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March 15, 2013

Final Independent External Peer Review Report Encinitas-Solana Beach Coastal Storm Damage Reduction Project Integrated Draft Feasibility Study and Environmental Impact Statement/ Environmental Impact Report (EIS/EIR)

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
Coastal Storm Damage Reduction Planning Center of Expertise
for the Baltimore District

Contract No. W912HQ-10-D-0002
Task Order: 0021

Final Independent External Peer Review Report
Encinitas-Solana Beach Coastal Storm Damage Reduction Project
Integrated Draft Feasibility Study and Environmental Impact Statement/ Environmental Impact Report (EIS/EIR)

by

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505 King Avenue
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Encinitas-Solana Beach Coastal Storm Damage Reduction Project Integrated Draft Feasibility Study and Environmental Impact Statement/ Environmental Impact Report (EIS/EIR)

EXECUTIVE SUMMARY

Project Background and Purpose

The Cities of Solana Beach and Encinitas, California, are located along the Pacific Ocean in San Diego County, California. The City of Encinitas is approximately 10 miles south of Oceanside Harbor, and 17 miles north of Point La Jolla. The Encinitas shoreline is about 6 miles long, bounded on the north by Batiquitos Lagoon and on the south by San Elijo Lagoon. The 4,920 feet-long southernmost segment of the Encinitas shoreline is a low-lying barrier spit fronting the San Elijo tidal lagoon. Immediately south of the City of Encinitas is the City of Solana Beach. Solana Beach is bounded by San Elijo Lagoon to the north and on the south by the City of Del Mar. It is approximately 17 miles south of Oceanside Harbor, and 10 miles north of Point La Jolla. Solana Beach's shoreline is about 2 miles long. Nearly all of the shoreline in the study area except Cardiff (8 miles total) consists of narrow sand and cobble beaches fronting nearshore bluffs.

Over the past 15 to 20 years, the Solana Beach-Encinitas shoreline has experienced accelerated erosion of the beaches and coastal bluffs. Since the late 1970s and early 1980s, southern California has experienced a series of unusual weather patterns when compared to the rest of the century. In addition to shoreline erosion processes, fluvial delivery has also been significantly reduced due to river damming and inland sand mining activities. The cumulative effects of these impacts have produced erosion of the once-wide, sandy beaches. As a result of the severe winter storms caused by El Nino in 1982-1983 and the extreme storm of 1988, most of the thin sand lens on the Encinitas beaches was lost even prior to the El Nino event in 1997-1998. Within Solana Beach, the chronically denuded beach condition was also worsened after the 1997-1998 season. It is apparent that beach sands were stripped away and lost from the littoral system during that season.

With the loss of the wide sandy beaches, storm waves attack the toe of the bluff and eventually form a notch. As the notch depth increases, it eventually triggers an upper bluff failure. The timing of bluff failures is difficult to predict; they often occur several months after storms. As a result, damages occur to bluff top structures and infrastructure when bluffs collapse. This has prompted property owners atop the bluffs to armor or otherwise try to protect their property before structural damage occurs. Approximately half of the shoreline in the study area has been modified with some type of bluff protection structure, at significant cost. These seawalls provide piecemeal protection at varying levels. In addition, the bluff failures are a safety hazard and have caused the loss of life. The Encinitas-Solana Beach Shoreline Protection Project Integrated Draft Feasibility Study and Environmental Impact Statement/Environmental Impact Report (EIS/EIR) focuses on a more comprehensive solution over the study area.

The loss of beach has also severely degraded recreational value in all reaches of the study area. In addition, the undercutting of the bluffs creates dangerous overhangs, which pose a threat to the public. There have been fatalities in recent years caused by sudden bluff collapse in the study area and adjacent beaches.

The critical areas of the study area were delineated in two segments. Segment 1 (Reaches 3, 4, and 5) exists within the City of Encinitas and extends from the 700 Block of Neptune Avenue to Swami's Reef and is approximately 2.0 miles in length; Segment 2 exists within the City of Solana Beach and stretches from Table Tops Reefs to the southern limit of Solana Beach (Reaches 8 and 9) and is approximately 1.4 miles in length.

Independent External Peer Review Process

The U.S. Army Corps of Engineers (USACE) is conducting an Independent External Peer Review (IEPR) of the Encinitas-Solana Beach Coastal Storm Damage Reduction Project Integrated Draft Feasibility Study and Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) (hereinafter: Encinitas-Solana Beach Feasibility Study and EIS/EIR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2012). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate the IEPR of the Encinitas-Solana Beach Feasibility Study and EIS/EIR. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2012) and OMB (2004). This final report describes the IEPR process, describes the panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel (the Panel).

Based on the technical content of the Encinitas-Solana Beach Feasibility Study and EIS/EIR review documents and the overall scope of the project, Battelle identified candidates for the Panel in the following key technical areas: Civil Works planning, economics, environment/ biology, and coastal engineering. Three panel members were selected for the IEPR from more than 12 candidates identified. USACE was given the list of candidate panel members, but Battelle made the final selection of the Panel.

The Panel received an electronic version of the 1,700-page Encinitas-Solana Beach Feasibility Study and EIS/EIR IEPR document and appendices, along with a charge that solicited comments on specific sections of the documents to be reviewed. USACE prepared the charge questions following guidance provided in USACE (2012) and OMB (2004), which were included in the draft and final Work Plans.

The USACE Project Delivery Team briefed the Panel and Battelle during a kick-off meeting held via teleconference prior to the start of the review to provide the Panel an opportunity to ask questions of USACE and clarify uncertainties. In addition, an in-person meeting to discuss the Encinitas-Solana Beach Feasibility Study and EIS/EIR project was held in Encinitas and Solana Beach, California on January 10, 2013; three panel members attended this meeting. As part of

this meeting, USACE led Battelle and the Panel on a visit of the Encinitas-Solana Beach Feasibility Study and EIS/EIR project site. Other than the teleconference and the in-person meetings/site visit, there was no direct communication between the Panel and USACE during the peer review process. The Panel produced more than 195 individual comments in response to the 65 charge questions.

IEPR panel members reviewed the Encinitas-Solana Beach Feasibility Study and EIS/EIR documents individually. The panel members then met via teleconference with Battelle to review key technical comments, discuss charge questions for which there were conflicting responses, 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, or low); and (4) recommendations on how to resolve the comment. Overall, 17 Final Panel Comments were identified and documented. Of these, four were identified as having high significance, ten had medium significance, and three had low significance.

Results of the Independent External Peer Review

The panel members agreed among themselves on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012; p. D-4) in the Encinitas-Solana Beach Feasibility Study and EIS/EIR review documents. Table ES-1 lists the Final Panel Comments statements by level of significance. The full text of the Final Panel Comments is presented in Appendix A of this report. The following summarizes the Panel's findings.

Engineering – From an engineering perspective, the planning process is done very well. However, the Panel has several concerns. Some of the key design assumptions for beach fill volumes, widths, performance, and costs are not provided in enough detail, even though these project aspects are critical to alternatives analysis and selection and project cost determination. An assumption has been made that the performance of the beach fill from the two primary borrow areas is the same, despite the differences in grain size distributions. It is also assumed without validation that beach fill unit costs will be 50% higher for renourishment events subsequent to the initial event. In addition, the report does not address the uncertainties of hopper dredge availability on the West Coast; had this risk been addressed, it might have resulted in alternative construction methods being considered. The Panel also does not understand why the Preconstruction Engineering and Design (PED) cost percentages are so much higher than the industry standard.

