Final Independent External Peer Review Report Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project

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

Contract No. W912HQ-15-D-0001
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BATTELLE
It can be done

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Executive Summary

PROJECT BACKGROUND AND PURPOSE

The Lake Okeechobee Watershed Restoration Project (LOWRP), a single-purpose ecosystem restoration project, was approved by Congress as part of the Comprehensive Everglades Restoration Plan (CERP) in the Water Resources Development Act of 2000. The non-Federal sponsor is the South Florida Water Management District (SFWMD).

The northern Lake Okeechobee watershed is located in portions of Martin, Okeechobee, Glades, and Highlands counties. The study area encompasses approximately 950 square miles of the northern watershed adjacent to Lake Okeechobee. Water flows into the study area from the Kissimmee Chain of Lakes and northern Kissimmee River and from Lake Istokpoga. The project area, where project features would be constructed, includes five sub-basins (Fisheating Creek, Indian Prairie, S-65D, S-65E, and Taylor Creek/Nubbin Slough) and Lake Okeechobee.

The objectives of the study are to:

- Better manage discharges from Lake Okeechobee to improve the salinity regime and the quality of oyster and submerged aquatic vegetation habitat in the northern estuaries
- Increase Lake Okeechobee aquatic and wildlife habitat (attenuate extreme high and low water levels)
- Increase the spatial extent and functionality of wetland habitat in the watershed
- Increase water supply availability to existing legal water users of Lake Okeechobee

LOWRP proposes structural and operational modifications to the Central and Southern Florida (C&SF) project to achieve restoration of the Everglades and the south Florida ecosystem, while considering other water-related needs such as urban and agricultural water supply and flood risk management. LOWRP will increase water storage capacity in the watershed, resulting in improved Lake Okeechobee water levels; improve the quantity and timing of discharges to the St. Lucie and Caloosahatchee estuaries that adversely affect salinity and estuarine biota; restore degraded habitat for fish and wildlife throughout the study area; and increase the spatial extent and functionality of wetlands.

Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The U.S. Army Corps of Engineers (USACE) is conducting an Independent External Peer

Review (IEPR) of the Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project (hereinafter: LOWRP IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (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: Civil Works planning, economics, aquatic and wetland ecology, hydrology and hydraulic (H&H) engineering, civil engineering, and geotechnical engineering or geology. 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 (1,427 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, 12 Final Panel Comments were identified and documented. Of these, four were identified as having high significance, two had medium/high significance, four had medium significance, one had medium/low significance, and one had low significance.

Battelle received public comments from USACE on the LOWRP (approximately 214 pages of public comment transcripts and 122 pages of other comments that had been compiled by USACE) 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 LOWRP review documents. After completing its review, the Panel confirmed that no new 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 LOWRP review documents. Table ES-1 lists the Final Panel Comment statements by level of significance. The full text of the Final Panel Comments is presented in Section 4.2 of this report. The following summarizes the Panel's findings.

Based on the Panel's review, the report is well-organized and well-written, and documents that USACE applied a rigorous methodology in developing the draft integrated Project Implementation Report/Environmental Impact Statement (PIR/EIS). However, the Panel identified several elements of the project where additional analysis is warranted and places where project findings and objectives need to be clarified, documented, or revised.

Engineering: The Panel understands that under SMART Planning, the PDT will conduct future analyses on the actual design of the project during the pre-construction engineering and design (PED) phase. This is reiterated in the report. However, due to the complex nature of this project, including high risk factors for public safety, project performance, and project cost, the lack of technical details on the engineering analysis, geotechnical investigations, and hydrologic-hydraulic modeling of the alternatives is the Panel's greatest concern. Without these details and data, the Panel cannot determine whether the project is feasible or safe, and the Panel notes that the related uncertainties have led to very high cost contingencies being applied. The Panel believes that information used to date does not rise to the level of a conceptual design or feasibility assessment that would allow for a proper assessment of the adequacy and acceptability of the methods and analyses used. Other engineering concerns raised by the Panel because of a lack of information include a concern that increased peak elevations in Lake Okeechobee and increased frequency and duration above Extreme High Stage could present a risk to the Herbert Hoover Dike (HHD) given its current Dam Safety Action Classification (DSAC) 1 status. In addition, the Panel is concerned about the uncertainty that remains around the extent and rate of aquifer storage and recovery (ASR) development as proposed for the alternatives and the Tentatively Selected Plan (TSP).

Plan Formulation/Economics: The PIR/EIS is unclear regarding the results of some analyses among the range of alternatives. For example, the results of the analysis for the future without (FWO) project alternative show an increased number of benefits with no direct costs, but it is unclear why that alternative was not identified as the TSP. Statements made in the PIR/EIS suggest that the FWO project alternative could be the TSP, or that other existing alternatives that would provide more benefit to Lake Okeechobee and the northern estuaries were not considered. Other statements indicate that there is no significant difference among the three action alternatives and the FWO project alternative. These statements led the Panel to question whether the FWO project alternative could be the TSP. In addition, the Panel found some statements in the PIR/EIS concerning the Existing Conditions Baseline (ECB) to be confusing because, in several instances, the statements treat the ECB as if it were an alternative.

With regard to the development of the alternatives and plan formulation, the Panel noted that in the cost effectiveness/incremental cost analyses (CE/ICAs), the assumptions used for the Lake Okeechobee Regulation Schedule (LORS) under the FWO project alternative did not include modifications to the LORS that were added for the action alternatives. Since some of the modifications (such as ongoing repairs to the HHD and new CERP infrastructure) are based on planned changes in the LORS, a similar level of optimization should be applied for the FWO project scenario. The Panel also found that the PIR/EIS does not devote equal consideration to the no-action (FWO project) alternative as required by

the National Environmental Policy Act (NEPA). Per NEPA, the FWO project alternative should be considered throughout the EIS.

Environmental: The Panel found that the environmental assessment methodology used to prepare the PIR/EIS was generally rigorous; however, two items warrant more thorough analysis. First, the Panel found that the performance evaluation of alternatives did not include a quantitative assessment of adverse impacts. These potential project impacts were not aggregated into a quantitative measure and compared to the FWO project alternative, as the potential project benefits were. Second, panel members noted that the range of alternatives did not include components to directly improve water quality flowing into Lake Okeechobee or a detailed evaluation of the water quality impacts of the lake's releases on the St. Lucie and Caloosahatchee estuaries and coastal regions.

Table ES-1. Overview of 12 Final Panel Comments Identified by the LOWRP IEPR Panel

No.	Final Panel Comment
Significance – High	
1	Technical details of the engineering analysis for the alternatives are either inadequate or, in some cases, absent.
2	Documentation of technical details for the geotechnical investigation and analysis of the alternatives is incomplete.
3	The technical discussion of H&H modeling for the alternatives does not provide sufficient details.
4	Based on the information provided in the PIR/EIS, it is unclear why the FWO project alternative is not the TSP given its increased number of benefits and no direct cost.
Significance – Medium/High	
5	Based on NEPA requirements, the FWO project alternative has not been properly considered in the PIR/EIS.
6	In the CE/ICAs, modifications added to the LORS under the action alternatives were not added under the FWO project alternative, making the comparison of alternatives more difficult.

Table ES-1. Overview of 12 Final Panel Comments Identified by the LOWRP IEPR Panel (continued)

No.	Final Panel Comment
Significance – Medium	
7	The range of alternative plans does not include components to directly improve water quality flowing into Lake Okeechobee or a detailed evaluation of the water quality impacts of the lake's releases on the St. Lucie and Caloosahatchee estuaries and coastal regions.
8	Uncertainty about the extent and rate of ASR development is not addressed in the alternatives analysis and the selection of the TSP.
9	The alternatives analysis in the PIR/EIS indicates that TSP implementation and operation would result in increased peak elevations in Lake Okeechobee and increased frequency and duration above Extreme High Stage, which could present a risk to the HHD.
10	The performance evaluation of alternatives does not include a quantitative assessment of potential adverse impacts under the action alternatives.
Significance – Medium/Low	
11	In numerous places in the PIR/EIS, the ECB appears to be treated as an alternative.
Significance – Low	
12	The PIR/EIS does not explain why a study of the lake's entire watershed was not included or why a watershed approach was not considered.

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LIST OF ACRONYMS

AAHU	Average Annual Habitat Unit
ac-ft	acre-foot
ADM	Agency Decision Milestone
AMMP	Adaptive Management and Monitoring Plan
APT	Aquifer Performance Test
ASR	Aquifer Storage and Recovery
C&SF	Central and Southern Florida
CE/ICA	Cost Effectiveness/Incremental Cost Analysis
CEPP	Central Everglades Planning Project
CERP	Comprehensive Everglades Restoration Plan
CHT	Constant Head Gravity Test
COI	Conflict of Interest
DrChecks	Design Review and Checking System
DRI	Double Ring Infiltrometer
DSAC	Dam Safety Action Classification
DSMR	Dam Safety Modification Report
EA	Environmental Assessment
EC	Engineer Circular
ECB	Existing Conditions Baseline
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ERDC	Engineer Research and Development Center
FDEP	Florida Department of Environmental Protection
FWO	Future Without (Project)
H&H	hydrology and hydraulic
HEC-FDA	Hydrologic Engineering Center Flood Damage Reduction Analysis
HEC-RAS	Hydrologic Engineering Center River Analysis System
HHD	Herbert Hoover Dike
HSDRRS	Hurricane Storm Damage and Risk Reduction System
HU	Habitat Unit

IEPR	Independent External Peer Review
IMC	Interagency Modeling Center
IRLS	Indian River Lagoon South
IWR	Institute for Water Resources
LECSA	Lower East Coast Service Areas
LiDAR	Light Detection and Ranging
LORS	Lake Okeechobee Regulation Schedule
LOWRP	Lake Okeechobee Watershed Restoration Project
NEPA	National Environmental Policy Act
O&M	Operation and Maintenance
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
PCX	Planning Center of Expertise
PDT	Project Delivery Team
PED	Pre-construction Engineering and Design
PIR	Project Implementation Report
RECOVER	REstoration COordination and VERification
RESOPS	Reservoir Sizing and Operations Screening
RSM-BN	Regional Simulation Model-Basins
RSM-GL	Regional Simulation Model-Glades
SAV	Submerged Aquatic Vegetation
SFWMM	South Florida Water Management Model
SFWMD	South Florida Water Management District
SPT	Standard Penetration Test
STA	Stormwater Treatment Area
USACE	United States Army Corps of Engineers
USSD	United States Society of Dams
TMDL	Total Maximum Daily Load
TSP	Tentatively Selected Plan
WAF	Wetland Attenuation Feature
WAM	Watershed Assessment Model

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1. INTRODUCTION

The Lake Okeechobee Watershed Restoration Project (LOWRP), a single-purpose ecosystem restoration project, was approved by Congress as part of the Comprehensive Everglades Restoration Plan (CERP) in the Water Resources Development Act of 2000. The non-Federal sponsor is the South Florida Water Management District (SFWMD).

The northern Lake Okeechobee watershed is located in portions of Martin, Okeechobee, Glades, and Highlands Counties. The study area encompasses approximately 950 square miles of the northern watershed adjacent to Lake Okeechobee. Water flows into the study area from the Kissimmee Chain of Lakes and northern Kissimmee River and from Lake Istokpoga. The project area, where project features would be constructed, includes five sub-basins (Fisheating Creek, Indian Prairie, S-65D, S-65E, and Taylor Creek/Nubbin Slough) and Lake Okeechobee.

