more fully evaluate the availability of water for re-entrainment, and no discussion is provided to explain how availability of water will be addressed in the PED phase.

Discrepancies and lack of detail make the risks associated with the sediment pumping, stockpile management, and re-entrainment operations unclear to the Panel.

Significance – Medium

A pressurized pipeline over the dike and sediment re-entrainment work near the spillway can potentially impact the risk level for the project.

Recommendations for Resolution

1. Resolve the discrepancy between the DIFR-EIS/EIR and the Geotechnical Appendix regarding whether the sediment pipeline will be routed over or around the Auxiliary Dike.
2. Resolve the discrepancy between the DIFR-EIS/EIR and Appendix M regarding the description of the slurry pipeline.
3. Provide summary details of head loss and pumping calculations in the DIFR-EIS/EIR or in Appendix M.
4. Evaluate the potential for increased risk to the dam and spillway due to slurry transport and re-entrainment operations.
5. Determine whether the amount of water required for transporting sediments will be consistently available.

Final Panel Comment 6

The DIFR-EIS/EIR does not assess the effects of channel degradation upstream of the dam beyond a 10-year horizon, nor does it provide for long-term monitoring of these effects.

Basis for Comment

The modeling results presented in Appendix N indicate that the sediment trap and the transition channel will degrade and coarsen the river bed, and that the river bed degradation and coarsening will stop downstream of Hamner Avenue after 10 years. The channel degradation predicted in the 10-year horizon includes an anticipated 10 feet of scour at the River Road Bridge. The analysis also acknowledges that the channel degradation can be expected to continue upstream, potentially affecting infrastructure such as pipelines and the piers of upstream bridges. The bridges immediately upstream of the upstream limit of channel degradation predicted in the 10-year horizon include Hamner Avenue and I-15. Appendix N recommends that the potential for upstream migration be investigated further prior to implementation of the trap and transition channel. The RCFCWCD, in its public comment 3, also stated that upstream head cutting and bank/slope failure potential upstream of the Entrainment Groin was not fully explained.

Absent a complete assessment of upstream channel degradation on existing infrastructure over the project's 50-year life, the infrastructure mitigation measures and costs to address upstream channel degradation, and to implement a long-term monitoring program cannot be fully understood.

Significance – Medium

The effects of channel degradation over the entire project life can potentially undermine the integrity of upstream infrastructure and the safety of the public.

Recommendations for Resolution

1. Perform a scour evaluation of the River Road Bridge using the predicted 10-year horizon channel degradation of 10 feet, and incorporate scour countermeasures into the project during PED, if necessary.
2. Develop, and include in the project's operations and maintenance manual, a program to monitor scour near public infrastructure and utilities within the upstream study reach so that corrective actions can be taken over the project life to protect this infrastructure where needed.

Final Panel Comment 7

The DIFR-EIS/EIR, including Appendix E, does not sufficiently address potential impacts to habitat if NER project monitoring and maintenance do not extend beyond the first 10 years post-construction.

Basis for Comment

Ongoing maintenance of the NER project is critical to the success of the Federal TSP. The Monitoring and Adaptive Management Plan (Appendix E) states that monitoring and maintenance will be performed only during the first 10 years post-construction. The PDT provided information in Appendix C (Response #1) stating that the regulations only allow the Federal sponsor to provide monitoring and maintenance for a period up to 10 years. The risk that the NER project will not realize the projected with-project benefits for the 50-year project life without required maintenance is not documented.

The DIFR-EIS/EIR states that the non-Federal sponsor or other entities may provide required monitoring and maintenance after 10 years. However, no commitments to do so are in place at this time. Unexpectedly high maintenance costs, uncertainties in the local economy (potentially affecting the sponsor's ability to cover this cost), and the absence of any financial commitments on the part of the local sponsor or others are significant risks to the planned NER project.

The assumption that new plantings and restored habitats will be resilient and will withstand invasion by non-native plants and wildlife is without basis.

No explanation is provided to support the assumption that non-native wildlife species, such as the Cowbird, will not return and re-establish dominance in the project area.

Significance – Medium/Low

The risks that habitat benefits from the NER project likely will be realized only if monitoring and maintenance continue throughout the project life cannot be fully assessed.

Recommendations for Resolution

1. Develop a written agreement (such as a Memorandum of Understanding) between USACE, the local sponsor, or others that commits to adaptive monitoring and maintenance for the life of the NER project.
2. Add a full explanation to the DIFR-EIS/EIR that supports the statement that non-native species will not re-colonize the project area during the 50-year project life.
3. Discuss in the DIFR-EIS/EIR (Section 6.4.2) the risk that the NER project will not realize the projected benefits over its life due to lack of maintenance.

Final Panel Comment 8

The water demand forecasts, which were based on aggregated projections made by individual water retailers, are not independently verified.

Basis for Comment

The use of water demand forecasts independently developed by each water retailer resulted in the use of methodologies and fundamental assumptions that varied across the study area. Based on graphical presentations in the report, the aggregated water demand forecasts closely mimic the anticipated increase in study area population. The Panel was unable to determine whether factors that decrease per capita water use, such as increases in the proportion of multi-family housing units or water use conservation measures, were incorporated into the forecasts. The Panel was also unable to determine whether the accuracy of the water demand analysis from each water retailer was independently verified. The use of different methodologies and assumptions by the various water retailers could result in inconsistent and inaccurate estimates of future water demand, which inform the NED benefits.

Significance – Low

Inaccurate water demand forecasts could impact the calculation of NED benefits.

Recommendations for Resolution

1. Verify the accuracy of the water demand forecasts by evaluating the various methodologies and assumptions developed by the various water retailers.

   OR

2. Develop water demand forecasts, using consistent methodology and assumptions, for the study area.

5. REFERENCES

FEMA (1977). Executive Order (EO) 11988 – Floodplain Management. Department of Homeland Security, Federal Emergency Management Agency, 42 FR 26971, 1977.

OMB (2004). Final Information Quality Bulletin for Peer Review. Executive Office of the President, Office of Management and Budget, Washington, D.C. Memorandum M-05-03. December 16.

The National Academies (2003). Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports. The National Academies (National Academy of Science, National Academy of Engineering, Institute of Medicine, National Research Council). May 12.

USACE (2018). Water Resources Policies and Authorities: Review Policy for Civil Works. Engineer Circular (EC) 1165-2-217. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. February 20.

USACE (2014). Safety of Dams—Policies and Procedures. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Regulation (ER) 1110-2-1156. March 31.

USACE (2000). Planning – Planning Guidance Notebook. Engineer Regulation (ER) 1105-2-100. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. April 22.