Economics – The combined Feasibility Study and EIS/EIR is very good from an economics standpoint. The planning process has been followed very well and the report is generally thorough from a planning and economics perspective. Given the large annual visitation numbers and the importance of recreational benefits relative to economic viability, the Panel believes that the Unit Day Value (UDV) method is not the most appropriate one to determine recreational resource value and that the Travel Cost Method (TCM) or the Contingent Value Method (CVM) should have been used instead. Although the UDV may not have been the best choice, the Panel thinks that a more transparent and better documented UDV analysis and scoring process would

have been beneficial. The Panel also finds that some aspects of the economic analysis are not well documented, including the sources of beach visitation data, recreational use data, bluff failure information, how risk and uncertainty were addressed in the Economic Model, and how the Del Mar reach was used in the National Economic Development (NED) benefit analysis.

Environmental – The project is well documented and generally meets the requirements of the National Environmental Policy Act (NEPA), with the exception of the conditions of existing wetland resources, which are not described in enough detail. The Panel has some concerns about the accuracy of the projected population growth of Solana Beach (which has implications for the recreational benefit analysis), inconsistencies with the characterization of the seawall alternative, and a lack of validation of some of the cost assumptions related to that alternative. A major concern from an environmental standpoint is that the climate change analysis does not evaluate the range of potential climate change impacts (e.g., increased storm intensity and frequency) and solely considers sea level rise. As to overall concept, the project would benefit from the complementary development of a long-term strategy to address the ultimate causes of shoreline retreat and bluff damage, namely, coastal sediment starvation and subsurface bluff erosion.

Table ES-1. Overview of 17 Final Panel Comments Identified by the Encinitas-Solana Beach Feasibility Study and EIS/EIR IEPR Panel

No.	Final Panel Comment
Significance – High	
1	The UDV method may not accurately represent the actual recreation benefits attributable to the project.
2	The process of assigning point values in the UDV analysis is not transparent, as required in the Economic Guidance Memorandum 11-03, or well documented.
3	The population growth of Solana Beach may be overestimated, which may affect the recreation benefit calculations.
4	Numerous design assumptions regarding beach fill quantities, beach fill performance (including erosion rates), and representative beach profiles have not been validated.
Significance – Medium	
5	Performance of the beach fill constructed from the two primary borrow areas, SO-5 and SO-6, is assumed to be equal; however, these two borrow areas have varying grains size distributions and, as such, the beach fills will perform differently.
6	The assumption that the beach fill unit costs would be 50% higher for subsequent renourishment events is not validated.
7	Although project impacts from sea level rise are addressed, the potential effects of other climate change-related consequences (e.g., increased storm severity and intensifying El Nino events) are not adequately evaluated.

Table ES-1, continued. Overview of 17 Final Panel Comments Identified by the Encinitas-Solana Beach Feasibility Study and EIS/EIR IEPR Panel

No.	Final Panel Comment
8	The development of the alternatives does not consider other construction methods aside from the hopper dredge method, nor does it incorporate the risk of a hopper dredge not being available on the West Coast.
9	The description of the existing conditions of ecologically valuable and impaired wetland resources does not meet National Environmental Policy Act requirements.
10	There were inconsistencies in the evaluation of the seawall alternative and some cost assumptions were not justified.
11	Critical components of the economic analysis are based on data sources that are not well-documented.
12	The Preconstruction Engineering and Design costs for the Encinitas and Solana Beach project segments are disproportionately higher than industry standard construction costs.
13	The impacts on public safety are difficult to assess given that the bluff failure data are spread throughout the report and the failure locations are not correlated with project segments.
14	There is little documentation provided in the report on the Economic Model's assumptions, limitations, and how risk and uncertainty are incorporated.
	Significance – Low
15	Watershed management measures to address sediment starvation are not included as part of a long-term strategy.
16	While adaptive management elements have been considered, it is unclear how they have been incorporated into the total project cost summary and the National Economic Development Plan.
17	It is not clear how the Del Mar reach was used in the National Economic Development benefit analysis.

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LIST OF ACRONYMS

AMP	Adaptive Management Plan
ATR	Agency Technical Review
COI	Conflict of Interest
CVM	Contingent Value Method
DrChecks	Design Review and Checking System
EGM	Economic Guidance Memorandum
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
FWOP	Future Without Project
FWP	Future With Project
IEPR	Independent External Peer Review
NED	National Economic Development
NEPA	National Environmental Policy Act
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
PDT	Project Delivery Team
PED	Preconstruction Engineering and Design
SAR	Safety Assurance Review
TCM	Travel Cost Method
UDV	Unit Day Value
USACE	United States Army Corps of Engineers

1. INTRODUCTION

The Cities of Solana Beach and Encinitas, California, are located along the Pacific Ocean in San Diego County, California. The City of Encinitas is approximately 10 miles south of Oceanside Harbor, and 17 miles north of Point La Jolla. The Encinitas shoreline is about 6 miles long, bounded on the north by Batiquitos Lagoon and on the south by San Elijo Lagoon. The 4,920 feet-long southernmost segment of the Encinitas shoreline is a low-lying barrier spit fronting the San Elijo tidal lagoon. Immediately south of the City of Encinitas is the City of Solana Beach. Solana Beach is bounded by San Elijo Lagoon to the north and on the south by the City of Del Mar. It is approximately 17 miles south of Oceanside Harbor, and 10 miles north of Point La Jolla. Solana Beach's shoreline is about 2 miles long. Nearly all of the shoreline in the study area except Cardiff (8 miles total) consists of narrow sand and cobble beaches fronting nearshore bluffs.

Over the past 15 to 20 years, the Solana Beach-Encinitas shoreline has experienced accelerated erosion of the beaches and coastal bluffs. Since the late 1970s and early 1980s, southern California has experienced a series of unusual weather patterns when compared to the rest of the century. In addition to shoreline erosion processes, fluvial delivery has also been significantly reduced due to river damming and inland sand mining activities. The cumulative effects of these impacts have produced erosion of the once-wide, sandy beaches. As a result of the severe winter storms caused by El Nino in the 1982-1983 and the extreme storm of 1988, most of the thin sand lens on the Encinitas beaches was lost even prior to the El Nino event in 1997-1998. Within Solana Beach, the chronically denuded beach condition was also worsened after the 1997-1998 season. It is apparent that beach sands were stripped away and lost from the littoral system during that season.

With the loss of the wide sandy beaches, storm waves attack the toe of the bluff and eventually form a notch. As the notch depth increases, it eventually triggers an upper bluff failure. The timing of bluff failures is difficult to predict and often occur several months after storms. As a result, damages occur to bluff top structures and infrastructure when bluffs collapse. This has prompted property owners atop the bluffs to armor or otherwise try to protect their property before structural damage occurs. Approximately half of the shoreline in the study area has been modified with some type of bluff protection structure, at significant cost. These seawalls provide piecemeal protection at varying levels. In addition, the bluff failures are a safety hazard and have caused the loss of life. The Encinitas-Solana Beach Shoreline Protection Project Integrated Draft Feasibility Study and Environmental Impact Statement/Environmental Impact Report (EIS/EIR) focuses on a more comprehensive solution over the study area. The loss of beach has also severely degraded recreational value in all reaches of the study area. In addition, the undercutting of the bluffs creates dangerous overhangs, which pose a threat to the public. There have been fatalities in recent years caused by sudden bluff collapse in the study area and adjacent beaches.

The critical areas of the study area were delineated in two segments. Segment 1 (Reaches 3, 4, and 5) exists within the City of Encinitas and extends from the 700 Block of Neptune Avenue to Swami's Reef and is approximately 2.0 miles in length; Segment 2 exists within the City of

Solana Beach and stretches from Table Tops Reefs to the southern limit of Solana Beach (Reaches 8 and 9) and is approximately 1.4 miles in length.

The objective of the work described here was to conduct an Independent External Peer Review (IEPR) of the Encinitas-Solana Beach Coastal Storm Damage Reduction Project Integrated Draft Feasibility Study and Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) (hereinafter Encinitas-Solana Beach Feasibility Study and EIS/EIR) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers (USACE) Engineer Circular *Civil Works Review* (EC 1165-2-214) (USACE, 2012) and Office of Management and Budget (OMB) bulletin *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses.