The objectives of the study are to:

- Better manage discharges from Lake Okeechobee to improve the salinity regime and the quality of oyster and submerged aquatic vegetation habitat in the northern estuaries
- Increase Lake Okeechobee aquatic and wildlife habitat (attenuate extreme high and low water levels)
- Increase the spatial extent and functionality of wetland habitat in the watershed
- Increase water supply availability to existing legal water users of Lake Okeechobee

LOWRP proposes structural and operational modifications to the Central and Southern Florida (C&SF) project to achieve restoration of the Everglades and the south Florida ecosystem, while considering other water-related needs such as urban and agricultural water supply and flood risk management. LOWRP will increase water storage capacity in the watershed, resulting in improved Lake Okeechobee water levels; improve the quantity and timing of discharges to the St. Lucie and Caloosahatchee estuaries that adversely affect salinity and estuarine biota; restore degraded habitat for fish and wildlife throughout the study area; and increase the spatial extent and functionality of wetlands.

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 Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project (hereinafter: LOWRP IEPR) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers (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 LOWRP 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 LOWRP 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 LOWRP 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: Civil Works planning, economics, aquatic and wetland ecology, hydrology and hydraulic (H&H) engineering, civil engineering, and geotechnical engineering or geology. The Panel reviewed the LOWRP documents and produced 12 Final Panel Comments in response to 22 charge questions provided by USACE for the review. This charge included two overview questions and one public comment question added by Battelle. Battelle instructed the Panel to develop the Final Panel Comments using a standardized four-part structure:

1. Comment Statement (succinct summary statement of concern)
2. Basis for Comment (details regarding the concern)
3. Significance (high, medium/high, medium, medium/low, or low; in accordance with specific criteria for determining level of significance)
4. Recommendation(s) for Resolution (at least one implementable action that could be taken to address the Final Panel Comment).

Battelle reviewed all Final Panel Comments for accuracy, adherence to USACE guidance (EC 1165-2-217), and completeness prior to determining that they were final and suitable for inclusion in the Final IEPR Report. There was no direct communication between the Panel and USACE during the preparation

of the Final Panel Comments. The Panel's findings are summarized in Section 4.1; the Final Panel Comments are presented in full in Section 4.2.

4. RESULTS OF THE IEPR

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

4.1 Summary of Final Panel Comments

Based on the Panel's review, the report is well-organized and well-written, and documents that USACE applied a rigorous methodology in developing the draft integrated Project Implementation Report/Environmental Impact Statement (PIR/EIS). However, the Panel identified several elements of the project where additional analysis is warranted and places where project findings and objectives need to be clarified, documented, or revised.

Engineering: The Panel understands that under SMART Planning, the PDT will conduct future analyses on the actual design of the project during the pre-construction engineering and design (PED) phase. This is reiterated in the report. However, due to the complex nature of this project, including high risk factors for public safety, project performance, and project cost, the lack of technical details on the engineering analysis, geotechnical investigations, and hydrologic-hydraulic modeling of the alternatives is the Panel's greatest concern. Without these data, the Panel cannot determine whether the project is feasible or safe, and the Panel notes that these uncertainties have led to very high cost contingencies being applied. The Panel believes that information used to date does not rise to the level of a conceptual design or feasibility assessment that would allow for a proper assessment of the adequacy and acceptability of the methods and analyses used. Other engineering concerns raised by the Panel because of a lack of information include a concern that increased peak elevations in Lake Okeechobee and increased frequency and duration above Extreme High Stage could present a risk to the Herbert Hoover Dike (HHD) given its current Dam Safety Action Classification (DSAC) 1 status. In addition, the Panel is concerned about the uncertainty that remains around the extent and rate of aquifer storage and recovery (ASR) development as proposed for the alternatives and the Tentatively Selected Plan (TSP).

Plan Formulation/Economics: The PIR/EIS is unclear regarding the results of some analyses among the range of alternatives. For example, the results of the analysis for the future without (FWO) project alternative show an increased number of benefits with no direct costs, but it is unclear why that alternative was not identified as the TSP. Statements made in the PIR/EIS suggest that the FWO project alternative could be the TSP, or that other existing alternatives that would provide more benefit to Lake Okeechobee and the northern estuaries were not considered. Other statements indicate that there is no significant difference among the three action alternatives and the FWO project alternative. These statements led the Panel to question whether the FWO project alternative could be the TSP. In addition, the Panel found some statements in the PIR/EIS concerning the Existing Conditions Baseline (ECB) to be confusing because, in several instances, the statements treat the ECB as if it were an alternative.

With regard to the development of the alternatives and plan formulation, the Panel noted that in the cost effectiveness/incremental cost analyses (CE/ICAs), the assumptions used for the Lake Okeechobee Regulation Schedule (LORS) under the FWO project alternative did not include modifications to the LORS that were added for the action alternatives. Since some of the modifications (such as ongoing repairs to the HHD and new CERP infrastructure) are based on planned changes in the LORS, a similar

level of optimization should be applied for the FWO project scenario. The Panel also found that the PIR/EIS does not devote equal consideration to the no-action (FWO project) alternative as required by the National Environmental Policy Act (NEPA). Per NEPA, the FWO project alternative should be considered throughout the EIS.

Environmental: The Panel found that the environmental assessment methodology used to prepare the PIR/EIS was generally rigorous; however, two items warrant more thorough analysis. First, the Panel found that the performance evaluation of alternatives did not include a quantitative assessment of adverse impacts. These potential project impacts were not aggregated into a quantitative measure and compared to the FWO project alternative, as the potential project benefits were. Second, panel members noted that the range of alternatives did not include components to directly improve water quality flowing into Lake Okeechobee or a detailed evaluation of the water quality impacts of the lake's releases on the St. Lucie and Caloosahatchee estuaries and coastal regions.

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

Technical details of the engineering analysis for the alternatives are either inadequate or, in some cases, absent.

Basis for Comment

Based on the contents in Appendix A-Engineering, the amount of Light Detection and Ranging (LiDAR) data used for the study is limited, and no physical survey was performed for the study. The PIR/EIS is devoid of engineering analysis, including hydraulic design and infrastructures. USACE acknowledges this shortcoming and notes that an engineering design report will be prepared, which will document the necessary engineering analyses for the updated conceptual design and construction.

The PIR/EIS presents NGVD29 as the vertical datum reference, whereas the Appendix A-Engineering supplement presents NAVD88 as the vertical datum reference. This is confusing and creates inconsistency in presenting engineering data for the project. Typically, a consistent datum or dual format is preferred.

Appendix A claims to present the conceptual design phase, and Section A.2 provides a list of design data that will be used to perform the preliminary design (conceptual design), but none of the design has been completed. The feasibility assessment includes an evaluation of design and construction issues. In the absence of engineering design analysis, this document does not rise to the level of conceptual design/preliminary design.

Value engineering and detailed engineering for canal and conveyance capabilities and structures have not yet been done and are scheduled for the engineering analysis phase. Purported engineering documentation presented in the current (July 2018) version of the PIR/EIS lacks the necessary technical content and also does not rise to the level of conceptual design/preliminary design.

The absence of detailed engineering analyses introduces project performance risk and led to the use of very high contingencies in the cost estimates, particularly in reference to the wetland attenuation feature (WAF) embankments.

Significance – High

Without an engineering analysis at the conceptual design level, the level of protection necessary for the community and the public may be compromised/underestimated, constituting a high-risk factor for public safety.

Recommendations for Resolution

1. Conduct a better field survey to represent the project area at a confident level.
2. Perform (at a minimum) the necessary engineering analysis to reflect a preliminary rather than conceptual design level.
3. Document all sources of data used in the study and ensure their accessibility.

Final Panel Comment 1
4. Document cost estimates with backup calculations of quantities and unit costs.

Final Panel Comment 2

Documentation of technical details for the geotechnical investigation and analysis of the alternatives is incomplete.

Basis for Comment

The geotechnical investigation and design analyses for the three major elements (WAF, wetlands, and ASR) are described in Appendix A-Engineering, Sections A.6 through A.8. Such analyses should include, at a minimum, site-specific geotechnical data validity, seepage and slope stability analyses, and settlement and foundation design analyses. The texts presented in these referenced sections are identical and generic and do not include design analysis. The document states that the analyses will be performed in the final PIR/EIS (revised conceptual design/feasibility assessment). Section A.2.6 (p. A-3) states that "Geotechnical design of the project features is based on guidance found in…", and the section subsequently lists the applicable guidance from various sources. But there are insufficient data to perform the design analysis; therefore, it is difficult to understand how the geotechnical design was completed and if so, where the design results are to be found.

The geotechnical data summarized in the document include six 30-foot standard penetration test (SPT) borings for the entire project area, along with a few constant head gravity tests (CHT) and 12 double ring infiltrometer tests (DRI), of which only 6 DRI showed steady trend. This testing was supplemented with extrapolated data from the C-41A Canal project. The details or source references for these borings and test results are missing. The summarized geotechnical and hydrogeological data for the soil layers within the project area are primarily based on non-site-specific published literature values. A limited hydrogeological characterization (a few aquifer performance tests [APTs] and geology results of unnamed exploratory boreholes) is provided for ASR design analysis. Furthermore, the APTs performed at Brighton Reservation, Paradise Run, and Kissimmee River list transmissivity values at two of the three sites that do not appear to be suitable for ASR storage zones in this area. A list of additional geotechnical/hydrogeological data collection programs is presented, but the list does not include any hydrogeological field-testing programs.

The engineering document lists the literature values of engineering properties for various soils/materials, but no geotechnical engineering analysis was performed. The validity of the geotechnical design analyses could not be evaluated in the absence of any analysis.

Although the PIR/EIS, along with all the attachments, acknowledges that the geotechnical analysis is inadequate in its current form and that the analysis will be completed in the future, the geotechnical engineering documentation presented in the current version of the PIR/EIS lacks validity and integrity, and does not rise to the level of conceptual design/feasibility assessment.

Significance – High

Without an accurate geotechnical characterization and valid design analyses, the hazards analysis may severely underestimate risk and thus create a false sense of safety, resulting in a high-risk factor for public safety, project performance, and project cost.

Final Panel Comment 2

Recommendations for Resolution

1. Conduct a more comprehensive field investigation to characterize the sites and develop a reliable data set for geotechnical design analysis.
2. Perform (at a minimum) seepage, slope stability, settlement, and foundation design analyses for all structures at potentially critical locations and for the proposed WAF embankments and seepage canal.
3. Perform a typical ASR well influence analysis and document it with reliable/verifiable data sources. This analysis should include an assessment of potential impacts on regional water supply/irrigation wells, as well as potential impacts on future off-site wells.
4. Conduct supplemental APTs at each of the proposed ASR clusters to quantify the transmissivity and potential insertion and removal efficiencies.
5. Document all sources of data used in the study and ensure their accessibility.

Final Panel Comment 3

The technical discussion of H&H modeling for the alternatives does not provide sufficient details.