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APPENDIX A

IEPR Process for the Prado Basin 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 Prado Basin 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 the United States Army Corps of Engineers (USACE) on February 6, 2019. 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 June 14, 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 Prado Basin IEPR.

Task	Action	Due Date
1	Award/Effective Date	8/23/2018
	Review documents available	2/6/2019
	Public comments available	4/4/2019
	Battelle submits draft Work Plan[a]	9/4/2018
	USACE provides comments on draft Work Plan	10/16/2018
	Battelle submits final Work Plan[a]	10/24/2018
2	Battelle submits list of selected panel members[a]	9/11/2018
	USACE confirms the panel members have no COI	10/2/2018
3	Battelle convenes kick-off meeting with USACE	9/4/2018
	Battelle convenes kick-off meeting with panel members	12/17/2018
	Battelle convenes kick-off meeting with USACE and panel members	NA
4	Panel members complete their individual reviews	3/8/2019
	Panel members provide draft Final Panel Comments to Battelle	3/20/2019
	Battelle sends public comments to panel members for review	4/4/2019
	Panel confirms no additional Final Panel Comment is necessary with regard to the public comments	4/9/2019
	Panel finalizes Final Panel Comments	4/10/2019
5	Battelle submits Final IEPR Report to USACE[a]	4/12/2019
6[b]	Battelle convenes Comment Response Teleconference with panel members and USACE	5/30/2019
	Battelle submits pdf printout of DrChecks project file[a]	6/14/2019
	Agency Decision Milestone (ADM) meeting[c]	6/25/2019
	Contract End/Delivery Date	8/31/2019

[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 Prado Basin 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 25 charge questions provided by USACE, two overview questions 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 to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel. Before the meeting, the IEPR Panel received an electronic version of the final charge. Upon availability, the Panel received 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
Draft Integrated Feasibility Report and Environmental Impact Statement/Environmental Impact Report (DIFR-EIS/EIR)	300
Appendix A: Affected Environment & Environmental Consequences Details	32
Appendix B: 404(B)(1) Evaluation	114
Appendix C: Coordination Act Report	5
Appendix D: Combined Habitat Assessment Protocols (CHAP)	104
Appendix E: Monitoring and Adaptive Management Plan	30
Appendix F: Mitigation, Monitoring and Reporting Plan	30
Appendix G: Biological Assessment	137
Appendix H: Air Quality/Greenhouse Gases	530
Appendix I: Cultural Resources Assessment	80
Appendix J: Traffic Impact Analysis	250
Appendix K: Design	100
Appendix L: Cost	59
Appendix M: Geotechnical	50
Appendix N: Hydrology & Hydraulic (H&H) & Sediment Management	50
Appendix O: Real Estate	30
Appendix P: Economics	60
Appendix Q: Hazardous, Toxic, and Radioactive Waste (HTRW)	4
Public Review Comments[a]	100
Risk Register[b]	30
Total Number of Review Pages	**2,065**

[a] *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.*

[b] *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.*

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* (Engineer Circular [EC] 1165-2-217), February 20, 2018
- Office of Management and Budget, *Final Information Quality Bulletin for Peer Review,* December 16, 2004.
- USACE Climate Change Adaptation Plan, June 2013 and June 2014
- Water Resources Policies and Authorities Incorporating Sea Level Change Considerations in Civil Works Programs, EC 1165-2-211
- Incorporating Sea Level Change in Civil Works Programs, Engineer Regulation (ER) 1100-2-8162
- Procedures to Evaluate Sea Level Change: Impacts, Responses, and Adaptation, Engineer Technical Letter (ETL) 1100-2-1

The Panel developed 11 clarifying questions for USACE to clarify the project actions. Battelle provided the questions to USACE, and USACE provided written responses to five of the questions prior to the end of the review. In response to one question, USACE provided the document below. This document was provided to Battelle and then sent to the Panel as additional information only and was not part of the official review.

- *Prado Basin Sediment Management Demonstration Project 100% Engineering Analysis-Draft*, HDR, November 2014

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 Prado Basin 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, eight 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 17 pdf files containing 105 pages of public comments on the Prado Basin 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 additional issues or concerns were identified other than those already covered in the Final Panel Comments.

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 eight Final Panel Comments developed by the Panel into DrChecks, USACE's 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.

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APPENDIX B

Identification and Selection of IEPR Panel Members for the Prado Basin Project

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B.1 Panel Identification

The candidates for the Prado Basin, Corona, California, Draft Integrated Feasibility Report and Environmental Impact Statement/Environmental Impact Report (DIFR-EIS/EIR) (Prado Basin) IEPR Panel were evaluated based on their technical expertise in the following key areas: economist, Civil Works planner/environmental resources compliance, hydrology and hydraulics (H&H)/civil engineer, and geotechnical engineer. These areas correspond to the technical content of the review documents and overall scope of the Prado Basin project.

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

Candidates were screened for the following potential exclusion criteria or 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."

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

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Prado Basin
1. Previous and/or current involvement by you or your firm in the Prado Basin, Corona, California, Feasibility Report and Environmental Impact Statement (hereinafter Prado Basin FR/EIS) and related projects.
2. Previous and/or current involvement by you or your firm in ecosystem restoration in the Santa Ana River watershed.
3. Previous and/or current involvement by you or your firm in the conceptual or actual design, construction, or operation and maintenance of any projects in the Prado Basin FR/EIS or related projects.

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Prado Basin
4. Current employment by the U.S. Army Corps of Engineers (USACE).
5. Previous and/or current involvement with paid or unpaid expert testimony related to Prado Basin projects.
6. Previous and/or current employment or affiliation with 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 Water District
7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to the Santa Ana River watershed.
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 Prado Basin FR/EIS.
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.
13. Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning ecosystem restoration review, 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 Prado Basin 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 Water District contracts.
17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to the Prado Basin FR/EIS.
18. Participation in relevant prior and/or current Federal studies related to the Prado Basin FR/EIS.
19. Previous and/or current participation in prior non-Federal studies related to the Prado Basin FR/EIS.

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Prado Basin
20. Has your research or analysis been evaluated as part of the Prado Basin FR/EIS?
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.

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. Prado Basin IEPR Panel: Summary of Panel Members.