This final report details the IEPR process, describes the IEPR panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel on the existing environmental, economic, and engineering analyses contained in the Encinitas-Solana Beach Feasibility Study and EIS/EIR. The full text of the Final Panel Comments is presented in Appendix A.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review (ATR), as described in USACE (2012) and USACE (2007).

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 economic, engineering, and environmental analysis 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 Encinitas-Solana Beach Feasibility Study and EIS/EIR was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by Engineer Circular. 1165-2-214) under Section 501(c)(3) of the U.S. Internal Revenue Code) with experience conducting IEPRs for USACE.

3. METHODS

This section describes the method followed in selecting the members for the IEPR Panel (the Panel) and in planning and conducting the IEPR. The IEPR was conducted following procedures described by USACE (2012) and in accordance with USACE (2007) and OMB (2004) guidance. 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).

3.1 Planning and Schedule

At the beginning of the Period of Performance, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., clarify expertise areas needed for panel members). Any revisions to the schedule were submitted as part of the final Work Plan.

Table 1 presents the schedule followed in executing the IEPR. Due dates for milestones and deliverables are based on the date that Battelle received the review documents from USACE (January 2, 2013)[1]. Note that the work items listed in Task 6 occur after the submission of this report. Battelle will enter the 17 Final Panel Comments developed by the Panel into USACE's Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle. Battelle will provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closure, as a final deliverable and record of the IEPR results.

Table 1. Encinitas-Solana Beach Feasibility Study and EIS/EIR IEPR Schedule

Task	Action	Due Date
1	Award/Effective Date	9/27/2011
	Battelle notified of project restart	9/26/2012
	Review documents available	1/2/2013
	Battelle submits draft Work Plan[a]	1/7/2013
	USACE provides comments on draft Work Plan	2/5/2013
	Battelle submits final Work Plan	2/7/2013
2	Battelle requests input from USACE on the conflict of interest (COI) questionnaire	9/26/2012
	USACE provides comments on COI questionnaire	10/5/2012
	Battelle submits list of selected panel members[a]	10/9/2012
	USACE confirms the Panel has no conflicts of interest	10/11/2012
	Battelle completes subcontracts for panel members	12/13/2012
3	Battelle convenes kick-off meeting with USACE	11/15/2012
	Battelle sends review documents to Panel	1/7/2013
	Battelle convenes Panel kick-off meeting	1/4/2013
	Battelle convenes USACE/Panel kick-off meeting	1/4/2013

[1] The award/effective date was September 27, 2011, although the documents were not ready for review at that time. Battelle was notified on September 26, 2012 that the IEPR would be beginning soon and a kickoff meeting with Battelle and USACE was held on November 15, 2012. Review documents were provided to Battelle on January 2, 2013.

Table 1, continued. Encinitas-Solana Beach Feasibility Study and EIS/EIR IEPR Schedule

Task	Action	Due Date
	USACE convenes site visit in Encinitas, CA	1/10/2013
4	Panel members complete their individual reviews	2/5/2013
	Battelle provides Panel merged individual comments and talking points for Panel Review Teleconference	2/13/2013
	Battelle convenes Panel Review Teleconference	2/14/2013
	Panel members provide draft Final Panel Comments to Battelle	2/25/2013
	Battelle finalizes Final Panel Comments	3/6/2013
5	Battelle submits Final IEPR Report to USACE[a]	3/15/2013
6[b]	Battelle convenes teleconference with USACE to review the Post-Final Panel Comment Response Process	3/18/2013
	USACE provides draft PDT Evaluator Responses to Battelle	3/21/2013
	Battelle convenes teleconference with Panel and USACE to discuss Final Panel Comments and draft responses	3/29/2013
	USACE inputs final PDT Evaluator Responses in DrChecks	4/3/2013
	Battelle inputs the Panel's BackCheck Responses in DrChecks	4/11/2013
	Battelle submits pdf printout of DrChecks project file[a]	4/12/2013
	Project Closeout	6/17/2013

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

3.2 Identification and Selection of IEPR Panel Members

The candidates for the Panel were evaluated based on their technical expertise in the following key areas: economics, Civil Works planning, coastal engineering, and environmental/biology. These areas correspond to the technical content of the Encinitas-Solana Beach Feasibility Study and EIS/EIR IEPR and overall scope of the Encinitas-Solana Beach Feasibility Study and EIS/EIR.

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 initially identified more than 12 candidates for the Panel, evaluated their technical expertise, and inquired about potential COIs. Of these, Battelle chose the most qualified candidates and confirmed their interest and availability, and ultimately proposed three experts for the final Panel. Information about the candidate panel members, including brief biographical information, highest level of education attained, and years of experience, was provided to USACE for feedback. Battelle made the final selection of panel members according to the selection criteria described in the Work Plan.

The three proposed primary reviewers constituted the final Panel. The remaining candidates were not proposed for a variety of reasons, including lack of availability, disclosed COIs, or lack of the precise technical expertise required.

The candidates were screened for the following potential exclusion criteria or COIs.[2] These COI questions were intended to serve as a means of disclosure and to better characterize a candidate's employment history and background. Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit.

- Previous and/or current involvement by you or your firm[3] in the Encinitas-Solana Beach Shoreline Protection Project Integrated Draft Feasibility Study and Environmental Impact Statement/Environmental Impact Report (EIS/EIR) (hereinafter: Encinitas-Solana Beach EIS/EIR) and/or technical appendices.
- Previous and/or current involvement by you or your firm[3] in flood risk management projects in the greater San Diego, California region.
- Previous and/or current involvement (conceptual or actual design, construction, or operations and maintenance) by you or your firm[3] in projects related to the Encinitas-Solana Beach Shoreline Protection Project.
- Current employment by the U.S. Army Corps of Engineers (USACE).
- Previous and/or current involvement in paid or unpaid expert testimony related to the Encinitas-Solana Beach Shoreline Protection Project.
- Previous and/or current employment or affiliation with members of the cooperating agencies or local sponsors: the City of Encinitas, California and the City of Solana Beach, California (for pay or pro bono).
- Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to the greater San Diego, California area.
- Current personal involvement in other USACE projects, including authorship of any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Los Angeles District.
- Previous or current involvement in the development or testing of models that will be used for or in support of the Encinitas-Solana Beach EIS/EIR, including but not limited to GENESIS and HEC-FDA.
- Current firm[3] involvement in other USACE projects, specifically those projects/contracts that are with the Los Angeles District. If yes, provide title/description, dates, and location

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

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

(USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the Los Angeles District. Please explain.

- Any previous employment by USACE as a direct employee or contractor (either as an individual or through your firm[3]) within the last 10 years, notably if those projects/contracts are with the Los Angeles District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning coastal storm damage and include the client/agency and duration of review (approximate dates).
- Pending, current, or future financial interests in the Encinitas-Solana Beach EIS/EIR-related contracts/awards from USACE.
- A significant portion (i.e., greater than 50%) of personal or firm[3] revenues within the last 3 years from USACE contracts.
- A significant portion (i.e., greater than 50%) of personal or firm[3] revenues within the last 3 years from contracts with the non-Federal sponsors (Cities of Encinitas and Solana Beach, California).
- Any publicly documented statement (including, for example, advocating for or discouraging against) related to the Encinitas-Solana Beach Shoreline Protection Project.
- Participation in prior Federal studies relevant to the Encinitas-Solana Beach Shoreline Protection Project and/or the Encinitas-Solana Beach EIS/EIR.
- Previous and/or current participation in prior non-Federal studies relevant to the Encinitas-Solana Beach Shoreline Protection Project and/or the Encinitas-Solana Beach EIS/EIR.
- 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:

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. Two of the final reviewers are affiliated with consulting companies and one is an independent consultant. 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 made the final selection of the Panel. Section 4 of this report provides names and biographical information on the panel members.