Basis for Comment

A comprehensive H&H analysis for the LOWRP would address, at a minimum, flood routing, canal conveyance, hydraulic design, structural modifications, and sea level change effects. The hydrologic modeling section in Appendix A-Engineering presents a systematic description of the modeling system used for the study. The preliminary screening assessments of Lake Okeechobee, northern estuaries, and conceptual sizing of aboveground storage configurations were performed using the Reservoir Sizing and Operations Screening (RESOPS) model to narrow down the number of aboveground features. This was followed by baseline evaluation involving the ECB and FWO project using the Regional Simulation Model-Basins (RSM-BN) model. The RSM-BN model was then used to evaluate the three action alternatives, and the Watershed Assessment Model (WAM) was used to estimate the water availability along main canals and wetland areas. The RSM is a regional-scale, robust and complex, link-node simulation model that implements abstractions of system infrastructures and operations to mimic the intent and result of the desired project features while not matching the exact mechanism (Interagency Modeling Center [IMC] report, p. 88). The eastern boundary conditions for groundwater/surface water flows were generated from the South Florida Water Management Model (SFWMM) regional model, and the southern boundary conditions for structural flows were generated from the RSM-Glades Lower East Coast Service Areas (RSM-GL LECSA) model.

ECB represents the 2018/2019 scenario of system infrastructure assumptions and operational practices. The FWO project represents the baseline condition (no-action alternative) with projections based on ECB and future infrastructures and operational practices dated to 2028. The hydrologic model presents a good comparison of the ECB vs. FWO project with an emphasis on the Lake Okeechobee, St Lucie, and Caloosahatchee stages, and compliance with the regulated stage envelope. The model assumptions, boundary conditions, and implementation for hydrologic conditions appear appropriate but could not be verified because the model output was inaccessible. The details on the model results are not adequately documented, and reference links given in the appendix are not accessible.

More advanced capabilities of RSM such as 1-D canal flow routing and 2-D overland flow/groundwater flow calculations were not used for the study; groundwater hydrology is not explicitly represented within the RSM. Therefore, flood routing, canal conveyance, hydraulic design, structural modifications, and sea level changes were not analyzed during this phase of the study. A detailed analysis of these features is essential for feasibility assessment or conceptual design of the system. The current document acknowledges these shortcomings. These are traditional analyses performed for feasibility level or conceptual design. The report indicates that an advanced H&H model analysis will be performed using the Hydrologic Engineering Center-River Analysis System (HEC-RAS) model for the final draft. In addition, a groundwater model for the alternatives is necessary.

Based on the above description, the technical contents presented at this time are inadequate as this is a conceptual design document and thus hazards analysis may not be accurate as presented.

Final Panel Comment 3

Additionally, breach modeling of the deep-water reservoir, shallow-water reservoir, and WAF was not presented and presumably not performed. The PIR/EIS noted that the facilities would be within tolerable risk of dam safety considerations, but also eliminated a deep storage alternative at site K-05 due to dam safety/public feedback concerns.

Significance – High

Without an accurate, thorough H&H analysis, the level of protection necessary for the community and the public may be compromised / underestimated, resulting in a high-risk factor for public safety, project performance, and project cost.

Recommendations for Resolution

1. Perform a hydraulic flow analysis using HEC-RAS to include flood routing, canal conveyance capacity, hydraulic and structural modifications, and appropriate level of climate change effects.
2. Use a groundwater flow model to evaluate the entire flow system, including the wetlands and ASR systems.
3. Provide a more detailed analysis of pump sizing and pump station design.
4. Document complete accessibility to the model implementation input and output data.
5. Perform and document breach analyses for aboveground storage facility alternatives.

Final Panel Comment 4

Based on the information provided in the PIR/EIS, it is unclear why the FWO project alternative is not the TSP given its increased number of benefits and no direct cost.

Basis for Comment

Collectively, statements in the PIR/EIS indicate that the action alternatives are not significantly different from each other and, in some instances, not much different from the FWO project alternative. However, there are no statistical analyses that support other claims in the PIR/EIS that there are significant differences among the action alternatives. If it cannot be demonstrated that the action alternatives are statistically different from each other, then the PIR/EIS is, in effect, comparing only two alternatives: one action alternative and the FWO project (no action). Further, some comments in the PIR/EIS and related documents suggest that the FWO project alternative could be the TSP or that other existing alternatives would provide more benefit to Lake Okeechobee and the northern estuaries, but that those alternatives were not considered. In addition, the PIR/EIS estimates that the TSP would cost $1.4 billion.

- Comments in Section 4:
  - Page 4-29 states, “However, it is uncertain if there is an ecologically significant difference between the LOWRP alternatives themselves…. and "Since FWO contains many of the large and important northern estuary restoration components such as CEPP, IRLS and C-43 reservoir, the next added increment of improvement afforded by the TSP is small in comparison but moves restoration one step closer to meeting the CERP targets."
  - The difference between the FWO project alternative and the action alternatives may not be statistically significant. Examining the data in Tables 4-1, 4-2, 4-3, 4-4, 4-10, 4-12, 4-13, 4-14, 4-15, 4-16, 4-17, 4-18, 4-19, 4-21, 4-22, 4-23, and 4-24 in the PIR/EIS and Tables G-20, G-21, G-22, G-24, G-24, G-25 and G-26 in Appendix G, the Panel notes that there are numerous instances where values comparing alternatives are numerically very close to each other.
- Comments in Section 5:
  - When analyzing the data presented Tables 5-4, 5-5, and 5-6 and Figures 5-1 and 5-20, there does not appear to be much difference between the three action alternatives and the FWO project alternative.
  - Page 5-7 states, “All alternatives significantly reduce the number and duration of the high-flow events, which provides a chance for the SAV to recover and become more resilient (Figure 5-1).” Similarly, p. 5-8 states, “All alternatives significantly reduce the number and duration of the high-flow events, which provides a chance for the SAV to recover and become more resilient (Figure 5-2).” It is not clear how significance was determined. Compared to the FWO project alternative, there does not appear to be much difference.
  - Table 5-7 (pp. 5-11 to 5-18) needs more details in the FWO column and an effect determination to allow comparison to the descriptions in the alternative’s columns.

Final Panel Comment 4

- Section 5.6.1, p. 5-19, states, "As compared with FWO, all LOWRP action alternatives show a minor beneficial effect with performance improvement within the northern estuaries, as indicated by fewer high-volume flow months…" This is based on the conclusions that the alternatives will make a significant difference for freshwater flows to the estuaries. But the comments from Table 5-7 suggest the benefits described will not happen under the action alternatives.

- Comments in Section 6:
  - Pages 6-10 and 6-11. The wording on these pages discusses the ecological benefits as if they are benefits of the TSP, but the data do not support this.
  - Page 6-13 states, "The TSP improves resiliency of the northern estuaries by reducing the number, duration, and frequency of undesirable discharge events from Lake Okeechobee. The TSP provides a 30% reduction from the FWO condition in high flow events (>2,800 cfs) lasting more than 60 consecutive days in the Caloosahatchee Estuary (Figure 6-7)." It is not clear how the percentages were calculated. This same concern applies to Figure 6-8 and the 46% reduction in the St. Lucie estuary. The Panel does not understand how these graphs show that the TSP improves resiliency of the northern estuaries.
  - Table 6-3, *1.3 Flows: Reduce high and low volume flows to the Caloosahatchee and St. Lucie estuaries* (p. 6-18), states that high flow volumes to the Caloosahatchee Estuary were reduced from 70 months under the FWO project alternative to 63 months with LOWRP and that incidences of low volume flows (<450 cfs) increased slightly from 23 months under the FWO project alternative to 24 months with the LOWRP. There is a similar discussion about the St. Lucie Estuary. It appears that the 70-month values (FWO project alternative) and the 63-month (LOWRP) values may not be statistically different with n = 492 and that the 37-month values (FWO project alternative) and the 20-month (LOWRP) values may not be statistically different with n = 492.

Adding to the Panel's concern that there are no significant differences between the three action alternatives and the FWO project alternative are the following comments in Appendix C of the PIR/EIS:

- Appendix C, p. C-169, includes the following sentence: 'This is to be expected given that all action alternatives, and even the FWO, reduce the frequency of low lake stages, both within and below the stage envelope, as compared to ECB." This suggests that the difference between the action alternatives and FWO may not be significant.

- Appendix C, p. C-165, states, "Beneficial effects to Lake Okeechobee's littoral vegetation are anticipated as a result of any of the action alternatives, relative to FWO. The overall effect of the alternatives is to stabilize water levels; maintaining lake stage within the ecologically preferred stage envelope (12.5–15.5 ft. NGVD) more frequently than the FWO (Table C-23, Figure C-52 to Figure C-54). The increase in time that stages were within the envelope varied from 4.2% - 6.2% increase over FWO for Alts 1BW and 2CR, respectively." The percentage difference of the alternatives and the FWO project alternative may not be statistically significant.

Final Panel Comment 4

With three similar action alternatives that have not been shown to be statistically different from each other and an FWO project alternative that appears to provide significant benefits at a lower cost than any of the action alternatives, the FWO project alternative could be the TSP because it provides substantial benefits at no direct cost. This is especially evident in what appears to be a lack of a significant difference in habitat units (HUs) and benefits. Thus, the choice of the TSP over the FWO project alternative is not clearly supported.

Significance – High

The apparent lack of difference in beneficial impacts among the alternatives introduces a level of uncertainty as to whether the estimated $1.4 billion cost of the TSP provides sufficient benefit to Lake Okeechobee and the northern estuaries to justify the price.

Recommendations for Resolution

1. Conduct the appropriate statistical analyses to determine if there is a significant difference between the three action alternatives. If applicable, explain why statistical insignificance may still be considered significant.
2. Conduct the appropriate statistical analyses to determine if there is a significant difference between the FWO project alternative and each of the three action alternatives.
3. In Sections 4, 5, and 6 of the PIR/EIS and related documents, clarify the significance of the action alternatives relative to each other and between the FWO project alternative and each action alternative
4. Clearly explain why the FWO project alternative should not be the TSP.
5. Include cost in the quantitative evaluation criteria when comparing the array of action alternatives with the FWO project alternative.

Final Panel Comment 5

Based on NEPA requirements, the FWO project alternative has not been properly considered in the PIR/EIS.

Basis for Comment

A rigorous examination of action alternatives is presented in the PIR/EIS and described in Appendix E. However, the PIR/EIS does not devote equal consideration to the no-action alternative (in this case, the FWO project alternative) as required by NEPA regulations for an EIS. NEPA requires that the no action alternative be considered as one of the alternatives in the EIS. In the case of the LOWRP, when equally evaluated with the other alternatives, it is possible that the FWO project alternative could be the preferred alternative. The FWO project alternative could be justifiably eliminated after (1) providing a sufficient analysis of the FWO project alternative and the action alternatives, (2) explaining why the FWO project alternative would not be the best choice, and (3) demonstrating that one of the three action alternatives should be the TSP.