Name	Affiliation	Location	Education	P.E.	Exp. (yrs)
Economist					
Daniel Maher	DSM Contracting, LLC	River Ridge, LA	M.S., Agricultural Economics	N/A	30+
Civil Works Planner / Environmental Resources Compliance (Dual Role)					
Kay Crouch	Independent consultant	Santa Fe, NM	M.S., Biology and Aquatic Ecology	No	40
Hydrology & Hydraulic (H&H) / Civil Engineering (Dual Role)					
Kenneth Avery	Bergmann	Rochester, NY	M.S., Water Resources Engineering	Yes	40
Geotechnical Engineering					
Charles Aubeny	Independent consultant	Bryan, TX	Ph.D., Civil Engineering	Yes	34

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

Table B-2. Prado Basin IEPR Panel: Technical Criteria and Areas of Expertise.

Technical Criterion	Maher	Crouch	Avery	Aubeny
Economist				
Minimum M.S. degree or higher	X			
At least 10 years of demonstrated experience in applied economics related to water resource economic evaluation or review	X			
Experience working with risk-informed approaches to decision making, risk models, and evaluation scenarios with regard to economic impact	X			
Able to evaluate the appropriateness of cost effectiveness and incremental cost analysis (CE/ICA), as applied to dollar costs and ecosystem restoration benefits	X			
Preferably familiar with USACE's Institute for Water Resources (IWR) Planning Suite	X			
Experience assessing regional economic development benefits using input/output modeling through the use of IMPLAN or similar models as well as analysis of other social effects associated with project alternatives	X			
Knowledge of and experience with the evaluation of benefits and costs for water supply and/or water conservation plans, in accordance with criteria outlined in the USACE Planning Guidance Notebook (ER 1105-2-100, Appendix E, Section VIII)	X			
Civil Works Planner / Environmental Resources Compliance (Dual Role)				
Minimum 10 years of demonstrated experience in public works planning		X		
Familiar with USACE plan formulation processes, procedures, and standards, with demonstrated plan formulation experience with respect to large, complex Civil Works projects with high public and interagency interests		X		
Familiar with evaluation of alternative plans for the USACE ecosystem restoration mission and with the development and evaluation of alternative plans for water supply for municipal, industrial, and agricultural uses		X		
At least 10 years of experience directly related to environmental evaluation or review and National Environmental Policy Act (NEPA) compliance		X		
Minimum M.S. degree or higher in a related field		X		
Familiar with the coastal habitats and fish and wildlife species that may be affected by the project alternatives in the study area		X		
Familiar with impact assessments, including cumulative effects analysis for complex ecosystem projects with competing trade-offs (highly desirable)		X		

Table B-2. Prado Basin IEPR Panel: Technical Criteria and Areas of Expertise (continued).

Technical Criterion	Maher	Crouch	Avery	Aubeny
Hydrology & Hydraulics (H&H) / Civil Engineering (Dual Role)				
Registered Professional Engineer (P.E.)			X	
Minimum 15 years of experience in H&H engineering			X	
Experience with all aspects of H&H engineering, including the analysis and modeling of multi-purpose reservoirs and riverine hydrology and hydraulics			X	
Has a thorough understanding of multi-purpose reservoir operations, open-channel dynamics, flood routing, and watershed hydrology			X	
Familiar with Hydrologic Engineering Center (HEC) modeling computer software, or equivalent commercial software, including HEC River Analysis System (RAS), HEC Reservoir System Simulation (ResSim), and HEC Hydrologic Modeling System (HMS)			X	
Minimum 10 years of experience in civil engineering with a minimum MS degree in engineering			X	
Has demonstrated experience in the design and construction of critical infrastructure related to dams, water conservation, and ecosystem restoration project features			X	
Capable of addressing the USACE Safety Assurance Review (SAR) aspects of all projects			X	
Geotechnical Engineer				
Minimum 15 years of experience in geotechnical engineering				X
Minimum M.S. degree or higher in engineering				X
Has demonstrated experience performing geotechnical evaluation and geo-civil design for all phases of ecosystem restoration projects				X
Experience in structural geotechnical evaluations such as static and dynamic slope stability, seepage through earthen embankments, and underseepage through the foundation of flood risk management structures (e.g., dam and levee embankments, floodwalls, closure structures) and settlement evaluation of the structure				X
Capable of addressing the USACE SAR aspects of all projects				X

B.3 Panel Member Qualifications

Detailed biographical information on each panel member's credentials, qualifications, and areas of technical expertise is summarized in the following paragraphs.

Name	Daniel Maher, M.S.
Role	Economist
Affiliation	DSM Contracting, LLC

Mr. Maher is a Project Manager with DSM Contracting and senior economist with over 30 years of experience. He received his M.S. in agricultural economics from Louisiana State University. He has managed numerous economic feasibility, evaluation, and impact studies for navigation projects, ecosystem restorations, flood control and flood risk projects, water supply projects, and recreational studies. He has conducted incremental analyses, cost effectiveness studies, and forecasting studies for clients across the country. Mr. Maher's computer skills include extensive experience with IMPLAN Economic Impact Software, IWR-Planning Suite, IWR-MAIN Water Use Forecast System, and the Microsoft Office Suite.

Mr. Maher has provided project management support to USACE on investigations, pre-construction engineering, and construction phases of ecosystem restoration, flood risk management, navigation, and recreation projects. Mr. Maher has experience in evaluation scenarios and decision making. For the Water Supply Demand Analysis, Pine Mountain Study Area, Arkansas, Mr. Maher was the senior economist responsible for developing the municipal and industrial `water use forecast as part of the Estimation and Analysis of Water Supply Benefits. Water use forecasts for the study area were developed using the most current water use estimates and water use patterns available for the area. This effort included extensive data collection, data manipulation, and modeling. Data collection included collecting water production, consumption, pricing, and conservation data from the water utilities serving the area; collecting and manipulating demographic data from the U.S. Bureau of the Census and the University of Arkansas at Little Rock; collecting climate data from the National Oceanic and Atmospheric Administration; and collecting other data from various public and private agencies. These data were used to estimate water use for current and projected water use, in 10-year intervals.

Mr. Maher also was responsible for conducting the independent review to evaluate the technical quality, system quality, and usability of the USACE Institute for Water Resources (IWR) Regional ECONomic System (RECONS) model, developed to provide accurate and defensible estimates of regional and national job creation and other economic measures such as income, value added, and sales.

As an economist on the Bubbly Creek Ecosystem Restoration Feasibility Study IEPR, Mr. Maher was responsible for assessing the adequacy and acceptability of the economic methods, models, and analyses used to conduct the cost effectiveness and incremental cost analysis (CE/ICA) for the ecosystem restoration of Bubbly Creek in Chicago, Illinois. Mr. Maher was also responsible for assessing the adequacy and acceptability of the economic methods, models, and analyses used to develop a water supply storage assessment of current and future water demands in the upper Apalachicola-Chattahoochee-Flint (ACF) basin as the economist for the ACF River Water Control Manual, EIS and Water Supply Storage Assessment Report IEPR. He also peer-reviewed the economic analyses of flood risk for the Truckee Meadows Flood Control Project, Nevada, General Reevaluation Report, and the

Berryessa Creek Flood Control Project General Reevaluation Report and Environmental Impact Statement/Environmental Impact Report.