Prior to beginning their review and within 13 days of their subcontracts being finalized, all members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel.

3.3 Preparation of the Charge and Conduct of the IEPR

Charge questions were provided by USACE and included in the draft and final Work Plans. In addition to a list of 65 charge questions/discussion points, the final charge included general

guidance for the Panel on the conduct of the peer review (provided in Appendix B of this final report).

Battelle planned and facilitated a kick-off meeting via teleconference during which USACE presented project details to the Panel. Before the meeting, the IEPR Panel received an electronic version of the final charge as well as the Encinitas-Solana Beach Feasibility Study and EIS/EIR documents and reference materials listed below. The documents and files in bold font were provided for review; the other documents were provided for reference or supplemental information only. In addition, during the review period, USACE provided an additional document at the request of panel members. This document was sent to Battelle, who provided it to the Panel as supplemental information only and not as part of the official review. This additional document requested by the Panel is identified below.

- **Encinitas-Solana Beach Shoreline Protection Project Integrated Draft Feasibility Study and Environmental Impact Statement/Environmental Impact Report (EIS/EIR) (588 pp) with appendices:**
    - **Appendix A – Agency Coordination and Public Involvement (98 pp)**
    - **Appendix B – Coastal Engineering Appendix (494 pp)**
    - **Appendix C – Geotechnical Engineering Appendix (78 pp)**
    - **Appendix D – 404(b)(1) Evaluation (16 pp)**
    - **Appendix E – Economic Appendix (190 pp)**
    - **Appendix F – Cost Estimate Appendix (9 pp)**
    - **Appendix G – Real Estate Appendix (23 pp)**
    - **Appendix H – Potential Impacts to Nearshore Resources and 8 Mitigation and Monitoring Plan (57 pp)**
    - **Appendix I – Air Quality Analysis (20 pp)**
    - **Appendix J – Coordination Act Report (86 pp)**
    - **Appendix K – Distribution List (5 pp)**
    - **Appendix M – Mitigation Strategy (25 pp)**
- **Approach to Incorporate Projected Future Sea Level Change into the Encinitas and Solana Beach Shoreline Protection Feasibility Study and CEQA and NEPA Compliance Efforts (13 pp)**
- USACE guidance Civil Works Review (EC 1165-2-214, 5 December 2012)
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

During the review process, the Panel requested the following supplemental information from USACE:

- USACE guidance Sea-Level Change Considerations for Civil Works Programs (EC 1165-2-212, 1 October 2011)

3.4 Site Visit

An in-person meeting to discuss the Encinitas-Solana Beach Feasibility Study and EIS/EIR was held in Encinitas and Solana Beach, California on January 10, 2013; all three panel members and the Battelle Project Manager attended this meeting. As part of this meeting, USACE led Battelle and the Panel on a tour of the Encinitas-Solana Beach Feasibility Study and EIS/EIR project area. This tour provided an opportunity for the IEPR panel members to see the project area and proposed project features, and to ask clarifying questions of the project delivery team (PDT). USACE, Battelle, and the panel members visited both Segments 1 and 2 of the project area, observed them both from the top of the bluffs as well as from the beaches, and were able to see examples of recent bluff collapses, notches, and seawalls. USACE pointed out specific project features to help the panel members better comprehend the design and construction intent of the project and answered questions posed by the panel members.

3.5 Review of Individual Comments

The Panel was instructed to address the charge questions/discussion points within a comment-response form provided by Battelle. At the end of the review period, the Panel produced 195 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. As a result of the review, Battelle summarized the 195 comments into a preliminary list of 27 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

3.6 IEPR Panel Teleconference

Battelle facilitated a 4-hour teleconference with the Panel so that the panel members could exchange technical information. The main goal of the teleconference was to identify which issues should be carried forward as Final Panel Comments in the Final IEPR Report and decide which panel member would serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the Final IEPR Report would accurately represent the Panel's assessment of the project, including any conflicting opinions. The Panel engaged in a thorough discussion of the overall positive and negative comments, added any missing issues of high-level importance to the findings, and merged any related individual comments. In addition, Battelle confirmed each Final Panel Comment's level of significance to the Panel.

The Panel also discussed responses to nine specific charge questions where there appeared to be disagreement among panel members. The conflicting comments were resolved based on the professional judgment of the Panel, and all sets of comments were determined not to be conflicting. Each comment was either incorporated into a Final Panel Comment, determined to be consistent with other Final Panel Comments already developed, or determined to be a non-significant issue.

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

3.7 Preparation of Final Panel Comments

Following the teleconference, Battelle prepared a summary memorandum for the Panel documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the Encinitas-Solana Beach Feasibility Study and EIS/EIR:

- Lead Responsibility: For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed the merged individual comments table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.
- Directive to the Lead: Each lead was encouraged to communicate directly with the other panel member as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- Format for Final Panel Comments: Each Final Panel Comment was presented as part of a four-part structure:
  1. Comment Statement (succinct summary statement of concern)
  2. Basis for Comment (details regarding the concern)
  3. Significance (high, medium, low; see description below)
  4. Recommendation(s) for Resolution (see description below).
- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:
  1. High: Describes a fundamental problem with the project that could affect the recommendation, success, or justification of the project. Comments rated as high indicate that the Panel analyzed or assessed the methods, models, and/or analyses and determined that there is a “showstopper” issue.
  2. Medium: Affects the completeness of the report in describing the project, but will not affect the recommendation or justification of the project. Comments rated as medium indicate that the Panel does not have sufficient information to analyze or assess the methods, models, or analyses.
  3. Low: Affects the understanding or accuracy of the project as described in the report, but will not affect the recommendation or justification of the project. Comments rated as low indicate that the Panel identified information (tables, figures, equations, discussions) that was mislabeled or incorrect or data or report sections that were not clearly described or presented.
- Guidance 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).

At the end of this process, 20 Final Panel Comments were prepared and assembled. During the Final Panel Comment development process, the Panel felt that three of the Final Panel Comments could be merged into other Final Panel Comments; therefore, the total Final Panel Comment count was reduced to 17.

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. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Final Panel Comments are presented in Appendix A of this report.

4. PANEL DESCRIPTION

Candidates for the Panel were identified using Battelle's Peer Reviewer Database, targeted Internet searches using key words (e.g., technical area, geographic region), searches of websites of universities or other compiled expert sites, and referrals. Battelle prepared a draft list of primary and backup candidate panel members (who were screened for availability, technical background, and COIs), and provided it to USACE for feedback. Battelle made the final selection of panel members.

An overview of the credentials of the final three primary members of the Panel and their qualifications in relation to the technical evaluation criteria is presented in Table 2. More detailed biographical information regarding each panel member and his or her area of technical expertise is presented in the text that follows the table.