The Panel's concern is based on the following sections of the PIR/EIS:

- The two-phase plan formulation strategy described in Section 3.1.1 is not used consistently to analyze the FWO project alternative. Tables 3-3 and 3-4 do not include the FWO project alternative. The analysis also does not include the FWO project alternative, nor does it explain why it was not included.
- Section 3.5, p. 3-19. The focused array of alternatives should include the FWO project alternative (the no-action alternative) because NEPA requires that it be considered. Not including the FWO implies it has been eliminated, but without explaining why.
- The FWO project alternative is not considered in the following tables: 4-5, 4-7, 4-18, 4-19, 4-21, 4-22, 4-23, 4-24, 4-25, and, most importantly, 4-27.
- Table 4-8 provides the planning-level total cost of the action alternatives, but the cost of the FWO project alternative is not included. For this project, the FWO project alternative includes authorized actions that would occur during the timeframe that the actions alternatives would be implemented. Even if the costs associated with the FWO project alternative are not considered as direct costs (meaning the cost of the FWO project alternative would be zero), the operations and maintenance (O&M) cost for the FWO needs to be considered. Related to this, considering the HUs of each alternative (total HUs in Table 4-10), the Panel believes that (1) the cost per HU would be the lowest for the FWO project alternative and (2) there would be some average annual habitat unit (AAHU) lift when the authorized projects scheduled to occur under the FWO project alternative are completed.
- Page 4-29 states, "Since FWO contains many of the large and important northern estuary restoration components such as CEPP, IRLS and C-43 reservoir, the next added increment of improvement afforded by the TSP is small in comparison but moves restoration one step closer to meeting the CERP targets." If the FWO project alternative has this much value, it should be

Final Panel Comment 5

evaluated and documented as the no-action alternative to demonstrate the relative significance of improvements already considered under the FWO project alternative.

- Appendix E, Plan Formulation Screening, does not discuss the FWO project alternative in the formulation plan. Authorized actions that are part of the FWO project alternative would result in water storage and wetland restoration; therefore, the FWO project alternative should be included in the plan formulation screening. Table E-4 shows that the WAF is the best buy among options carried forward after initial screening. Per Table E-5, the deep reservoir option is the only aboveground storage element that results in a storage value (195,000 acre-feet [ac-ft]) closer to the CERP target (200,000 ac-ft). All other aboveground storage elements provide only a third of the target value. Figures E-4 and E-5 show the most benefit from high-discharge improvements with a reservoir and maximum number of ASRs but do not include the WAF and ASR option. The Panel therefore does not know how the WAF with ASRs option compares to Reservoir and ASRs options.
- Section 5.3.1, p. 5-2, states, “Under all alternatives, above ground storage features….” is not accurate because the FWO project alternative is not considered here or included in Table 5-1.
- Section 5.6.2, p. 5-20, states, “All alternatives have a potential significant impact on the entrainment and impingement of fish and aquatic invertebrates.” This is not correct because the FWO project alternative has not been considered.
- Table 5-7 does not include effectiveness determinations for the FWO project alternative; therefore, it is not possible to determine how the FWO project alternative compares to the action alternatives.
- The RECOVER System-wide Evaluation (pages 4-29 and 4-30) evaluates only the action alternatives.
- The PIR/EIS (p. 6-10) notes that hydrologic modeling for the TSP was optimized to maximize estuary benefits using the 2008 LORS, with modifications proposed by the Central Everglades Planning Project (CEPP) along with new optimizations proposed by LOWRP. This is further expanded in the LOWRP Final Array of Alternatives Model Documentation Report (April 27, 2018; pages 53-57), which describes the optimization process for the alternatives simulated for LOWRP to identify a TSP. The documentation does not indicate that a similar level of optimization of LORS 2008 was performed for the FWO project alternative scenario.

Significance – Medium/High

Because the FWO project alternative was not adequately considered or fully included in the alternatives analysis, NEPA requirements have not been met and the technical or scientific basis for selection of the alternatives may have been influenced.

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Recommendations for Resolution

1. Conduct a new assessment of the three action alternatives and the FWO project alternative that compares the FWO project alternative to the action alternatives for all factors used to evaluate the action alternatives. Include this information in all relevant tables and figures. This assessment should include optimization of the hydrologic model and LORS 2008, consistent with the analysis for the alternatives and TSP.
2. Compare the cost of the FWO project alternative to the costs of the action alternatives.
3. Include a section in the PIR/EIS that explains, based on the new alternatives analysis, why the FWO project alternative is not the preferred alternative.

Final Panel Comment 6

In the CE/ICAs, modifications added to the LORS under the action alternatives were not added under the FWO project alternative, making the comparison of alternatives more difficult.

Basis for Comment

HU estimates for the FWO project alternative are based on the existing 2008 LORS and CEPP refinements (PIR/EIS, p. 2-5). HU estimates for the action alternatives, however, include planned changes in the LORS based on ongoing repairs to the HHD and new CERP infrastructure (C-44 reservoir, Indian River Lagoon South [IRLS], and C-43 West reservoir) (PIR/EIS, p. 4-14). Additionally, the PIR/EIS (p. 6-10) notes that the hydrologic modeling for the TSP was optimized to maximize estuary benefits using the 2008 LORS, with modifications proposed by CEPP along with new optimizations proposed by the LOWRP. This is further expanded in the LOWRP Final Array of Alternatives Model Documentation Report (April 27, 2018) where pages 53-57 describe the optimization process for the alternatives simulated for LOWRP in an effort to identify a TSP. The documentation does not indicate that a similar level of optimization of LORS 2008 was performed for the FWO project scenario. Therefore, the CE/ICA comparison between the FWO project alternative and the action alternatives does not use the same baseline and is not consistent with USACE guidelines.

Furthermore, if the ecosystem restoration benefits of the HHD repair and other new CERP infrastructure were included in prior PIRs to support these projects, this PIR/EIS is double-counting benefits that are properly attributable to other components of CERP. The CE/ICA should focus only on HU benefits that are directly attributable to the proposed actions. The PIR/EIS statement (p. 4-14) that "…the benefits presented in the effectiveness analysis would not be realized without the proposed lake schedule modifications" affirms that the FWO project alternative does not include the revised LORS that was in the alternatives analysis.

Significance – Medium/High

The analysis of action alternatives uses a different baseline than the FWO project alternative and is likely to overstate the HU benefits under the action alternatives and, specifically, the TSP.

Recommendations for Resolution

1. Provide a CE/ICA for the FWO project alternative and the action alternatives that uses the same baseline assumptions about the LORS.
2. Provide more information and further discussion about the benefits that are attributable to the proposed project and how these are distinct from the CEPP refinements, HHD repairs, and new CERP projects.
3. Perform a system optimization analysis for the FWO project scenario to the same level of detail as the array of action alternatives and the TSP.

Final Panel Comment 7

The range of alternative plans does not include components to directly improve water quality flowing into Lake Okeechobee or a detailed evaluation of the water quality impacts of the lake's releases on the St. Lucie and Caloosahatchee estuaries and coastal regions.

Basis for Comment

The original CERP scope for LOWRP envisioned 200,000 ac-ft for reservoir storage, a billion gallons per day of ASR wells, and 7,875 acres of stormwater treatment areas (STAs) (4,375-acre reservoir and reservoir-assisted STA and 2,500-acre STA) (PIR/EIS, pages 2-5 and 2-6). The northern tributaries included in the LOWRP are a significant source of nutrient loading into Lake Okeechobee, and current levels of nutrients in the lake are well above total maximum daily loads (TMDLs) established for the lake (Ollis et al., 2018). Both the storage capacity and water quality components of the original CERP are considerably reduced in the range of alternatives.

Water quality was apparently not addressed in the PIR/EIS because "…USACE policies have evolved since authorization of the CERP" (PIR/EIS, p. 1-4). This, despite the fact that the PIR/EIS states (page 6-7):

> "The LOWRP Adaptive Management and Monitoring Plan (AMMP) contain [sic] descriptions of monitoring that should address specific uncertainties identified during LOWRP planning, **required parameters such as water quality** and water levels, and ecological features that track LOWRP's progress toward success. The monitoring data will indicate LOWRP's progress toward the objectives of LOWRP, and LOWRP's conformance to applicable legal requirements." [Bolding added for emphasis]

It is unclear from the PIR/EIS if the AMMP includes water quality monitoring. If so, then some explanation is necessary as to how water quality measurements are connected to performance monitoring. For example, if water quality is a criterion used for the structural/non-structural improvements within the FWO project alternative, then some explanation is warranted. If a water quality evaluation is omitted due to the changes in USACE policy (as stated in the PIR/EIS), a detailed explanation of the policy changes should be presented. On the other hand, if water quality impacts were omitted due to prior agreements with the State of Florida, these agreements should be identified in the PIR/EIS. Similarly, if the State of Florida has plans for structural features to address water quality in the northern tributaries (other than the Basin Management Action Plan and TMDL described in the PIR/EIS [p. 5-29]), these should also be identified. The potential consequences of the alternatives and TSP for future STAs or other structural water quality developments in the study area are also not addressed.

Because water quality is not addressed, the environmental and economic impacts of releases, especially nutrients and algae, from Lake Okeechobee are also not addressed. The economic impacts on people and businesses in the St. Lucie and Caloosahatchee estuaries and coastal areas from these releases have not been insignificant and have resulted in declared states of emergency in these areas in the past 2 of 3 years (FDEP, 2018; Sweedler, 2018). Changes in HUs such as those used in the CE/ICA do not capture these economic impacts and the full consequences of releases from Lake

Final Panel Comment 7

Okeechobee. In addition, the Regional Economic Development analysis (PIR/EIS, Section 4.3.2) does not address these significant economic impacts.

Significance – Medium

The potential impacts of the TSP on water quality in Lake Okeechobee and the east and west coast estuaries cannot be evaluated because the information provided in the report is incomplete.

Recommendations for Resolution

1. Explain in detail why water quality components from the original CERP were not included in the LOWRP PIR/EIS.
2. Provide a thorough analysis of the impacts under the alternatives and the TSP on nutrient loadings to Lake Okeechobee, if applicable.
3. Provide a thorough analysis of the environmental and economic impacts of releases from Lake Okeechobee to the St. Lucie and Caloosahatchee estuaries and coastal areas.
4. Identify the potential impacts of the alternatives and the TSP on future STAs or other structural water quality developments in the study area.
5. Provide details on the monitoring plan for water quality to achieve the objectives of the LOWRP.

Literature Cited:

FDEP (2018). Emergency Authorizations Implement Measures to Address South Florida Algal Blooms. Florida Department of Environmental Protection, Tallahassee, Florida. Available online at: https://floridadep.gov/dear/algal-bloom/content/emergency-authorizations-implement-measures-address-south-florida-algal

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Sweedler, M. (2018). Florida fights giant algal bloom in Lake Okeechobee. Wall Street Journal, July 16, 2018. Available online at: https://www.wsj.com/articles/florida-fights-giant-algal-bloom-in-lake-okeechobee-1531746000

Final Panel Comment 8

Uncertainty about the extent and rate of ASR development is not addressed in the alternatives analysis and the selection of the TSP.

Basis for Comment

The REstoration COordination & VERification (RECOVER) team expressed concerns that "ASR… is a significant source of uncertainty" (PIR/EIS, p. 4-29; Annex E, p. E-11), but there is no modeling of alternative rates and scales of ASR development to evaluate the impact of uncertainty on alternative outcomes. For example, Alt. 2Cr, the Best Buy alternative, would provide a relatively short-term capacity of 195,000 ac-ft of deep storage. How does the relative certainty of this outcome compare with the uncertainty of developing an equivalent ASR storage to equate Alt. 1BW's 43,000 ac-ft of shallow storage with Alt. 2Cr's 195,000 ac-ft? The difference of 152,000 ac-ft of storage would require approximately 27 ASR wells (at 5,600 ac-ft/well) to match 2Cr's level of storage. What would be the short-term (10- to 25-year) ecological impact of waiting to build this much ASR storage? What would happen to the expected outcome from the alternatives and the TSP if full development of ASR is not possible?