Mr. Maher's experience includes conducting economic analyses of major projects for the Florida Inland Navigation District. As Project Manager/Senior Economist, he was responsible for a series of 12 related, stand-alone studies that identified and quantified the total economic impacts estimated to occur from waterway projects (including the influence of the waterways on property values) operated, maintained, or within the District's 12 counties. The IMPLAN input-output model was used to calculate expected impacts for each county under three waterway conditions: (1) existing conditions (6½-foot depths); (2) cessation of waterway maintenance (3-foot depths); and (3) increased waterway maintenance (10-foot depths). In addition, Mr. Maher was the Project Manager/Senior Economist responsible for conducting an update of previously estimated regional economic impacts of Florida Inland Navigation District waterways using IMPLAN. The analysis included business activity, personal income, and employment generated by each county within the District's boundaries as a result of maintaining navigation on the waterways. In addition, total District- and state-level economic impacts were estimated using updated county-level data. Fuel taxes and sales taxes attributable to activities associated with the waterways were also estimated. This updated and expanded analysis is used to educate the public with respect to the importance of the marine industries on the local, District, and state economies.

Mr. Maher was the Project Manager responsible for estimating the regional economic development expected to result from extending navigation into southwest Arkansas. The analysis estimated the total increase in business activity, personal income of area residents, regional employment, and tax revenues that would be generated by waterway construction activities, recreational expenditures, and increased industrial output resulting from decreased transportation costs. He also was the Project Manager responsible for estimating the regional economic impacts associated with the redevelopment of the Memphis, Tennessee, riverfront and portions of Mud Island. One-time increases in economic impacts resulting from construction expenditures and recurring impacts resulting from facility operations were estimated for proposed private sector residential development, hotel and conference center, retail/entertainment facilities, marina, and an edutainment center. The IMPLAN input-output model was used for both of these projects.

Mr. Maher served as the phase manager tasked with conducting CE/ICAs of the costs and benefits of two ecosystem restoration projects: the Canonsburg Lake Ecosystem Restoration Project (USACE, Pittsburgh District) and the Licking River Watershed and Dillon Lake Ecosystem Restoration Project in Dillon, Ohio (USACE, Huntington District). For the Canonsburg project, the analyses were intended to provide decision-makers with a comparison of alternatives that produced different levels of environmental outputs in order to select the alternative that best satisfied project objectives. A total of 37 alternatives (including no action) were developed to address the restoration of Canonsburg Lake. For the Licking River / Dillon Lake project, the work consisted of analyzing alternatives for restoring various reaches of the Licking River that were eroding and impacting the water quality of the river and the downstream Dillon Lake. Sediment from Licking River was also depositing in the lake, resulting in shoals and restricted water flow. Restoration alternatives considered included armoring the bank line, revegetating river bank and near-river bank areas, and dredging a portion of the lake to improve water flow and quality.

In addition, Mr. Maher was the Project Manager and/or Senior Economist responsible for several other CE/ICAs: the Incremental Analysis for Four Feasibility Level Studies on the Ohio River Ecosystem Restoration Project (USACE, Louisville District); ICAs for the proposed Hovey Lake restoration project in Indiana (USACE, Louisville District); and a CE/ICA on proposed alternatives for the ecosystem and

environmental restoration of the Chicopit Bay at the intersection of the St. Johns River and the Intracoastal Waterway in Florida (USACE, Jacksonville District). For the Ohio River project, major tasks included developing alternatives for meeting the objectives of the project, developing construction costs and environmental output associated with each alternative, and determining the incremental costs of producing environmental output of each cost-effective alternative. The principal elements of the Hovey Lake project were to restore an oxbow habitat and reduce erosion and control sediment for Ohio River overbank flooding. Three alternatives were developed to meet project objectives. Construction costs and environmental output were developed for each alternative, and the cost-effective alternatives and the incremental costs of producing environmental output of each of those alternatives were determined.

Name	Kay Crouch, M.S.
Role	Civil Works Planner / Environmental Resources Compliance
Affiliation	Crouch Environmental Services, Inc.

Ms. Crouch is an independent environmental consultant and the founder of Crouch Environmental Services, Inc. of Houston, Texas. She specializes in National Environmental Policy Act (NEPA) analysis, environmental site assessment, permitting, wetlands delineation, and natural resource mitigation for projects with high public and interagency interests. She earned her M.S. in biology/ecology in 1978 from Steven F. Austin State University and has received additional academic training in the NEPA process from the Duke University Nicholas School of Environmental and Earth Sciences (2004-05). Ms. Crouch has more than 40 years of nationwide experience in conducting environmental site assessments and NEPA impact assessments for complex multi-objective public works projects with competing trade-offs. Her experience includes performing wetlands delineations, endangered species surveys, and environmental site assessments in California.

Ms. Crouch has assessed NEPA impacts in marsh and urban areas and related ecosystem species and habitats. She has done extensive work in the coastal marsh habitats that span the Gulf Coast and in a wide variety of habitat types throughout the nation. She has experience in high and low tidal marsh restoration and evaluation as well as inland wetlands. In the mid-1990s, Crouch Environmental Services designed and constructed the Baytown Nature Center, in Baytown, Texas. For that large, several-hundred-acre coastal marsh creation project, the company received the 1998 Award of Excellence from the National Association of Landscape Architects. She also has experience restoring upland habitats such as forests and coastal prairies.

Ms. Crouch is familiar with USACE calculations of environmental benefits and routinely performs cumulative effects analyses on high-visibility public works projects as part of her extensive NEPA practice. She is also familiar with several types of habitat models utilized nationwide. Habitat modeling has been required on every flood damage reduction and ecosystem restoration project she has worked on relating to the USACE, including the Bayport Container Terminal, the Clear Creek Flood Damage Reduction Project, and the Addicks and Barker Dams and Reservoirs in Harris County, Texas. Other nationwide NEPA projects have consisted of flood damage reduction projects, dams, ports, parks, offshore activities, linear transportation corridors, power plants, and other types of projects involving Federal funding.