Table 2. Encinitas-Solana Beach IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	David Luckie	Michael Poff	Felicia Rein
Economics			
Minimum 10 years' experience directly related to water resource economic evaluation or review	X		
Minimum 5 years' experience directly dealing with HEC-FDA	X		
Minimum 2 years' experience in reviewing Federal water resource economic documents justifying construction efforts.	X		
Experience related to regional economic development	X		
Capable of evaluating traditional National Economic Development plan benefits associated with coastal storm damage risk reduction projects, along with coastal recreational benefits	X		
Minimum M.S. degree in economics	X[a]		
Civil Works Planning			
Minimum 10 years' planning experience	X		
Very familiar with USACE Civil Works planning policies, methodologies, and procedures	X		
Minimum 5 years' experience working directly with or for USACE on Civil Works projects	X		
Experience related to USACE and coastal storm damage reduction and protection projects, or experience working on projects conducted as a result coastal storm damage	X		
Minimum M.S. degree in relevant field	X[a]		
Coastal Engineering			
Registered professional engineer with a minimum 10 years' experience in coastal engineering with an emphasis on large coastal storm damage reduction and protection projects		X	
Familiar with USACE application of risk and uncertainty analyses with coastal storm damage reduction and protection projects		X	

Table 2, continued. Encinitas-Solana Beach IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	David Luckie	Michael Poff	Felicia Rein
Familiar with standard USACE coastal engineering computer models		X	
Familiar with the GENESIS computer program		X	
Capable of completing a USACE Safety Assurance Review (SAR)		X	
Environmental/Biology			
Minimum 10 years' demonstrated experience with projects along the Pacific Ocean coast of the United States			X
Particular knowledge of construction impacts on marine and terrestrial ecology of coastal regions of southern California			X
Familiar with all National Environmental Policy Act Environmental Impact Statement requirements			X
Experience with the Endangered Species Act			X
Experience with essential fish habitat			X
Experience with the Marine Mammals Protection Act			X
Minimum M.S. degree in an appropriate field of study			X

[a] Waiver statement presented as part of Task 2 deliverable and approved by USACE

David Luckie

Role: Economics and Civil Works planning expertise
Affiliation: Independent Consultant

Mr. Luckie is currently the Principal Economist at CivilTech Engineering, Inc. and has 24 years of professional experience in economics, planning, plan formulation, benefit-cost analysis, and risk-based analysis. He earned his B.S. in economics from the University of South Alabama in 1986. For 17 years, Mr. Luckie worked for USACE, Mobile District in the Planning and Environmental Division as a regional economist/product team leader where he was involved in numerous high profile Civil Works projects, including the Alabama-Coosa Tallapoosa-Apalachicola Chattahoochee Flint Programmatic Draft EIS, which covered water resource planning issues for two watersheds and three states.

Mr. Luckie has experience providing detailed forecasts of coastal storm damage reduction benefits, including working on the Panama City Beaches Storm Damage Reduction Project in northwest Florida. His responsibilities included assisting in development of the without-project conditions including the structure inventory, followed by assisting in the development and

screening of alternative plans to reduce coastal storm damage from tropical storms, hurricanes, and winter storm events. He is also familiar with estimating damage and costs associated with coastal erosion, waves, and inundation. In the wake of Hurricanes Erin, Opal, Georges, Ivan, and Dennis, Mr. Luckie conducted extensive inventories of structures affected or damaged by the storms. His responsibilities included assembling a comprehensive database of damaged structures and facilities (residential, commercial, industrial, and government); conducting damage assessments of each asset using a standardized building performance assessment form; and collecting data on structure type, structure purpose, structure condition, damage incurred, mode of damage (including waves, inundation, or erosion), and the likelihood of the structure to withstand similar events.

Mr. Luckie is a prolific Excel modeler and has developed numerous risk-based tools to model water shortage risk, decision tree analysis, and warning system effectiveness. Mr. Luckie has extensive experience using HEC-FDA and HEC-FIA, dating back to application development in the mid- and late 1990s. As senior regional economist and plan formulator on the Village Creek Watershed Study (Birmingham, Alabama), Mr. Luckie used HEC-FDA extensively in coordination with hydrologic and hydraulic engineers. Mr. Luckie has built numerous @Risk simulations to conduct Monte Carlo analyses covering a broad array of water resource risk and uncertainty issues. He is very familiar with National Economic Development (NED) procedures and USACE's Planning Guidance Notebook (ER 1105-2-10), and has served on previous IEPR panels.

Michael Poff, P.E.

Role: Coastal engineering expertise
Affiliation: Coastal Engineering Consultants, Inc.

Mr. Poff is vice president of engineering for Coastal Engineering Consultants Inc. specializing in civil, coastal, and environmental projects. He holds an M.S. degree in coastal engineering from the University of Delaware with over 20 years of experience in the coastal design/construction cost engineering field. He is a registered Professional Engineer in the states of Florida and Louisiana, and is experienced in project management, civil design, coastal engineering design, environmental permitting, and marine survey services.

His design experience includes beach, dune, and marsh fill layouts; borrow area geometry; inlet and navigation channel dredge templates; channel markers; coastal structures such as groins, jetties, and revetments; beachfront stormwater drainage; and dune vegetation. He is experienced with large complex Civil Works projects with high public and interagency interests on the order of $200 million, and has been closely involved in the design, permitting and construction of five major coastal restoration projects including the Scofield Island Barrier Shoreline Restoration Project, the Charlotte County Erosion Control Project, the Blind Pass Restoration Project, the Marco Island Beach Renourishment Project, and the Bay Joe Wise Headland Restoration Project. He is experienced in performing cost engineering and construction management for all phases of beach restoration, beach maintenance, and mitigation planning for both small and large scale projects including Federal ecosystem restoration projects. His responsibilities included pay request review/approval, preparation of field change orders, pay survey review/verification, and project certification. He is experienced in the construction industry and practices of the coastal

environment of the southeastern United States, and is familiar with industry practices followed in the western United States.

Mr. Poff has performed cost growth analyses and risk assessment analyses for several Federal projects, cost engineering, and related services for marine projects. He has conducted multiple engineering assignments as part of the USACE 6-step Planning Process for major coastal and ecosystem restoration feasibility studies and has performed risk and uncertainty analyses for storm damage reduction and protection projects following USACE standards and methods. He has served as a professional engineer on a major planning project to restore the barrier islands within the Terrebonne Basin (Louisiana), including oversight of coastal processes computer modeling, alternatives analysis, cost estimating, and incremental cost analysis.

Mr. Poff is experienced with the IEPR process and has participated on a previous review of storm damage reduction projects; his experience and background makes him capable of addressing the Safety Assurance Review (SAR) of a USACE project. He is a member of the American and Florida Shore and Beach Preservation Associations, American Society of Engineers, and the Florida Engineering Society/Florida Institute of Consulting Engineers Leadership Institute.

Felicia Rein, Ph.D.

Role: Environmental/biology expertise.
Affiliation: Watershed Solutions, Inc.

Dr. Rein is the owner and senior scientist at Watershed Solutions, Inc., a Florida State certified small business enterprise (SBE), providing environmental consulting and restoration services, specializing in ecologic restoration, environmental assessment and impact analyses, ecological monitoring, water resource management, and erosion control. She is also an affiliate professor at Florida Atlantic University in the Geosciences Department. She earned her Ph.D. in ecosystem science/restoration ecology from the University of California at Santa Cruz in 2000, where she studied processes of erosion, slope failure, and shoreline protection. Her doctoral research was a four year field study in Elkhorn Slough, on the central Pacific coast, where understanding weather patterns and cumulative impacts were critical to her analysis.

As a specialist on the land-water interface, Dr. Rein has managed projects all along the Pacific coast, including a sand mine reclamation study in northern San Diego County. Dr. Rein has over 25 years of experience managing and carrying out large-scale multidisciplinary projects, many along the Pacific coast. While at HDR in Pearl River, New York, Dr. Rein was involved with New York/New Jersey harbor projects, including projects dealing with shoreline protection. Working as a senior project manager for Denise Duffy & Associates, Dr. Rein was based in Monterey, California and worked in environmental impact assessment, analyzing impacts of dozens of projects on the Pacific coast. These projects involved analyzing environmental trade-offs for threatened species, water resources and other land uses, developing mitigation plans, conducting wetland delineations, and monitoring construction sites for erosion control compliance. She currently has a project in review at the California State Water Resource Control Board dealing with a complex environmental study around Carmel Valley, central Pacific Coast, balancing water rights, California red-legged frogs and steelhead salmon, which are both

Federally Threatened Species.