This uncertainty about ASR development is acknowledged in the PIR/EIS (p. 6-61), but any detailed evaluation is deferred to future adaptive management once a final TSP has been decided. Furthermore, Appendix A, Section A.8.2.3, notes that aquifer performance tests were performed at three locations, and two of the locations indicated transmissivity rates in the Upper Floridian Aquifer well below the 20,000 feet (ft) squared per day noted to be suitable for ASR storage. While this section notes that transmissivity rates are higher in the Avon Park Permeable Zone, the recovery rates in this zone were estimated to be 30%. This very low efficiency introduces substantial risk to the project due to the large storage volumes of the TSP provided by the ASR component.

RECOVER also expressed concerns about the uncertainty related to potential ecotoxicological impacts of ASR development and the need for future testing (PIR/EIS, Annex E, p. E-11). The PIR/EIS does not discuss the potential costs of this testing or describe how treatment costs for ASR inflows and outflows would impact ASR construction and O&M costs.

Significance – Medium

Without an analysis of the uncertainty about the rate of ASR development, it is not possible to determine if the alternatives or TSP will achieve the expected project benefits.

Recommendations for Resolution

1. Evaluate the impacts of different rates of ASR development on each of the alternatives and determine the likelihood of achieving the expected level of HU benefits used in the CE/ICA.

2. Perform additional aquifer performance tests to better establish transmissivity rates and recovery efficiencies at each proposed ASR cluster.

Final Panel Comment 8

3. Discuss the costs associated with testing ASR water quality and the potential treatment costs necessary to bring recovered groundwater into compliance with applicable surface water standards.

Final Panel Comment 9

The alternatives analysis in the PIR/EIS indicates that TSP implementation and operation would result in increased peak elevations in Lake Okeechobee and increased frequency and duration above Extreme High Stage, which could present a risk to the HHD.

Basis for Comment

The PIR/EIS and supporting documents note that a goal of the project is to reduce the frequency of stages in Lake Okeechobee above Extreme High Stages. However, the hydrologic analysis predicts that implementation and operation of the project under the TSP would increase the peak elevation in Lake Okeechobee from 17.58 ft to 18.05 ft and increase the number of days with Lake Okeechobee elevations above 17 ft from 34 days to 209 days over the 40-year period of record evaluated. Lake Okeechobee has a surface area of approximately 325,000 acres, so a difference in peak stages of 0.5 ft represents a significant volume of water.

This performance does not align with the project goals, and the increased high-water levels in Lake Okeechobee could be a source of increased risk to the HHD. The HHD was assigned a DSAC 1 in 2006, which is characterized as “Critically near failure or Extreme high risk.” While there is an ongoing rehabilitation program for HHD, Annex B (p. 26) notes:

> “Following completion of the HHD remediation, the degree to which higher maximum lake stages and increased frequency and duration of high lake stages would be accepted, if at all, will be contingent on the conclusions identified in the 2015 Dam Safety Modification Report (DSMR)…Lake Okeechobee high water performance requirements will likely need to be revisited following completion of a future DSMR.”

Furthermore, if increased frequency and duration of high lake stages are found to be intolerable for the HHD, the proposed benefits from the TSP would likely be reduced.

Significance – Medium

If the proposed benefits from implementation of the TSP were reduced, the TSP’s incremental benefit over the FWO project conditions may make the project cost-prohibitive.

Recommendations for Resolution

1. Analyze the ECB, FWO project alternative, and all action alternatives with the same extreme high-water level constraints for Lake Okeechobee. This analysis could further be bracketed with an evaluation of alternatives constrained to the existing extreme water level regime, as well as at a higher lake level regime that may be permissible when HHD remediation is complete.

Final Panel Comment 10

The performance evaluation of alternatives does not include a quantitative assessment of potential adverse impacts under the action alternatives.

Basis for Comment

The alternatives evaluation presented in Section 4 of the PIR/EIS and in Appendix E quantified potential project ecological benefits in terms of AAHUs. These included performance measures for the Lake Okeechobee Watershed in terms of Wetland Habitat Quality, for Lake Okeechobee in terms of Lake Stage Envelope and Ecological Indicator Score, and for the Northern Tributaries in terms of Caloosahatchee Estuary Salinity Envelope and the St. Lucie Estuary Envelope. The three primary benefit components were then aggregated into an AAHU increase for each alternative above the FWO project alternative. Section 4 of the PIR/EIS discusses potential project impacts; however, these are generally qualitative in nature or quantified individually. The potential project impacts are not aggregated into a quantitative measure and compared to the FWO project alternative as the potential project benefits were.

The PIR/EIS (p. 6-16) notes that, “After the benefits claimed in the previously authorized projects, the remaining system-wide goals must address more extreme conditions. Projects like the LOWRP must deal with larger magnitude events that present a significant design challenge and usually cost more per incremental lift.” The evaluation criteria were focused on providing a quantitative methodology to compute the incremental lift for the array of alternatives. Potential adverse impacts include, but are not limited to:

- Loss of local property tax
- Need to purchase (or use eminent domain to acquire) large tracts of private land
- Loss of Prime and Unique Farmland
- Aesthetics impacts
- Noise
- Light pollution
- Air quality impacts
- Cultural and historic resources impacts
- Threatened and endangered species impacts
- Initial capital and ongoing operation cost impacts
- Pump station impacts to fish and invertebrates
- Impacts to regional groundwater wells
- Irreversible commitment of resources
- Potential for water quality impacts of ASRs

Final Panel Comment 10

If a similar approach were developed to aggregate and quantify potential project impacts, the FWO project alternative would have the least impacts. When this is considered in the evaluation process, the incremental benefits provided by the TSP may not be sufficient to warrant the capital and long-term cost and negative impacts associated with TSP implementation. Potentially anemic incremental benefits under the TSP could make the FWO project alternative a more cost-effective and preferable option, as it may provide a similar level of benefit with no adverse impacts and no direct cost.

Significance – Medium

A more robust performance evaluation that assesses impacts quantitatively would increase confidence in the results of the alternatives analyses, particularly when impacts under the TSP are compared with impacts under the FWO project alternative.

Recommendations for Resolution

1. Develop an evaluation procedure to quantify the potential negative impacts of the array of alternatives.
2. Develop weighted criteria that include both benefits and impacts of the array of alternatives and the FWO project alternative.

Final Panel Comment 11

In numerous places in the PIR/EIS, the ECB appears to be treated as an alternative.

Basis for Comment

In most EISs, holding the existing condition constant for analysis is considered the no action alternative. This PIR/EIS is unique because the existing condition is not considered the no action alternative; instead, the existing condition, held constant for analysis, is represented by the ECB. The no action alternative (called the FWO project alternative in the PIR/EIS) describes future conditions that are assumed to be in place if none of the action alternatives are implemented.

The PIR/EIS, including Appendix A, clearly states that the ECB is not an alternative; rather, it represents the 2018-2019 conditions, while the FWO project alternative represents the 2028 conditions as the no action alternative. Both the ECB and the FWO project alternative were generated using the baseline conditions of 2016/2017. These were the contents of the baseline evaluations documented in Appendix A.

However, portions of the PIR/EIS compare the ECB to the FWO project alternative and the three action alternatives, thus giving the perception that the ECB is being considered as one of the alternatives. This leads to confusion when trying to understand the alternatives analysis and may be influencing the selection of the TSP. For example:

1. Numerous tables and figures in the PIR/EIS include the ECB with the alternatives, giving the appearance that the ECB is an alternative. Examples of this are Tables 4-13, 4-14, 4-15, 5-5, 5-6, 5-8, and 5-9 and Figures 5-1, 6-6, and 6-11.
2. Table 4-17 includes estuary HUs for the ECB, thus giving the impression that it is an alternative.
3. Page C-169 states, “For example, since all alternatives reduce the occurrence of lake stages below the beneficial envelope, indicators that perform well under low-water conditions scored considerably lower than ECB and similar or worse than FWO. This is to be expected given that all action alternatives, and even the FWO, reduce the frequency of low lake stages, both within and below the stage envelope, as compared to ECB.”
4. Comments on pp. 2-15, 4-30, 5-23, 6-18, and 6-53 compare the ECB to the FWO project alternative and the action alternatives.

Significance – Medium/Low

Including the ECB in the alternative analysis discussions creates the impression that the ECB is an alternative and may introduce uncertainty or confusion.

Recommendations for Resolution

1. Explain why the ECB is compared to the FWO project alternative and the action alternatives.

Final Panel Comment 12

The PIR/EIS does not explain why a study of the lake's entire watershed was not included or why a watershed approach was not considered.

Basis for Comment

Water releases from the upper Kissimmee watershed to the study area are controlled. However, the schedule for releasing the water can be changed at any time; therefore, a watershed approach may be a better way to develop alternatives that would provide a greater benefit based on cost, as well as more effective approaches to regulating lake levels and discharges of water to the northern estuaries.

It is also not clear why the entire or larger portion of the watershed was not considered. If LOWRP's focus is on water levels in the lake, an analysis of the entire watershed is necessary.

Significance – Low

Without considering a watershed approach, other valid alternatives may be overlooked or the wrong alternative may be selected.

Recommendations for Resolution

1. Explain why the entire watershed was not considered when developing and selecting the alternatives.

5. REFERENCES

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APPENDIX A

IEPR Process for the LOWRP

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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 Lake Okeechobee Watershed Restoration Project (LOWRP) Independent External Peer Review (IEPR). Due dates for milestones and deliverables are based on the award/effective date listed in Table A-1. The review documents were provided by U.S. Army Corps of Engineers (USACE) on July 12, 2018. Note that the actions listed under Task 6 occur after the submission of this report. Battelle anticipates submitting the pdf printout of the USACE's Design Review and Checking System (DrChecks) project file (the final deliverable) on November 28, 2018. 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 LOWRP IEPR

Task	Action	Due Date
1	Award/Effective Date	7/11/2018
	Review documents available	7/12/2018
	Public comments available	8/24/2018
	Battelle submits draft Work Plan[a]	7/18/2018
	USACE provides comments on draft Work Plan	7/25/2018
	Battelle submits final Work Plan[a]	7/27/2018
2	Battelle submits list of selected panel members[a]	7/23/2018
	USACE confirms the panel members have no conflict of interest (COI)	7/25/2018
3	Battelle convenes kick-off meeting with USACE	7/26/2018
	Battelle convenes kick-off meeting with panel members	8/6/2018
	Battelle convenes kick-off meeting with USACE and panel members	8/6/2018
4	Panel members complete their individual reviews	8/29/2018
	Panel members provide draft Final Panel Comments to Battelle	9/12/2018
	Battelle sends public comments to panel members for review	8/30/2018
	Panel finalizes Final Panel Comments	9/18/2018
5	Battelle submits Final IEPR Report to USACE[a]	9/26/2018
6[b]	Battelle convenes Comment Response Teleconference with panel members and USACE	11/9/2018
	Battelle submits pdf printout of DrChecks project file[a]	11/28/2018
	Agency Decision Milestone (ADM) meeting[c]	TBD
	Contract End/Delivery Date	7/31/2019

[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 LOWRP 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 22 charge questions provided by USACE, two overview questions and one public comment question added by Battelle (all questions were included in the draft and final Work Plans), and general guidance for the Panel on the conduct of the peer review (provided in Appendix C of this final report).