Ms. Crouch has extensive knowledge of endangered species surveys and impact analysis. She has completed numerous projects that involve compliance with the Endangered Species Act. The evaluation of the presence or absence of listed species has been required for almost every project in which she has

been involved, including USACE 404 permit applications requiring field investigations for listed species in California and numerous other states. She also has completed the Section 7 consultation process for several species.

Almost every project Ms. Crouch has worked on has involved investigating and evaluating cultural resource issues. She is intimately familiar with the record search step as well as field survey techniques for cultural resources. She also has supervisory experience related to USACE 404 permits, as well as NEPA documentation and Section 106 experience for the analysis of historical issues. She has demonstrated experience conducting biological assessments, including wetlands delineations, compilation of biological assessments for Section 404 permitting, and NEPA documentation.

Ms. Crouch's skills include knowledge of the USACE planning process, SMART planning, and calculation and application of environmental impacts and benefits. She is well versed in various modeling types and in the performance of ICA. She has experience reviewing the application of Wetland Value Assessment (WVA) methodology and has calculated the environmental losses and benefits of USACE projects using the hydrogeomorphic approach, habitat evaluation procedures, and WVA, as well as other models. Most recently, she performed a WVA analysis for the Addicks and Barker Dams environmental assessment in Harris County, Texas (USACE, Galveston District).

In 2001, Ms. Crouch was selected to receive a Telly Award for a video presentation she produced for the USACE Galveston District which describes, via interviews with staff and the use of graphics, the USACE planning process. In 2010, Ms. Crouch and her staff were recognized as the "National Best Practice Standard" for the USACE for public engagement work performed for the Addicks and Barker Dams and Reservoirs dam safety project.

Ms. Crouch has performed IEPR reviews for numerous USACE projects for the New Orleans District, including the Mississippi River Gulf Outlet (2011); Southwest Louisiana (2013 and 2015); Louisiana West Bank (2014); Morganza (2012); New Orleans to Venice (2011); and Barataria Basin (2011). She is a standing member of the Louisiana Water Resources Council. She has also performed IEPR reviews for projects in Tennessee (Center Hill Dam, 2013); Missouri (Alton to Gale Levees, 2010, and East St. Louis Levees, 2010); Princeville, North Carolina (2014); Norfolk (2018); and the Brazos River Floodgates (2018).

Name	Kenneth Avery, M.S., P.E.
Role	Hydrology & Hydraulics (H&H) / Civil Engineer
Affiliation	Bergmann Associates, Inc.

Mr. Avery is a senior H&H engineer with Bergmann Associates, Inc., in Rochester, New York. He earned his M.S. in Water Resources Engineering from Clarkson University and is a registered P.E. in Michigan, New York, Florida, and Montana. Mr. Avery has 40 years of experience in water resources, environmental, and civil engineering, including projects focused on ecosystem restoration. His H&H experience includes engineering support for state agencies, local watershed organizations, environmental groups, and the Federal government (USACE, National Park Service). Mr. Avery served on IEPRs for the Navigation and Ecosystem Sustainability Program's Project P2 Lock & Dam 22 Fish Passage Improvement Project; Inner Harbor Navigation Canal Lock Replacement, Orleans Parish, Louisiana, General Reevaluation Report; Protection of the Harvey-Algiers Canal; Louisiana Coastal Area Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma

Navigation Lock Ecosystem Restoration Project; and Integrated Feasibility Study and Environmental Impact Statement; Mississippi River Ship Channel Gulf to Baton Rouge, Louisiana, General Reevaluation Report, New Orleans.

Mr. Avery is familiar with standard USACE H&H computer models and has experience working with numerical modeling applications for navigation and flood risk reduction projects. For the Fargo-Moorhead Flood Damage Reduction Project (USACE, St. Paul District), he worked with a team of hydraulic modelers responsible for developing two-dimensional numerical and physical hydraulic models of alternative configurations for channel realignments and aqueduct designs to carry the Maple River over the Red River diversion channel. For the Devils Lake City Embankments project (USACE, St. Paul District), he led HEC-RAS hydraulic modeling of the interior drainage areas that included conveyance channels, ponding areas, and pumping stations and piping systems to achieve a 1% annual chance flood elevation on the protected side of the embankment at or below the Federal Emergency Management Agency's (FEMA) Special Flood Hazard Area.

Mr. Avery is also familiar with USACE applications of risk and uncertainty analysis in navigation transportation projects. As part of several lock and dam rehabilitation projects, he developed a method for determining the seasonally adjusted hydrologic risk of flooding during cofferdam construction for the Utica Harbor Dam, Lock & Dam E-26. As consultant manager for the New York State Canal Corporation's (NYSCC) Dam Safety Program, which includes 80 dams, Mr. Avery led a Dam Risk Prioritization study for 13 high- and intermediate-hazard dams in the portfolio using FEMA's Risk Prioritization Tool for Dams. The risk prioritization process involves identifying potential failure modes, then compiling the overall risk onto risk plots of annual probability vs. life loss potential and comparing the results to tolerability limits established by the Australian National Committee on Large Dams. For construction of improvements to dams in NYSCC's portfolio, Mr. Avery participates on Potential Failure Mode Analysis (PFMA) teams that evaluate risk of failure during construction of improvements.

In the field of water resources, Mr. Avery's experience encompasses planning, engineering, and design. His principal disciplines of concentration are surface water hydrology; open- and closed-channel hydraulics; revetment, bridge, and channel scour; and sediment transport. Mr. Avery has used steady and unsteady flow hydraulic models such as the HEC and National Weather Service software, ADH, and DYNLET. His design experience covers hydraulic structures, dams, sewers, highway and bridge hydraulics, penstocks, natural channels, and riprap revetment. Mr. Avery's relevant experience includes serving as the project manager and lead hydrologist for the Chase-Hibbard Dam Fish Ladder and Portage Study in Elmira, New York. The fish ladder project involved hydrologic analysis of discharges to determine operational hydraulic requirements for the fish ladder during the migration season, and under high-flow and low-flow conditions; determination of target fish species; review of a previous fish ladder design; estimation of costs; and evaluation of the conceptual design.

Mr. Avery was project manager for the 1D- and 2D-hydraulic and sediment transport modeling involving a reach of the Hudson River estuary in the vicinity of Gays Point using HEC-RAS and ADH. The New York State Department of Environmental Conservation permit for the New York Bridge Project required that the New York State Thruway Authority consider a restoration of a secondary channel at Gays Point as compensatory mitigation for project-related impacts. Gays Point is a man-made peninsula consisting of dredge fill that creates a tidal embayment (i.e., contiguous backwater) that is separated from the main channel of the Hudson River. The proposed restoration consisted of excavating a channel through the existing uplands of Gays Point to connect the tidal embayment to the main channel of the Hudson River

via a secondary channel, thus providing geometric conditions with greater variation in discharge, velocity and stage, and coarser substrates that are known to result in a healthier aquatic ecosystem.