Dr. Rein is experienced with the IEPR process, and has participated in project reviews that included technical models estimating fluvial delivery into the system and optimizing the hydrodynamics to rehabilitate jetties. Dr. Rein has extensive experience preparing planning documents such as EIRs and EISs and has experience with all National Environmental Policy Act (NEPA) EIS requirements, as well as the Endangered Species Act, essential fish habitat, and the Marine Mammals Protection Act. Dr. Rein is a member of Sigma Xi National Scientific Research Society.

5. SUMMARY OF FINAL PANEL COMMENTS

The panel members agreed among themselves on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012; p. D-4) in the Encinitas-Solana Beach Feasibility Study and EIS/EIR review documents. Table ES-1 lists the Final Panel Comments statements by level of significance. The full text of the Final Panel Comments is presented in Appendix A of this report. The following summarizes the Panel's findings.

Engineering – From an engineering perspective, the planning process is done very well. However, the Panel has several concerns. Some of the key design assumptions for beach fill volumes, widths, performance, and costs are not validated, even though these project aspects are critical to alternatives analysis and selection and project cost determination. An assumption has been made that the performance of the beach fill from the two primary borrow areas is the same, despite the differences in grain size distributions. It is also assumed without validation that beach fill unit costs will be 50% higher for renourishment events subsequent to the initial event. In addition, the report does not address the uncertainties of hopper dredge availability on the West Coast; had this risk been addressed, it might have resulted in alternative construction methods being considered. Finally, the Panel does not understand why the Preconstruction Engineering and Design (PED) cost percentages are so much higher than industry standard.

Economics – The combined Feasibility Study and EIS/EIR is very good from an economics standpoint. The planning process has been followed very well and the report is generally well documented and thorough. Given the large annual visitation numbers and the importance of recreational benefits relative to economic viability, the Panel believes that the Unit Day Value (UDV) method is not the most appropriate one to determine recreational resource value and that the Travel Cost Method (TCM) or the Contingent Value Method (CVM) should have been used instead. Although the UDV may not have been the best choice, the Panel thinks that a more transparent and better documented UDV analysis and scoring process would have been beneficial. The Panel also finds that other aspects of the economic analysis are not well documented, including the sources of beach visitation data, recreational use data, bluff failure information, how risk and uncertainty were addressed in the Economic Model, and how the Del Mar reach was used in the National Economic Development (NED) benefit analysis.

Environmental – The project is well documented and generally meets the requirements of the National Environmental Policy Act (NEPA), with the exception of the conditions of existing wetland resources, which are not described in enough detail. The Panel has some other concerns about the accuracy of the projected population growth of Solana Beach (which has implications for the recreational benefit analysis), inconsistencies with the characterization of the seawall alternative, and a lack of validation of some of the cost assumptions related to that alternative. A major concern from an environmental standpoint is that the climate change analysis does not evaluate the range of potential climate change impacts (e.g., increased storm intensity and frequency) and solely considers sea level rise. As to overall concept, the project would benefit from the complementary development of a long-term strategy to address the ultimate causes of shoreline retreat and bluff damage, namely, coastal sediment starvation and subsurface bluff erosion.

Table 3. Overview of the 17 Final Panel Comments Identified by the Encinitas-Solana Beach Feasibility Study and EIS/EIR IEPR Panel.

No.	Final Panel Comment
Significance – High	
1	The UDV method may not accurately represent the actual recreation benefits attributable to the project.
2	The process of assigning point values in the UDV analysis is not transparent, as required in the Economic Guidance Memorandum 11-03, or well documented.
3	The population growth of Solana Beach may be overestimated, which may affect the recreation benefit calculations.
4	Numerous design assumptions regarding beach fill quantities, beach fill performance (including erosion rates), and representative beach profiles have not been validated.
Significance – Medium	
5	Performance of the beach fill constructed from the two primary borrow areas, SO-5 and SO-6, is assumed to be equal; however, these two borrow areas have varying grains size distributions and, as such, the beach fills will perform differently.
6	The assumption that the beach fill unit costs would be 50% higher for subsequent renourishment events is not validated.
7	Although project impacts from sea level rise are addressed, the potential effects of other climate change-related consequences (e.g., increased storm severity and intensifying El Nino events) are not adequately evaluated.

Table 3, continued. Overview of the 17 Final Panel Comments Identified by the Encinitas-Solana Beach Feasibility Study and EIS/EIR IEPR Panel

No.	Final Panel Comment
8	The development of the alternatives does not consider other construction methods aside from the hopper dredge method, nor does it incorporate the risk of a hopper dredge not being available on the West Coast.
9	The description of the existing conditions of ecologically valuable and impaired wetland resources does not meet National Environmental Policy Act requirements.
10	There were inconsistencies in the evaluation of the seawall alternative and some cost assumptions were not justified.
No.	**Final Panel Comment**
11	Critical components of the economic analysis are based on data sources that are not well-documented.
12	The Preconstruction Engineering and Design costs for the Encinitas and Solana Beach project segments are disproportionately higher than industry standard construction costs.
13	The impacts on public safety are difficult to assess given that the bluff failure data are spread throughout the report and the failure locations are not correlated with project segments.
14	There is little documentation provided in the report on the Economic Model's assumptions, limitations, and how risk and uncertainty are incorporated.
	Significance – Low
15	Watershed management measures to address sediment starvation are not included as part of a long-term strategy.
16	While adaptive management elements have been considered, it is unclear how they have been incorporated into the total project cost summary and the National Economic Development Plan.
17	It is not clear how the Del Mar reach was used in the National Economic Development benefit analysis.

6. REFERENCES

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

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

USACE (2012). Water Resources Policies and Authorities: Civil Works Review. Department of the Army, US Army Corps of Engineers, Washington, D.C. Engineer Circular (EC) No. 1165-2-214. December 15.

USACE (2010). Economic Guidance Memorandum 11-03, Unit Day Values for Recreation for Fiscal Year 2011. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. 5 November.

USACE (2000). Planning Guidance Notebook. Appendix E. Civil Works Missions and Evaluation Procedures. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Regulation 1105-2-100. 22 April.

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APPENDIX A

Final Panel Comments

on the

Encinitas-Solana Beach Feasibility Study and EIS/EIR

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Final Panel Comment 1

The UDV method may not accurately represent the actual recreation benefits attributable to the project.

Basis for Comment

The Unit Day Value (UDV) method is better suited for reconnaissance level of detail because it is a subjective method and estimates recreation demand without respect to price. As a result, it provides a rough estimate of recreation resource value that is better suited for determining whether further study is warranted, rather than determining whether investment is warranted in the further development of the resource.

At the feasibility level, and when recreation benefits are crucial to the economic viability of the project (as is the case with the Encinitas-Solana Beach project), a more rigorous, transparent, and defensible approach is recommended to estimate consumer willingness to pay for the recreation resource

Engineer Regulation 1105-2-100 (USACE, 2000), Appendix E (pp. E-185 – E-186) describes the process and criteria for selecting the most appropriate method for estimating recreation benefits. When expected annual visitation exceeds 750,000, or when recreation benefits are vital to the economic viability, either the Travel Cost Method (TCM) or the Contingent Value Method (CVM) should be used. In the case of the Encinitas-Solana Beach project, Section 4.8.4 and Table 4.8.4 of the Economics Appendix state that existing and expected annual visitation well exceed the 750,000 visitation threshold, and Section 5.3 of the Economics Appendix demonstrates that there is no economically viable project alternative without recreation benefits.

The guidance cited above states that if a regional model is available and applicable to the study area, it should be used. Section 10.8 of the Appendix cites a TCM study performed by Phillip King, which appears to value the beaches in the study area at a much higher figure, $22 and $17, respectively. The report should document and describe why this regional model was not applicable or feasible for use in this study.

Significance – High

The project may not be economically justified if the process for estimating recreation benefits is not appropriate.