Prior to beginning their review and after their subcontracts were finalized, all the members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel. Battelle planned and facilitated a second kick-off meeting via teleconference during which USACE presented project details to the Panel. Before the meetings, the IEPR Panel received an electronic version of the final charge, as well as the review documents and reference/supplemental materials listed in Table A-2.

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

Review Documents	No. of Review Pages
Integrated Project Implementation Report/Environmental Impact Statement (PIR/EIS)	312
Appendix A: Engineering	210
Appendix B: Cost Estimates	14
Appendix C: Environmental	660
Appendix D: Real Estate	27
Appendix E: Plan Formulation and Evaluation	64
Appendix F: Recreation	22
Appendix G: Environmental Benefits	118
Total Number of Review Pages	**1,427**
Supporting Documents[a]	
Appendix C: Environmental (subset – Scoping and Formulation Letters)	582
Public Comments[b]	336
Risk Register	30
Annex A - FWCA and Endangered Species	314
Annex B - WRDA 2000 and Florida State Law	142
Annex C - Operating Manual	21
Annex D - Monitoring Plans	104
Annex E - RECOVER Reviews	74
Annex F - Invasive and Nuisance Species	42
Annex G - HTRW	170
Annex H - Sea Level & Climate Change Assessment	24
Total Number of Supporting Documents	**1,839**

[a] *Supporting documentation only. These documents are not for Panel review and should be used as information sources only. They are not included in the total page count.*

[b] *USACE submitted public comments to Battelle upon their availability according to the schedule in Table A-1. Battelle in turn submitted the comments to the IEPR Panel for review.*

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

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

About halfway through the review, a teleconference was held with USACE, Battelle, and the Panel so that USACE could answer any questions the Panel had concerning either the review documents or the project. Prior to this teleconference, Battelle submitted 18 panel member questions to USACE. USACE was able to provide responses to most of the questions during the teleconference, and provided additional data after the call.

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 LOWRP 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, 12 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 three PDF files containing 214 pages of public comment transcripts and 122 pages of other comments that had been compiled by USACE on the LOWRP 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 new 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 12 Final Panel Comments developed by the Panel into USACE's DrChecks, a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle. Battelle will provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closeout, as a final deliverable and record of the IEPR results.

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APPENDIX B

Identification and Selection of IEPR Panel Members for the LOWRP

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B.1 Panel Identification

The candidates for the Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project (hereinafter: LOWRP IEPR) Panel were evaluated based on their technical expertise in the following key areas: Civil Works planning/economics, aquatic and wetland ecology, hydrology and hydraulic (H&H) engineering/geotechnical engineering, and civil engineering. These areas correspond to the technical content of the review documents and overall scope of the LOWRP 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."

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project
1. Previous and/or current involvement by you or your firm in the Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project and related projects.
2. Previous and/or current involvement by you or your firm in ecosystem restoration and central and southern Florida.
3. Previous and/or current involvement by you or your firm in the conceptual or actual design, construction, or operation and maintenance (O&M) of any projects in the Central and Southern

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project

Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project area and related projects.

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 the Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project.

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):*
   - South Florida Water Management District.
   - Florida Department of Environmental Protection
   - Seminole Tribe of Florida, Inc.
   - Bureau of Indian Affairs
   - Martin County, Glades County, Okeechobee County or Lee County governments.

7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to central and southern Florida.

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 Jacksonville District.

9. Previous or current involvement with the development or testing of models that will be used for, or in support of the Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project.

   Note. Models currently mentioned in the documents: Hydrologic Performance – Regional Simulation Model for Basins (RSM-BN); Reservoir Sizing and Operations Screening Model (RESOPS); Land Suitability Model; LOWRP Benefit Model; Lake Okeechobee and northern estuaries conceptual ecological models; IMPLAN model, Lower Kissimmee River Basin groundwater model; LOWRP Planning Model

10. Current firm involvement with other USACE projects, specifically those projects/contracts that are with the Jacksonville 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 Jacksonville District. Please explain.

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

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project
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 Jacksonville 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 Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration 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 South Florida Water Management District contracts.
17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to the Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project.
18. Participation in relevant prior and/or current Federal studies related to the Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project.
19. Previous and/or current participation in prior non-Federal studies related to the Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project.
20. Has your research or analysis been evaluated as part of the Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project?
21. Is there any past, present, or future activity, relationship, or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project? If so, please describe.

Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit. The term "firm" in a screening question referred to any joint venture in which a firm was involved. It applied whether that firm serves as a prime or

as a subcontractor to a prime. Candidates were asked to clarify the relationship in the screening questions.

B.2 Panel Selection

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. Table B-1 provides information on each panel member's affiliation, location, education, and overall years of experience. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. USACE was given the list of candidate panel members, but Battelle selected the final Panel.

Table B-1. LOWRP IEPR Panel: Summary of Panel Members

Name	Affiliation	Location	Education	P.E.	Exp. (yrs)
Civil Works Planner/Economist (Dual Role)					
J. Walter Milon	Independent Consultant	Orlando, FL	Ph.D., Economics	N/A	38
Aquatic and Wetland Ecologist					
Kris Thoemke	Coastal Engineering Consultants, Inc.	Naples, FL	Ph.D., Biology	N/A	39
H&H/Geotechnical Engineer (Dual Role)					
Bijay K. Panigrahi	AMCON, Inc.	Orlando, FL	Ph.D., Civil Engineering	Yes	35
Civil Engineer					
Kevin Ruswick	Schnabel Engineering, Inc.	Clifton Park, NY	M.S., Water Resources Engineering	Yes	24

Table B-2 presents an overview of the credentials of the final four panel members 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. LOWRP IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Milon	Thoemke	Panigrahi	Ruswick
Civil Works Planner/Economist (Dual Role)				
Minimum 10 years of demonstrated experience in applied economics related to water resource economic evaluation or review	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			
Familiarity with the USACE tool for CE/ICA called the Institute for Water Resources (IWR) Planning Suite	X			
Able to ascertain computational accuracy of spreadsheets	X			
Able to identify incidental non-ecosystem restoration benefits	X			
Familiarity with separable cost/separable benefit analyses	X			
Aquatic and Wetland Ecologist				
Minimum M.S. degree or higher in a related field		X		
Minimum 10 years of experience directly related to environmental evaluation or review		X		
Familiarity with the ecology of shallow freshwater systems, freshwater wetlands, coastal wetlands, and estuarine environments in South Florida		X		
Familiarity with methods for evaluating ecological benefits in those environments, including the ecological modeling tools utilized for benefit calculation		X		
Familiarity with impact assessments, including cumulative effects analysis for complex ecosystem projects with competing trade-offs		X		
H&H/Geotechnical Engineer (Dual Role)				
Minimum of 10 years of experience in their area of expertise			X	
Experience with all aspects of H&H engineering, including a thorough understanding of water storage and conveyance as well as regional water management operations			X	
Familiarity with Hydrologic Engineering Center (HEC) modeling computer software, or equivalent commercial software including HEC River Analysis System (RAS)			X	
Ability to understand the application of Reservoir Sizing and Operations Screening (RESOPS), Regional Simulation Model-Basins (RSM-BN) and South Florida Water Management Model (SFWMM)			X	
Registered Professional Engineer			X	
Minimum of 10 years of experience in geotechnical engineering or groundwater geology			X	
Minimum M.S. degree or higher in a related field			X	

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

Technical Criterion	Milon	Thoemke	Panigrahi	Ruswick
Demonstrated experience in the evaluation of soils, geology, and groundwater for design and construction of critical infrastructure related to large water storage impoundments and ecosystem restoration project features, including aquifer storage and recovery (ASR) wells			X	
Civil Engineer				
Registered Professional Engineer				X
Minimum of 10 years of experience in civil engineering				X
Minimum M.S. degree or higher in engineering				X
Demonstrated experience in the design and construction of critical infrastructure related to large water storage impoundments and ecosystem restoration project features				X
Experience in risk analysis in water resource projects and application of current dam safety design standards for high-hazard impoundments				X

B.3 Panel Member Qualifications

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

Name	J. Walter Milon, Ph.D.
Role	Civil Works Planner/Economist (Dual Role)
Affiliation	Independent Consultant

Dr. Milon is the Provost's Distinguished Research Professor in the Department of Economics at the University of Central Florida's College of Business Administration, where he has taught graduate-level courses in benefit-cost and social impact analyses, economic theory, and natural resource and environmental economics. He earned his Ph.D. in economics from Florida State University in 1978 and has 38 years of experience in natural resource and environmental economics and water resource economic evaluation. He is a member of the Association of Environmental and Resource Economists and the American Economic Association.

Dr. Milon is familiar with USACE plan formulation processes, procedures, and standards as they relate to ecosystem restoration and flood risk management. He has more than 10 years of experience reviewing Federal water resource economic documents justifying construction efforts. He has participated in planning and technical advisory support for the USACE Florida Everglades Restudy (1995-1999) and was lead economist on five USACE IEPRs: the Everglades C-111 construction project (2009); the Louisiana

Coastal Areas Restoration Project (2009-2011); the White Oak Bayou, Texas, flood control plan (2011); the Caño Martin Peña Ecosystem Restoration Project, San Juan, Puerto Rico (2013); and the Lower Yellowstone Intake Diversion Dam Fish Passage Project, Montana, Draft Environmental Impact Statement.

Dr. Milon is familiar with large, complex Civil Works projects with high public and interagency interests, having served as a consultant for planning and technical advisory support on the USACE Florida Everglades Restudy (1995-1999). He has taught graduate courses and conducted research in benefit-cost analysis, risk management, and flood damage assessment modeling, which includes the use of the Hydrologic Engineering Center Flood Damage Reduction Analysis (HEC-FDA) modeling software. He was the principal investigator on the Socioeconomic Evaluation of Hurricane Evacuation Response project for the Florida Hurricane Research Alliance and was co-principal investigator on Florida's Coastal Environmental Resources: Economic Valuation and Analysis project.

Dr. Milon is experienced in evaluating the USACE application of risk and uncertainty analyses in storm damage reduction studies in the southeastern United States. He is also experienced in Civil Works real estate laws, policies, and coastal property rights, and has conducted research on coastal property valuation. Dr. Milon has served as the lead economist on recent USACE IEPRs involving flood risk management, ecosystem restoration, and coastal storm damage reduction—namely, the White Oak Bayou, Texas, Federal Flood Damage Reduction Plan; the Louisiana Coastal Areas Restoration Project; the Caño Martín Peña Ecosystem Restoration Project, San Juan, Puerto Rico; and the Walton County, Florida, Hurricane and Storm Damage Reduction Project.

Dr. Milon has worked directly for or with USACE in applying Principles and Guidelines to Civil Works projects, including Coastal Storm Risk Management projects, and as such has over 20 years of experience working with the USACE six-step planning formulation process. He also teaches graduate courses and conducts research in benefit-cost and cost effectiveness and incremental cost analysis (CE/ICA) methods.