Mr. Avery was responsible for site assessment and oversight of hydraulic modeling and proposed design for a Nature Conservancy-supported stream and wetland restoration project in the Parish Flats area at the south end of Canandaigua Lake in Central New York State. Conceptual designs included wetland enhancement, grassland enhancement, stream modifications, and hydraulic conveyance modifications to provide better access to the floodplain and increased floodplain storage along Naples and Parish Creeks. The project included hydraulic survey, groundwater well and stream gage installation, site reconnaissance, H&H modeling, preliminary engineering design, and cost estimates.

Mr. Avery was project manager and senior hydraulic engineer on the Fall Brook Acid Mine Drainage Section 206 Ecosystem Restoration Project, responsible for the engineering tasks (hydrology, hydraulics, cost estimating, plan development). This project included 7,000 feet of ecological stream restoration of Fall Brook and Murin Run using fluvial geomorphologic principles. The key components of the project included providing an impermeable liner to eliminate exfiltration and restore the stream's aquatic habitat by removing obstacles to fish passage, providing in-stream structure (J-hooks, cross-vanes, boulder clusters) and cover, and providing a low-flow channel. Hydrologic records were used to develop base flow conditions. Mr. Avery led the development of a HEC-RAS model for existing and improved conditions, assessed existing drainage structures, and determined impacts of the proposed improvements on floodplains.

As a channel design expert, Mr. Avery served as project manager for the engineering and design of a 2,000-foot-long section of Minisceongo Creek. The creek had experienced severe channel erosion, including failure of gabion sections, slope failures, and collapse of drainage outfall pipes. Mr. Avery developed a repair strategy and prepared plans, specifications, permits, and cost estimates to repair the primary damage area. He has conducted physical hydraulic modeling (including for Control Structure 46 for the Monroe County Department of Engineering in Rochester, New York) and has done extensive work with dams, navigation channels, locks, spillways, and outlet works.

Mr. Avery provided dam safety compliance support services to the New York State Canal Corporation to meet New York State Department of Environmental Conservation Part 673 regulations. These services included hazard class re-revaluations; emergency action plans (EAPs); dam breaching analyses; inundation mapping; inspection and maintenance plans; condition inspections; and engineering assessment reports for over a dozen high- and intermediate-hazard dams. He performed dam breaching and inundation mapping analyses on another 13 dams to confirm the hazard class. This effort resulted in the preparation of full EAPs for six intermediate-hazard-class dams and recommendation for reclassification to a low-hazard class for seven dams. He also provided hydraulic and structural analyses services to support the revised operational guidance and structural rehabilitation of Movable Dams 4 through 11 on the Mohawk River, following damages and flooding that occurred during Hurricane Irene and Tropical Storm Lee.

Mr. Avery was the lead H&H engineer for a $27.5 million major rehabilitation project at Emsworth Dam on the Ohio River (USACE Pittsburgh District). He was responsible for the analysis and design of new grout-bag scour protection downstream of the eight gate bays and one fixed crest weir bay, tie-ins for the grout bags to the dam apron, lock river wall, and left abutment. He prepared contract drawings, specifications, construction cost estimates, Design Documentation Report, and Engineering Considerations and Instructions for Field Personnel for the grout bag scour protection work.

In addition, Mr. Avery is capable of addressing USACE Safety Assurance Review (SAR) as applied to this IEPR. He has served as a panel member for Type I and Type II IEPRs on other USACE projects that posed a significant threat to human life and public safety; the review charge included elements of SAR. Mr. Avery is a member of the American Society of Civil Engineers (ASCE), the Society of American Military Engineers, the American Water Resource Association, the New York State Floodplain and Stormwater Managers Association, the Association of State Dam Safety Officials, and the United States Society for Dams. He is a diplomate of the American Association of Water Resources Engineers and is a Certified Floodplain Manager.

Name	Charles Aubeny, Ph.D., P.E.
Role	Geotechnical Engineer
Affiliation	Independent Consultant

Dr. Aubeny is a professor at Texas A&M University teaching soil mechanics, geotechnical design, geotechnical testing, and numerical methods in geotechnical engineering. He earned his Ph.D. in civil engineering from the Massachusetts Institute of Technology in 1992 and is a registered P.E. in Colorado, Texas, and California. His experience includes over 19 years of academic research and external consulting involving slope stability, in situ testing, numerical analysis, foundations and pipelines, and unsaturated soils; 8 years with the Embankment Dams Branch of the U.S. Bureau of Reclamation (USBR); and 7 years in private consulting. His geotechnical engineering experience relevant to levee and earth dam design and construction includes supervising geotechnical field investigations and laboratory testing programs; supervising and/or performing analyses for seepage, static and dynamic slope stability, static settlement, liquefaction, seismically induced settlements, and wave runup; developing and evaluating various foundation remediation alternatives; designing earthen embankments, including the internal filter and drainage systems; designing slope protection measures; designing instrumentation systems for monitoring; supervising cost comparisons for various design alternatives; preparing specifications; preparing construction considerations and monitoring construction; developing guidelines for reservoir first filling and dam operation, and evaluating the safety of existing dams and levees and preparing upgrade alternatives to address deficiencies. His expertise includes performing cost engineering and construction management for all phases of flood risk management, including levee engineering experience (1992-1999) that included comparative cost evaluations and quantity/cost estimates on dam design and remediation alternatives in embankment dam design at USBR (1978-1986).

Dr. Aubeny's experience includes the following projects: director of geotechnical investigations for the Elk Grove Bufferlands Mitigation for the California Department of Water Resources; director of site investigations, geotechnical analyses, geotechnical quality control and instrument monitoring for the Mokelumne Aqueduct Upgrade for the East Bay Municipal Utility District; resident engineer for the Butt Valley Dam seismic upgrade and stream channel restoration for Pacific Gas & Electric; director of site investigations and geotechnical analyses for upgrades to the North Beach Lake and the regional wastewater treatment plant flood control system for the Sacramento Area Flood Control Agency involving both earthen embankments and concrete floodwalls; the Twitchell Island, Sherman Island, and Hotchkiss Tract levees for individual reclamation districts in coordination with the California Department of Water Resources; and wastewater retention dikes for Sonoma County. At the USBR, he served as design engineer involved in all phases of the McGee Creek Dam project in southeast Oklahoma, including geotechnical site characterization; evaluation of earthen and rockfill embankment alternatives; final

design addressing issues of slope stability, through- and under-seepage, dispersive erosion, settlement, riprap slope protection, freeboard, and appurtenant structures such as outlet conduits; and monitoring of construction to provide design approval for adequacy of the foundation excavation and surface treatment, the grout curtain, and the earthfill placement. His USBR experience also includes safety evaluations of existing dams throughout 17 Western states. He drafted the USBR Design Standards for Foundation Surface Treatment for Embankment Dams, which were in effect from 1986 until they were incorporated into an updated version in 2012.