Recommendations for Resolution

1. Describe why regional models such as TCM or CVM were not used, including how the method selection procedure from ER 1105-2-100 was followed.
2. Explain why the King study could not be used or adapted to Encinitas-Solana Beach.

Literature Cited:

USACE (2000). Planning Guidance Notebook. Appendix E. Civil Works Missions and Evaluation Procedures. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Regulation 1105-2-100. 22 April.

Final Panel Comment 2

The process of assigning point values in the UDV analysis is not transparent, as required in the Economic Guidance Memorandum 11-03, or well documented.

Basis for Comment

Given the importance of the recreation benefit analysis to the economic justification of the project, the method by which the resource value is estimated requires much greater detail and a higher degree of transparency.

The Unit Day Value (UDV) method is a highly subjective process, and in recognition of this fact, Economic Guidance Memorandum (EGM) 11-03 (USACE, 2010) calls for careful description of not only why the UDV method is the most appropriate, but also how the recreation resource was scored or rated against the criteria in Table 1 of EGM 11-03. More detail describing why a particular point value was assigned for the judgment factors in Table 1 is necessary for the Panel to understand how the beaches in the study area ranked the way they did. The beaches score relatively high on the scale and are accordingly assigned a relatively high value, without which there may not be sufficient National Economic Development (NED) benefits for project justification.

Section 4.8.2 of Appendix E provides a one-paragraph description of the scoring process and provides a cursory explanation of the amenities' contribution to the overall value to the resource. The section provides no detail on the number of experts used, their qualifications, or how each responded to the criteria and judgment factors in Table 1 of the EGM.

Section 4.8.2 should include much more detail, including the number of experts interviewed, their qualifications as experts, and a rigorous discussion of how the experts scored the amenities. The report should identify where the experts disagreed on the value of a feature or amenity as well as where there was consensus and explain how issues were resolved in arriving at the final figures.

Significance – High

A transparent and well-documented UDV analysis is crucial to assessing recreation benefits and therefore determining project feasibility.

Recommendations for Resolution

1. Expand Section 4.8.2 of Appendix E to describe the experts who were consulted and their qualifications.
2. Add a scoring matrix to the section, showing expert score assignments and identifying areas of disagreement and consensus.
3. Explain how any issues were resolved and how final scores were assigned.

Literature Cited:

USACE (2010). Unit Day Values for Recreation for Fiscal Year 2011. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Economic Guidance Memorandum 11-03. 5 November.

Final Panel Comment 3

The population growth of Solana Beach may be overestimated, which may affect the recreation benefit calculations.

Basis for Comment

The population growth assumption for Solana Beach is based on the San Diego Association of Governments (SANDAG) 2050 Regional Growth Forecast. The main report (p. 278) states that the City of Solana Beach is predicted to grow by 23.9 percent from 2010 to 2050. This growth estimate is partially used in calculating future recreational use benefits. However, demographic data presented on p. 278 of the main report show that the City of Solana Beach did not experience any growth between 2000 and 2010.

A statement later in the document (p. 297) claims that "Solana Beach has been extensively developed (99 percent built out) and has little vacant developable land remaining." Given this level of build out, the estimated 23.9 percent population growth rate provided in the main report is not clearly justified.

Population drives demand and the Unit Day Value (UDV) estimates price independently of demand. A significant change in price or demand would significantly change the recreation benefits, which could affect project justification.

Significance – High

The population estimate in the report contributes to the recreational use benefit calculation, a critical component of project justification.

Recommendations for Resolution

1. Provide justification for the future population growth estimate for Solana Beach or decrease the estimated rate of growth to reflect a conservative estimate based on the past decade of growth and available land.
2. Recalculate the recreational use benefit based on the new growth rate estimate of Solana Beach and determine the impact on the overall recreational benefit calculation.

Final Panel Comment 4

Numerous design assumptions regarding beach fill quantities, beach fill performance (including erosion rates), and representative beach profiles have not been validated.

Basis for Comment

Validation of the following design assumptions, which were instrumental in the development and selection of the beach renourishment alternative, are necessary to verify project costs and justify the selection of the National Economic Development (NED) plan.

- Determination of the beach fill quantities and performance of the beach fills are based on a volume to shoreline change relationship that is not validated. Validating the relationship confirms the beach fill volumes, renourishment intervals, and associated project costs. (Main Report, p. 64; Appendix B, pp. 54, 247)
- While a sediment budget is developed for the study area, it is not used in assessing alternatives or predicting the Future With Project (FWP) and Future Without Project (FWOP) conditions. Rather it is the above described shoreline to volume change relationship that is the basis of the performance analysis which, as stated, is not validated. Further, there are inconsistencies in the magnitude of the reported net loss rates for the study area. (Main Report, p. 68; Appendix B, p. 57)
- The reported erosion rates of the Regional Beach Sand Project (RBSP) are significantly greater than historic sediment transport rates, and are very different between the two Segments (Encinitas: approximately 106,000 cy/yr; Solana: approximately 22,000 cy/yr). Further, while it is inferred, it is not clearly stated that the RBSP project performance is used in the predictions of the project performance. Without the sediment budget or related projects to predict performance, the above described shoreline to volume change relationship is the basis of the performance analysis which, as stated, is not validated. (Appendix E, p. 23)
- The use of the wave refraction study results developed in the San Diego Association of Governments (SANDAG) project to document that no impacts are expected from nearshore borrow area mining for this project (e.g., Borrow Areas SO-5, SO-6) is not validated by relating this project's geomorphology and coastal forcing functions to the SANDAG example. Confirming no impacts from nearshore borrow area mining eliminates the need for additional mitigation and related project costs. (Main Report, p. 340)

  The assumption of the depth of closure of -30 ft is not validated by either profile comparisons over time to track seaward cross shore transport or by empirical methods. Further, a different depth of closure was used in the GENESIS report that is not explained. The value in the GENESIS report more closely matches the expected depth of closure based on visual review of the profile comparisons over time provided in the report. The GENESIS model results were used to determine renourishment intervals, thus the correct depth of closure value must be

employed. (Appendix B, pp. 54, 188, 212)

- The limited examples of the construction templates and 2-year design adjustments plotted over the representative profile for each Segment (Encinitas and Solana) assumes the sand will transport seaward to -30 ft in Encinitas but shallower in Solana. Further, the cross shore losses are less than the gains for the Solana Segment's representative profile; thus a volume imbalance occurs that is not explained. These discrepancies affect beach fill volumes, renourishment volumes, and associated project costs. (Appendix B, p. 146)
- The representative profiles form the basis of many of the decision matrices throughout plan formulation. The report includes descriptions that indicate there is sufficient alongshore variability of the offshore/nearshore/bluff characteristics and the underlying hardpan profiles. Use of just one profile per Segment is not validated and introduces uncertainties in determination of quantities for each alternative. (Appendix B, p. 247)

Significance – High

Validation of the design assumptions for beach fill volumes, widths, and performance are central to plan formulation as they affect the results of the alternatives analysis and plan selection.

Recommendations for Resolution

1. Compute representative beach volume changes for each Segment to validate the application of the shoreline to volume change relationship in the development and analysis of alternative plans and evaluation of project performance. Options include profile comparisons over time or through direct comparison and justification of using documented SANDAG project relationships.
2. Use sediment budget and volume change analysis as part of developing and analyzing alternatives, specifically, beach fill designs and predicting FWP and FWOP conditions.
3. Provide detailed comparisons of the similarities between site conditions (e.g., wave climate, shoreline conditions, natural erosion rates, native beach conditions, native sediment conditions, sediment budget, and geological controls) and project conditions (e.g., berm height, depth of closure, berm width, fill volume density, proposed borrow area sediment conditions, borrow area sediment compatibility) to validate the use of the SANDAG and RBSP I projects in predicting project performance and impacts on resources.
4. Compute depth of closure through direct profile comparisons and empirical methods and resolve inconsistencies in depth of closure values cited throughout the report.
5. Resolve cross-shore sediment transport inconsistencies between the two project segments and volume imbalance in Solana.
6. Document the alongshore similarities for offshore/nearshore/bluff characteristics and underlying hardpan profiles to enable application of only one representative profile per Segment, or analyze multiple profiles per Segment.