Dr. Milon is a former member of the National Research Council Committee on USACE Water Resources Science, Engineering, and Planning; the Committee on Water Resources Science, Engineering and Policy; and the Southern Economics Association. Through his research and teaching experience, Dr. Milon has authored an economics book and more than 15 book chapters, 45 reports, and 40 journal articles. He has been involved in more than 25 university contracts and grants and serves as a private economic consultant to both government and private clients.

Name	Kris Thoemke, Ph.D., CEP
Role	Aquatic and Wetland Ecologist
Affiliation	Coastal Engineering Consultants, Inc.

Dr. Thoemke is a Senior Scientist for Coastal Engineering Consultants, Inc. He received his Ph.D. in biology from the University of South Florida in 1979 and is a Certified Environmental Professional. He has 39 years of experience as a professional ecologist in South Florida and has been a researcher and land manager for the State of Florida, a private ecological consultant, an environmental and outdoor communicator, and an Everglades project manager for a non-profit organization. He also teaches

undergraduate- and graduate-level environmental management, fisheries management, and fish and wildlife policy and management courses for the American Public University System.

For the past eight years as an environmental consultant, Dr. Thoemke has conducted marine and estuarine environmental assessments (EAs), environmental permitting, and listed species surveys along the Atlantic and Gulf coasts in Florida. His environmental consulting work has been related to water resource environmental permitting and National Environmental Policy Act (NEPA) compliance documentation. He has also teaches graduate courses in environmental management, permitting, and NEPA compliance. His experience with wetlands and estuarine ecosystems derives from his Ph.D. work on estuarine invertebrates; 11 years as manager of Rookery Bay National Estuarine Research Reserve in Naples, Florida; four years as a wetland ecologist conducting Everglades restoration work; and 14 years as a wetlands and estuarine consultant.

Dr. Thoemke is familiar with large, complex Civil Works projects with high public and interagency interests. His direct experience includes his work as a wetland scientist on the Florida Everglades restoration program, ongoing involvement as the environmental scientist for the Charlotte County, Florida, Erosion Control Project for Stump Pass, and participation on teams working on large Civil Works restoration projects for the State of Louisiana in the Mississippi Delta region.

Dr. Thoemke has studied construction impacts on the marine and terrestrial ecology of coastal regions and characterization of benthic communities; specifically, he has identified and assessed construction impacts on seagrass, mangrove, shorebird, and dune plant communities at Stump Pass and Blind Pass, Florida, and gopher tortoise habitat at Clam Pass and Vanderbilt Beach Parks, Florida. His Ph.D. research focused on estuarine benthic invertebrates, and he has been characterizing benthic communities for more than 30 years. Dr. Thoemke also has extensive experience permitting and mitigating for construction impacts resulting from coastal and upland development, including assessing and monitoring impacts on beach and dune systems, nesting sea turtles, shorebirds, and upland listed species found in the coastal and beach/dune habitats. In addition, he has conducted post-storm analysis of beach and dune systems.

Dr. Thoemke is familiar with all NEPA and environmental impact statement (EIS) requirements. He gained experience with environmental policies and processes by preparing reports and by serving on IEPR panels, including the Walton County, Florida, Hurricane and Storm Reduction Feasibility Report and Draft Environmental Assessment, and the Central Everglades Planning Project Draft Project Implementation Report and EIS.

Dr. Thoemke was a member of an integrated team of scientists and engineers that prepared the EIS for the Terrebonne Basin Barrier Island Shoreline Restoration Project, Louisiana, including Endangered Species Act, essential fish habitat (EFH), and NEPA requirements. He has also reviewed EISs and EAs for other coastal restoration projects in the Mississippi Delta. Dr. Thoemke was project manager on the Port Everglades Ocean Dredged Material Disposal Site Environmental Assessment, which included Marine Mammals Protection Act listed species. In addition, he has completed Section 7 assessments for listed species under National Marine Fisheries Service jurisdiction for projects in several south Florida locations, and coordinated with the U.S. Fish and Wildlife Service to prepare an updated Biological Opinion for swimming sea turtles and shorebirds on Marco Island, Florida. He has provided EFH consultation to several projects and continues to prepare EFH studies for marine and estuarine species as a part of his permitting work.

Dr. Thoemke is a member of the National Association of Environmental Professionals and a member and Chairman of the Certification Review Board of the Academy of Board Certified Environmental Professionals.

Name	Bijay K. Panigrahi, Ph.D., P.E., P.G., D.WRE, BCEE, CUC
Role	H&H/Geotechnical Engineer (Dual Role)
Affiliation	AMCON, Inc. and KBC Construction, LLC

Dr. Bijay K. Panigrahi is a Principal Engineer and President of AMCON, Inc. (formerly, BPC Group) and KBC Construction, LLC in Orlando, Florida. He is a licensed Professional Geologist (P.G.) in Florida and North Carolina, Certified Underground Utility and Excavation Contractor (CUC), BCEE (Board Certified Environmental Engineer), D.WRE (Diplomate, Water Resources Engineering) and a registered professional engineer in Florida, Virginia, and Michigan. He received his Ph.D. in Civil Engineering from Drexel University in 1985 and an M.E. in Hydraulic Engineering from the Asian Institute of Technology in Thailand in 1978.

Dr. Panigrahi has more than 35 years of experience in environmental, geotechnical, and water resources engineering, including groundwater and surface water modeling. He has directed and managed multidisciplinary projects involving hydrology and hydraulic (H&H) modeling, flood protection studies, feasibility studies, stormwater management system design, watershed and water quality assessment and modeling, stochastic modeling, geotechnical and environmental design and studies, seepage and slope stability analyses, foundation analyses, scour and erosion control, water resources facility design, and permitting.

Dr. Panigrahi has assessed and designed several canal conveyance systems and water resources control structures such as levees/dikes, culverts, reservoirs, and treatment systems. He has completed civil engineering infrastructure projects (CERP and non-CERP) in Florida involving modeling and design of hydraulic structures (reservoirs/impoundments, canals, culverts, and pump stations) and hydraulic measurements and rating analyses. He has also completed wave run analyses and scour evaluation for extreme hurricane conditions on Big Sand Lake to assist in the design of the Westgate Lakes resort in Orlando, Florida, and H&H modeling of the C-51 basin (including ACME Basin B) in support of Basin Rule modifications, using HEC-HMS/HEC-RAS models for calibration to Hurricane Irene and further basin analyses.

Dr. Panigrahi has provided technical expert testimony and litigation support services, including formulation of standard care of opinion, risk assessment, and administrative hearing, on several cases. They include a Lake Nona Blvd. slope failure analysis resulting from construction dewatering during hurricane Irma; stormwater pond design for a development in northern Florida; accidental fire in a chemical storage and distribution facility in Niles, Michigan, containing dense non-aqueous phase liquids; administrative hearing for permitting of Marlin sub-station for Florida Power & Light; and mitigation of land subsidence of a property in Lakeland, Florida.

Dr. Panigrahi has served on peer review panels as the subject expert in hydraulic, hydrology, geotechnical, and environmental engineering. He has reviewed more than 30 hydraulic-hydrodynamic models, which included surface water, groundwater, integrated surface water-groundwater, seepage, and

numerous watershed water quality models for the Interagency Modeling Center/South Florida Water Management District. Some of these projects include Biscayne Bay Coastal Wetlands, Lower East Coast Sub-Regional model, C-11 and C-9 Impoundments, C-44 Canal Design, and Stormwater Treatment Area 5&6 Expansion. He was a member of review panels for Modeling Water Management Practices in Central Broward County, Florida; Engineering and Modeling aspects of Supplemental (Advanced) Treatment Technology Standard of Comparison documents for two technologies: Periphyton-based Stormwater Treatment Areas technology and Submerged Aquatic Vegetation/Lime Rock Treatment technology; and integrated water supply model SIGMA-MODFLOW for Orange County Utility, Florida. He served on the IEPR Panel that performed a hydraulic design review for the following Hurricane Storm Damage and Risk Reduction System (HSDRRS) projects for USACE, New Orleans District (through Battelle Memorial Institute): HSDRRS Design Guidelines; HSDRRS Design Elevation Report and Addenda; Interstate Highway 10 Crossing and Highway 310 Crossing (design of T-wall); and Lake Pontchartrain and Vicinity 145-Bayou Bienvenue to Bayou Dupre Levee (design and construction of T-wall on earthen levee).

Dr. Panigrahi has worked on numerous planning, design, permitting, and construction projects. Most notably, they include gravity bypass, earthen cofferdam, dewatering, traffic control, erosion control, environmental protection for C-44 Reservoir/STA System Discharge Project, South Florida Water Management District (SFWMD); feasibility study (H&H modeling, environmental and permitting issues, seepage and stability analyses, and retrofit alternatives) for replacement and/or retrofit of the coastal gated spillway structure S-46, SFWMD; and engineering services for design and construction of an 840-foot-long temporary outer wall system in the ocean with more than 25-foot tidal head differential consisting of steel sheet pile cofferdam, shoring, and dewatering/rewatering system for WRA Land/Water Interface, Kings Bay Navy Submarine Base, U.S. Navy. Other projects include designs, plans, and permits for earthen cofferdams, sheet pile and shoring systems, dewatering, traffic control, erosion control, environmental protection for STA1W Expansion #1 project, SFWMD; design of seepage canal and reservoir impact evaluation on the surrounding community for the Site 1 Impoundment Fran Reich Preserve project, SFWMD; civil and geotechnical engineering services (scour analysis, bank stabilization, erosion control, sheet piling and bridge foundations) for the Riverside Acres S/D Arch Pipe Replacement project for Orange County; and design of an optimal groundwater recovery system and impact evaluation of the recovery system on Cone Ranch wellfield and the surrounding wetlands for the Plant City Phosphate Complex, CFI Industries (1,200 feet deep, 282 square miles).

Dr. Panigrahi served on the Florida Board of Professional Engineers (Gubernatorial Appointment) from 2008 to 2012, and has authored more than 50 technical manuals, monographs, and peer-reviewed papers.

Name	Kevin Ruswick, P.E., CFM
Role	Civil Engineer
Affiliation	Schnabel Engineering, Inc.

Mr. Ruswick is a water resources engineer for Schnabel Engineering, Inc. in Clifton Park, New York. He is a registered professional engineer in New York and Illinois, a Certified Floodplain Manager, and a Construction Specifications Institute Construction Documents Technologist. He earned his M.S. in water resources engineering in 1996 from the University of California-Berkeley and has more than 24 years of demonstrable experience in the fields of civil and water resources engineering. He has experience in the private sector, state, local, and Federal government, as well as working directly with USACE, both as a

consultant and subcontractor and through his past service as a hydraulic engineer for USACE Chicago District.

Mr. Ruswick is familiar with large complex Civil Works projects with high public and interagency interests and has extensive experience in large-scale flood reduction projects and the H&H analysis of flood control reservoirs. While with the USACE Chicago District, he served as technical hydraulic lead for a large flood reduction and environmental restoration study along the Kankakee River spanning Indiana and Illinois. He also worked recently on evaluating the spillway compliance of the George B. Stevenson Dam in Pennsylvania, a large flood control dam in the Susquehanna River Basin. For this project, his detailed hydrologic modeling, which was validated to historic storm events, demonstrated that the existing facility met all regulatory requirements and serves as an effective flood reduction facility. This project also included evaluation of environmental restoration components, including stream restoration. Another example is his recent work on the Fulmer Creek flood reduction study in Herkimer, New York. As a follow-up study to a previous USACE ice jam flooding analysis, Mr. Ruswick evaluated the potential for upstream flow control facilities within the watershed to reduce recurrent rainfall-induced flooding through this urban area in the Mohawk River valley. Mr. Ruswick's professional experience also includes the design and construction of large wetland mitigation banks.