Dr. Aubeny has performed independent external peer reviews for the Freeport Harbor Navigation Improvement Project (2008), the Mississippi Coastal Improvement Study (2008-2009), the Santa Maria and Bradley Canyon, California, levees (2010-2012), the Kansas City, Missouri and Kansas, Flood Risk Management Project (2012-2014), the Dallas Floodway Feasibility Study and Environmental Impact Statement (2013), the Lower San Joaquin River, California, Flood Risk Management Feasibility Study (2015-2017), and the City of Norfolk, Virginia, Coastal Storm Risk Management Feasibility Study (2017-2018). Collectively, these reviews addressed topics of risk assessment; adequacy of geotechnical site investigations; slope stability analysis; seepage analysis; riprap and soil cement slope protection; seepage barriers such as slurry trenches and sheetpile walls; drainage measures, including relief wells; regional impacts of seepage control measures; floodwall stability; pile supports for floodwalls; closure structures; encroachments to embankments; internal erosion; wave runup; overtopping; soil improvement; constructability; and construction quality control. He is capable of addressing the USACE SAR aspect of projects and has served on the USACE SAR panel for the Santa Maria Levee slope protection upgrade.

Dr. Aubeny has practical experience with commercial software supporting geotechnical analysis and design for slope stability, seepage, deformation and settlement, pile installation, axial and lateral pile response, and seismic response. He also teaches two graduate courses in numerical methods covering both theoretical development and practical applications for these types of programs. He actively participates in related professional engineering activities and has published more than 80 professional papers. He is a Fellow in the ASCE and serves as Associate Editor for two prominent journals: the ASCE Journal of Geotechnical and Geoenvironmental Engineering and the American Society for Testing and Materials (ASTM) Journal of Geotechnical Testing.

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APPENDIX C

Final Charge for the Prado Basin IEPR

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Charge Questions and Guidance to the Panel Members for the Independent External Peer Review (IEPR) of the Prado Basin, Corona, California, Feasibility Report and Environmental Impact Statement (FR/EIS)

This is the final Charge to the Panel for the Prado Basin IEPR. This final Charge was submitted to USACE as part of the final Work Plan, originally submitted on October 24, 2018. Due to a delay in receipt of the documents, the Charge was updated in February 2019 to include dates that reflected the potential review period of performance. The dates and page counts in this document have not been updated since to match actual changes made throughout the project.

Charge Questions and Guidance to the Panel Members

BACKGROUND

The study area includes the Prado Dam Basin near Corona, California, and lies within the Santa Ana River watershed approximately 25 miles southeast of Los Angeles, California. The study area extends along the Santa Ana River from the Prado Dam Basin to the Pacific Ocean, over a reach of approximately 30.5 miles. The proposed Project Area is located within the footprint of the Santa Ana River Mainstem Project (SARM) and encompasses most of the Prado Basin, including approximately 4,500 acres of riparian habitat immediately upstream of Prado Dam, and extends along Reach 9 of the Santa Ana River for 7 miles downstream of Prado Dam. While this study considers impacts of potential project features within the entire study area, the project area is a subset of the study area as potential features and active management activities for the project would not extend beyond Reach 9 of the Santa Ana River in the downstream direction. The partners in this study, the U.S. Army Corps of Engineers (USACE) Civil Works Program and the Orange County Water District (OCWD), have responsibilities for managing the Santa Ana River to address a variety of public objectives for water resource management. The Prado Dam and flood control basin were constructed in 1941 to provide flood risk management for developed areas of Orange County. This major water control feature can be adapted and supplemented with additional measures to address two water resource management objectives: ecosystem restoration and water conservation. The ecosystem restoration measures included in this study have been developed and evaluated to restore the quality and function of aquatic, riparian, and transitional habitats within the study area, and to address obstacles to regional wildlife movement for both terrestrial and aquatic species. The purpose of water conservation for this study is to increase water retention at Prado Dam that would be released to support groundwater recharge at OCWD's facilities along the Santa Ana River watershed downstream of Prado Dam. To that end, the operation of the dam would be changed to impound more water and then release stored water in a controlled manner to optimize recharge of aquifers associated with downstream reaches of the Santa Ana River. Water conservation measures would also allow OCWD to adjust the timing and flow rate of releases to increase the quantity of water provided to downstream intake structures.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Prado Basin, Corona, California, Feasibility Report and Environmental Impact Statement (FR/EIS) (hereinafter Prado Basin 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			
		Economics	Civil Works Planner/ Environmental Resources & Compliance (Dual Role)	H&H/Civil Engineer (Dual Role)	Geotech-nical Engineer
Integrated Draft Feasibility Report and EIS	674	674	674	674	674
Appendix A: Mailing List	6		6		
Appendix B: 404(B)(1) Evaluation	136		136		
Appendix C: Coordination Act Report	4		4		
Appendix D: Combined Habitat Assessment Protocols (CHAP)	236		236		
Appendix E: Monitoring and Adaptive Management Plan	32		32		
Appendix F: Mitigation, Monitoring and Reporting Plan	28		28		
Appendix G: Biological Assessment	172		172		
Appendix H: Air Quality/Greenhouse Gases	90		90		
Appendix I: Cultural Resources Assessment	94		94		
Appendix J: Traffic Impact Analysis	250	250	250		
Appendix K: Design	102			102	102
Appendix L: Cost	62	62		62	
Appendix M: Geotechnical	60			60	60

Review Documents	No. of Review Pages	Subject Matter Experts			
		Economics	Civil Works Planner/ Environmental Resources & Compliance (Dual Role)	H&H/Civil Engineer (Dual Role)	Geotech-nical Engineer
Appendix N: Hydrology & Hydraulic & Sediment Management	92			92	92
Appendix O: Real Estate	54		54		
Appendix P: Economics	60	60			
Appendix Q: HTRW	16		16		
Public Review Comments[a]	100	100	100	100	100
Risk Register[b]	30	30	30	30	30
Total Number of Review Pages	**2298**	**1176**	**1922**	**1120**	**1058**

[a] USACE will submit public comments to Battelle, which will in turn submit to the IEPR Panel.

[b] Supplemental information.

Documents for Reference

- USACE guidance *Review Policy for Civil Works,* (EC 1165-2-217, February 20, 2018)
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004)
- Foundations of SMART Planning
- Feasibility Study Milestones (PB 2017-01)
- SMART – Planning Overview
- Planning Modernization Fact Sheet.

SCHEDULE & DELIVERABLES

This schedule is based on the receipt date of the final review documents and may be revised if review document availability changes. This schedule may also 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	Scope Summary - Milestones and Deliverables	Due Date Working Days
Attend Meetings and Begin Peer Review	Battelle sends review documents to panel members	2/7/2019
	Battelle convenes kick-off meeting with USACE and panel members	TBD
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	2/21/2019
	Agency Decision Milestone Meeting	TBD
Prepare Final Panel Comments and Review Public Comments	Panel members complete their review of the documents	3/8/2019
	Battelle provides talking points to panel members for Panel Review Teleconference	3/12/2019
	Battelle convenes Panel Review Teleconference	3/13/2019
	Battelle provides Final Panel Comment templates and instructions to panel members	3/14/2019
	Panel members provide draft Final Panel Comments to Battelle	3/20/2019

Task	Scope Summary - Milestones and Deliverables	Due Date Working Days
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	3/21/2019 - 3/27/2019
	Panel finalizes Final Panel Comments	3/28/2019
	Battelle receives public comments from USACE	3/27/2019
	Battelle sends public comments to Panel	3/29/2019
	Panel members complete their review of the public comments	4/3/2019
	Battelle and Panel review the Panel's responses to the charge question regarding the public comments	4/4/2019
	Panel drafts Final Panel Comment on public comments, if necessary	4/8/2019
	Panel finalizes Final Panel Comment regarding public comments, if necessary	4/10/2019
Review Final IEPR Report	Battelle provides Final IEPR Report to panel members for review	4/12/2019
	Panel members provide comments on Final IEPR Report	4/16/2019
	Battelle submits Final IEPR Report to USACE*	4/18/2019
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	4/25/2019
Comment/ Response Process	Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	4/29/2019
	Battelle convenes teleconference with USACE to review Comment Response process	4/29/2019
	Battelle convenes teleconference with Panel to review Comment Response process	4/29/2019
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	5/13/2019
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	5/17/2019
	USACE PCX provides draft PDT Evaluator Responses to Battelle	5/20/2019
	Battelle provides draft PDT Evaluator Responses to panel members	5/22/2019
	Panel members provide draft BackCheck Responses to Battelle	5/28/2019
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	5/29/2019
	Battelle convenes Comment Response Teleconference with panel members and USACE	5/30/2019
	USACE inputs final PDT Evaluator Responses to DrChecks	6/6/2019
	Battelle provides final PDT Evaluator Responses to panel members	6/7/2019
	Panel members provide final BackCheck Responses to Battelle	6/12/2019
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	6/13/2019
	Battelle submits pdf printout of DrChecks project file*	6/14/2019
	Contract End/Delivery Date	8/31/2019

***** 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 Prado Basin, Corona, California, Feasibility Report and Environmental Impact Statement (FR/EIS)

Charge Questions and Relevant Sections as Supplied by USACE

The following charge to reviewers outlines the objectives of the Independent External Peer Review (IEPR) for the subject study and identifies specific items for consideration for 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 and to address the specific technical and scientific questions included in the review 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 review charge. The Panel can use all available information to determine what scientific and technical issues related to the decision document may be important to raise to decision makers. This includes comments received from agencies and the public as part of the public review process.

The Panel's 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 would 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 a brief statement of the comment, explaining why it is important, outlining any potential consequences of failure to address, and providing suggestions on how to address the comment.

The Panel is asked to consider the following items as part of its review of the decision document and supporting materials.

<u>Broad Evaluation Review Charge Questions</u>

1. Are the need for and intent of the decision document clear?

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

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, and;

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.

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

Safety Assurance Review Charge Questions

Since project designs are initiated in the decision document phase, a Safety Assurance Review (SAR) is incorporated into Type I IEPR. For the Tentatively Selected Plan, assess whether:

14. The models used to assess life safety hazards are appropriate;

15. The assumptions made for the life safety hazards are appropriate;

16. The quality and quantity of the surveys, investigations, and engineering are sufficient for a concept design considering the life safety hazards and to support the models and assumptions made for determining the hazards;

17. The analysis adequately addresses the uncertainty and residual risk given the consequences associated with the potential for loss of life for this type of project; and

18. From a public safety perspective, the proposed alternative is reasonably appropriate or are there other alternatives that should be considered.

Specific Technical and Scientific Review Charge Questions

19. Evaluate whether the potential risks of holding water behind Prado Dam for longer periods of the year and/or holding water at higher elevations have been assessed appropriately.

20. Evaluate whether the interpretations of the flood forecasting analysis and conclusions based on this analysis are reasonable in consideration of timing of the evacuation of the pool behind Prado Dam.

21. Assess the adequacy of the water demand analysis used to identify future water use in the OCWD service area as well as the water supply analysis to identify future sources of water that are expected to be available.

22. Assess the assumptions used to identify the future without-project and future with-project sediment transport rates in the study area, especially downstream of Prado Dam.

23. Are the assumptions regarding study area water demand, supply, and projected water supply costs and benefits reasonable and at an appropriate level of detail to support the water conservation benefit/cost analysis?

24. Was the cost effectiveness and incremental cost analysis for ecosystem restoration measures and plans conducted in accordance with proper methodology, as outlined in the Planning Guidance Notebook, and utilizing the Institute for Water Resources (IWR) Planning Suite software?

25. Did the feasibility study include an assessment of the regional economic development impacts associated with the Tentatively Selected Plan, and was this analysis conducted utilizing appropriate methodology and utilizing USACE's Regional Economic Systems (RECONS) software?

Battelle Summary Charge Questions to the Panel Members

Summary Questions

26. 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.

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

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APPENDIX D

Conflict of Interest Form

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Conflicts of Interest Questionnaire

Independent External Peer Review

Prado Basin, Corona, California Feasibility Report and Environmental Impact Statement (FR/EIS)

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: **Jason Jenkins**
TELEPHONE: **614-424-4873**
ADDRESS: **505 King Avenue, Columbus, Ohio 43201**
EMAIL ADDRESS: **jenkinsj@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.

Jason Jenkins — 8/21/2018 Date

BATTELLE

It can be done