Mr. Ruswick has significant experience in serving on IEPR panels for large-scale dam safety, environmental restoration, and flood control projects. Recent examples include serving on a panel for the Rough River Dam Rehabilitation project located in the Falls of Rough, Kentucky. This dam was classified with a Dam Safety Action Classification (DSAC) 2 circa 2005, based on a very high incremental risk level due to karstic voids in the foundation. Interim risk reduction measures were initiated, and the current project includes implementation of the Dam Safety Modification Study through grouting of karstic foundation rock below the large earthen flood control dam. Another recent panel assignment was for the Mamaroneck-Sheldrake flood control project in New Rochelle, New York. This project, designed by the New York District, included evaluation of flood control reservoirs as well as channel and hydraulic structures to reduce flooding in this flood-prone area. Mr. Ruswick also served on an IEPR panel for the Napa Salt Marsh restoration project in Napa County, California. This project included the evaluation of potential life safety risks associated with the potential failure of an extensive network of levees constructed as part of salt harvesting operations.

In addition to IEPR panels, Mr. Ruswick has served as a civil and water resources engineering subject matter expert on numerous Value Engineering studies for large-scale flood control and environmental restoration projects. These include the Poplar Island Environmental Restoration Project in the Chesapeake Bay, as well as the C-43 West Reservoir Project, which was a component of CERP.

Mr. Ruswick is proficient with the HEC modeling computer software, including HEC-RAS and HEC-HMS. He received training from program developers while working for the Chicago District USACE and applies both models to engineering studies on a routine basis. He has also taught short training courses on each model at the college level. He has performed more than 60 dam breach evaluations and hazard class evaluations. This includes more than 30 breach analyses with 2-dimensional (2-D) modeling software that is critical for evaluating the potential impacts from dam breaches in areas of low topographic relief and/or from ring embankment facilities.

Mr. Ruswick is well-versed in dam safety evaluations, including dam inspections, dam breach analyses, potential failure modes analysis, rehabilitation design, and the design of new dams and flood control systems. He has delivered more than ten technical presentations at regional and national dam safety

conferences for the Association of State Dam Safety Officials and the United States Society of Dams (USSD). He is a member of the USSD Hydrology/Hydraulics & Dam Removal Committees and was recently awarded the 2018 Northeast Regional Award of Merit for his contributions to dam safety on a regional level.

Mr. Ruswick also remains abreast of technical advancements in incorporating risk into dam safety evaluations. This includes his recent service as a subject matter expert for water resources engineering for a Screening Level Risk Assessment involving multiple high-hazard dams owned by the Ohio Department of Natural Resources. This included conducting a failure modes analysis as well as performing consequence assessments to semi-quantitatively assess the risk of the high-hazard dams to aid in rehabilitation budgeting priorities. He also has experience in the growing application of risk registers during the design and construction phases of large-scale Civil Works projects.

APPENDIX C

Final Charge for the LOWRP IEPR

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Charge Questions and Guidance to the Panel Members for the Independent External Peer Review (IEPR) of the Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project

This is the final Charge to the Panel for the LOWRP IEPR. This final Charge was submitted to USACE as part of the final Work Plan, originally submitted on July 27, 2018. The dates in this document have not been updated to match actual changes made throughout the project.

BACKGROUND

The Lake Okeechobee Watershed Restoration Project (LOWRP), a single-purpose ecosystem restoration project, was approved by Congress as part of the Comprehensive Everglades Restoration Plan (CERP) in the Water Resources Development Act of 2000. The non-Federal sponsor is the South Florida Water Management District (SFWMD).

The northern Lake Okeechobee watershed is located in portions of Martin, Okeechobee, Glades, and Highlands Counties. The study area encompasses approximately 950 square miles of the northern watershed adjacent to Lake Okeechobee. Water flows into the study area from the Kissimmee Chain of Lakes and northern Kissimmee River and from Lake Istokpoga. The project area, where project features would be constructed, includes five sub-basins and Lake Okeechobee.

The objectives of the study are to:

- Better manage discharges from Lake Okeechobee to improve the salinity regime and the quality of oyster and submerged aquatic vegetation habitat in the northern estuaries
- Increase Lake Okeechobee aquatic and wildlife habitat (attenuate extreme high and low water levels)
- Increase the spatial extent and functionality of wetland habitat in the watershed
- Increase water supply availability to existing legal water users of Lake Okeechobee.

LOWRP proposes structural and operational modifications to the Central and Southern Florida (C&SF) project to achieve restoration of the Everglades and the south Florida ecosystem, while considering other water-related needs such as urban and agricultural water supply and flood risk management. LOWRP will increase water storage capacity in the watershed, resulting in improved Lake Okeechobee water levels; improve the quantity and timing of discharges to the St. Lucie and Caloosahatchee estuaries that adversely affect salinity and estuarine biota; restore degraded habitat for fish and wildlife throughout the study area; and increase the spatial extent and functionality of wetlands.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the C&SF CERP LOWRP (hereinafter: LOWRP 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.

	Subject Matter Experts				
Review Documents	**No. of Review Pages**	**Civil Works Planner/ Economist**	**Aquatic and Wetland Ecologist**	**Civil Engineer**	**H&H/Geotechnical Engineer (Dual Role)**
Integrated Project Implementation Report/EIS	312	312	312	312	312
Appendix A: Engineering	210			210	210
Appendix B: Cost Estimates	14	14		14	
Appendix C: Environmental	660		660		
Appendix D: Real Estate	27	27	27		
Appendix E: Plan Formulation and Evaluation	64	64	64	64	64
Appendix F: Recreation	22		22		
Appendix G: Environmental Benefits	118		118		
Total Number of Review Pages	**1,427**	**417**	**1,203**	**600**	**586**
Supporting Documents					
Appendix C: Environmental (subset – Scoping and Formulation Letters)	582		582		
Public Comments*	336	336	336	336	336
Risk Register	30	30	30	30	30
Annex A _ FWCA and Endangered Species	314		314		
Annex B - WRDA 2000 and Florida State Law	142		142		
Annex C - Operating Manual	21		21		21
Annex D - Monitoring Plans	104		104		104
Annex E - RECOVER Reviews	74		74		
Annex F - Invasive and Nuisance Species	42		42		
Annex G - HTRW	170		170		
Annex H - Sea Level & Climate Change Assessment	24		24		24
Total Number of Supporting Documents Pages	**1,839**	**366**	**1,839**	**366**	**515**

* Page count for public comments is approximate. USACE will submit public comments to Battelle, which will in turn submit the comments to the IEPR Panel.

Documents for Reference

- USACE guidance *Review Policy for Civil Works,* (EC 1165-2-217, February 20, 2018)
- OMB's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

SCHEDULE & DELIVERABLES

This schedule is based on the receipt date of the final review documents. 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	Action	Due Date
Attend Meetings and Begin Peer Review	Subcontractors complete mandatory Operations Security (OPSEC) training	9/5/2018
	Battelle sends review documents to panel members	8/7/2018
	Battelle convenes kick-off meeting with panel members	8/8/2018
	Battelle convenes kick-off meeting with USACE and panel members	8/8/2018
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	8/17/2018
Prepare Final Panel Comments	Panel members complete their individual reviews	8/29/2018
	Battelle provides talking points for Panel Review Teleconference to panel members	8/30/2018
	Battelle convenes Panel Review Teleconference	8/31/2018
	Battelle provides Final Panel Comment templates and instructions to panel members	8/31/2018
	Panel members provide draft Final Panel Comments to Battelle	9/10/2018
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	9/11/2018 - 9/17/2018
	Panel finalizes Final Panel Comments	9/18/2018
Review Public Comments **	Battelle receives public comments from USACE	8/24/2018
	Battelle sends public comments to Panel	8/30/2018
	Panel completes its review of public comments	9/5/2018
	Battelle and Panel review the Panel's responses to the charge question regarding the public comments	9/6/2018
	Panel drafts Final Panel Comment for public comments, if necessary	9/13/2018
	Panel finalizes Final Panel Comment regarding public comments, if necessary	9/17/2018
Review Final IEPR Report	Battelle provides Final IEPR Report to panel members for review	9/20/2018
	Panel members provide comments on Final IEPR Report	9/24/2018
	*Battelle submits Final IEPR Report to USACE	9/26/2018
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	10/3/2018
Comment/ Response Process	Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	10/5/2018
	Battelle convenes teleconference with USACE to review the Comment Response process	10/5/2018

Task	Action	Due Date
	Battelle convenes teleconference with Panel to review the Comment Response process	10/5/2018
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	10/24/2018
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	10/30/2018
	USACE PCX provides draft PDT Evaluator Responses to Battelle	10/31/2018
	Battelle provides draft PDT Evaluator Responses to panel members	11/2/2018
	Panel members provide draft BackCheck Responses to Battelle	11/7/2018
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	11/8/2018
	Battelle convenes Comment Response Teleconference with panel members and USACE	11/9/2018
	USACE inputs final PDT Evaluator Responses to DrChecks	11/16/2018
	Battelle provides final PDT Evaluator Responses to panel members	11/19/2018
	Panel members provide final BackCheck Responses to Battelle	11/26/2018
	Battelle inputs panel members' final BackCheck Responses to DrChecks	11/27/2018
	*Battelle submits pdf printout of DrChecks project file	11/28/2018
To be Attended by Battelle and the Lead Panel Member (Note the Lead Panel Member will be determined after the Final Report is Prepared)		
SLM 1	Senior Leader Meeting (SLM) 1 - Agency Decision Milestone (ADM) Meeting	10/5/2018

* 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.

2. Please contact the Battelle 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 Central and Southern Florida Project (C&SF), Comprehensive Everglades Restoration Plan (CERP), Lake Okeechobee Watershed Restoration Project (LOWRP)

Charge Questions and Relevant Sections as Supplied by USACE

The following Review 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 in addition to addressing 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 the comment, why it is important, any potential consequences of failure to address, and 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.

Broad Evaluation Review Charge Questions

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
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?

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.
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 geotechnical data and analysis at the proposed reservoir locations are reasonable at this conceptual stage of design, including the preliminary evaluation of seepage.
20. Is the assessment of residual flood risk and potential for induced flooding of the Tentatively Selected Plan appropriate?
21. Are the assessments of regional geology for implementation of Aquifer Storage and Recovery wells and the associated recovery rates appropriate?
22. Are the applications of dam safety criteria for determination of hazard classification appropriate for the specific project locations and are the associated design criteria for levee height appropriately applied for the specific project location?

Battelle Summary Charge Questions to the Panel Members[1]

Summary Questions

23. 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.

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

Public Comment Questions

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

[1] Questions 23 through 25 are Battelle-supplied questions and should not be construed or considered part of the list of USACE-supplied questions. These questions were delineated in a separate appendix in the final Work Plan submitted to USACE.

APPENDIX D

Conflict of Interest Form

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Conflicts of Interest Questionnaire

Independent External Peer Review

Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project

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: **Aaron J. MacDiarmid**
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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.

Aaron J. MacDiarmid

July 2, 2018
Date

BATTELLE

It can be done