Final Panel Comment 5

Performance of the beach fill constructed from the two primary borrow areas, SO-5 and SO-6, is assumed to be equal; however, these two borrow areas have varying grains size distributions and, as such, the beach fills will perform differently.

Basis for Comment

The assumption is made that the beach fill constructed from the two borrow areas will perform equally. However, one of the borrow areas is composed of finer grain sediments than the other borrow area. This grain size difference may affect beach fill performance, renourishment volumes and interval, the seaward transport of sediment over resources, and the mitigation determination (Main Report, p. 204; Appendix B, pp. 154, 212, 237, 307). For example, the finer grain sediments will erode faster than the coarser grain sediments, thus affecting renourishment intervals and associated costs. Further, finer grain sediments will be carried more seaward than coarser grain sediments with the potential to cover nearshore resources, thus increasing mitigation requirements.

In addition, it is unclear how and when the overfill ratio of 20% and contingency of 29% described in the Main Report (e.g., pp. 127 and 130) and Appendix E (e.g., p. E-100) were applied and included. The overfill ratio and contingency is directly tied to total volume requirements and total Project costs

Finally, there are multiple inconsistencies within the Main Report and Appendix B with the reported grain size distributions for these borrow areas. These inconsistencies include mean grain sizes for each borrow area, and, on page 204, the values presented in the table are different from those presented in the accompanying text. Inconsistent reporting precludes understanding which borrow area is composed of the finer sediments and as such, will not achieve the stated performance for its associated project Segment (Main Report, p. 204; Appendix B, pp. 154, 212, 237, 307).

Significance – Medium

Differences in beach fill performance may affect the renourishment interval, thus affecting total project costs and benefit-to-cost ratios.

Recommendations for Resolution

1. Use the existing grain size data to ascertain the difference in performance between the beach fills constructed from the two primary borrow areas, SO-5 and SO-6.
2. Based on the beach fill performance differences, reevaluate renourishment volumes and intervals, reevaluate the mitigation determination, recompute the contingency factor, and update total project costs.
3. Add a clear description to the report of how and when the overfill ratio and contingency were applied.
4. Resolve inconsistencies in reporting of grain size characteristics.

Final Panel Comment 6

The assumption that the beach fill unit costs would be 50% higher for subsequent renourishment events is not validated.

Basis for Comment

An assumption was made that the beach fill unit costs would be 50% higher for subsequent renourishment events (Appendix B, p. 312). While the report includes a sensitivity analysis on unit costs for dredging, there was no validation of this assumption. Industry standard cost estimating practices were not employed nor were any data sources used to verify these unit costs. Lack of validation of renourishment unit costs could impact the total project costs and thus affect the benefit-to-cost ratios for the beach fill alternatives.

Significance – Medium

Assuming renourishment unit costs versus accurately computing them may affect total project costs, thus impacting the benefit-to-cost ratios.

Recommendations for Resolution

1. Compute the renourishment costs using industry standard cost estimating practices (e.g., MCACES, which was used to compute initial restoration costs).
2. Update total project costs based on accurate renourishment costs.
3. Update benefit-to-cost ratios.

Final Panel Comment 7

Although project impacts from sea level rise are addressed, the potential effects of other climate change-related consequences (e.g., increased storm severity and intensifying El Nino events) are not adequately evaluated.

Basis for Comment

Potential effects of climate change are included in the document; however, it is not clear that a systemic approach has been considered. Climate change is addressed in all alternatives with different sea level rise scenarios, but the possibility of catastrophic failure resulting from one extreme high intensity storm is not discussed in detail. Although the document does consistently acknowledge that future weather patterns would be more intensified as a result of climate change, the document does not address how the project would be affected and what mitigation options exist.

Just one high intensity storm event can have significant impacts, with repercussions for long- term costs needed to maintain the target beach width, as well as costs for bluff stabilization and "emergency" protection measures. Long-term maintenance schedules and costs may be higher than anticipated. For example, a block of seawalls may be damaged or destroyed in a severe storm. A severe storm event with unusually high wave impact has the potential to produce sudden catastrophic slope failure, incurring loss of both property and human life. The report does not adequately discuss this possible scenario. Similarly, high intensity storms and changing coastal conditions may cause sand movement to differ from model results, requiring more frequent beach nourishment to maintain sufficient beach and provide adequate protection. The potential exists for a single large storm event to mobilize newly placed material entirely out of the littoral cell, depending upon the timing of placement relative to the storm.

The Main Report states (p. 114):

> "The annual wave climate in a short time span may accelerate or slow down sediment loss during a particular replenishment cycle as compared to the average projection derived from historical observations or model simulations. As a consequence, there exists some risk that a protective beach may be eroded away before the next designated sand replenishment cycle is carried out. Under such conditions, the bluff base would again be vulnerable to direct wave attack. Bluff failure may be triggered from additional toe erosion, if a substantial toe notch has previously been developed."

The hybrid notch fill beach nourishment alternative has been formulated to reduce these risks, but the cost of interim nourishment activities due to severe storms is not included in the cost analysis. The potential need for interim nourishment events justifies consideration in the cost analysis.

From a system perspective, future sediment transport processes in this dynamic system may be strongly affected by the potential effects of climate change, particularly increased storm intensity. Although the analysis is adequate and potential scenarios

have been considered, the unpredictable nature of future storm intensity makes planning challenging. Due to these risks, additional emergency contingency planning is needed to prevent catastrophic loss.

Significance – Medium

Significant impacts from just one high intensity storm event can affect long-term costs needed to maintain the target beach width, as well as costs for bluff stabilization and "emergency" protection measures.

Recommendations for Resolution

1. Evaluate the possible impacts on long-term maintenance costs (interim beach nourishment, hard structures such as seawall replacement) of the increased intensity of individual severe storm events.
2. Consider the potential of catastrophic failure and significant property loss occurring during a severe isolated storm event in the risk discussion and emergency measures.
3. Define additional emergency measures to ensure public safety during an extreme storm event, such as closing the bluff paths or evacuation of shoreline homes.
4. Analyze recent climate data to update the hydrology section and evaluate expected climate trends for Future With Project (FWP) and Future Without Project (FWOP) projections, based on current data.
5. Incorporate accurate renourishment costs into the risk register to account for the possibility of additional unforeseen nourishment events.

Final Panel Comment 8

The development of the alternatives does not consider other construction methods aside from the hopper dredge method, nor does it incorporate the risk of a hopper dredge not being available on the West Coast.

Basis for Comment

No alternate construction methods aside from the hopper dredge are considered in the development and costing of the beach fill alternatives. Given the distances between the borrow areas and the beach fill sites, alternate construction methods may be viable, such as the use of a hydraulic cutterhead dredge with a direct pipeline to the receiver beach or with spider barge scow loading, towing, and offloading at the receiver beach.

The report acknowledges that hopper dredges are not readily available on the West Coast (Appendix F, p. 5). The Panama Canal is undergoing major expansion, and mobilizing a hopper dredge from the Gulf of Mexico as indicated in the report could be affected by this expansion plan. There is a significant volume of dredging construction coming in the next decade for the Gulf Coast region to address storm erosion, ecosystem restoration, and adverse effects of the Deepwater Horizon Oil Spill, all of which could affect mobilizing a hopper dredge to the West Coast for this project. Due to the limited availability of hopper dredges on the West Coast, alternate methods may prove to be more cost-effective, especially when computing the risk register and contingencies.

It is unclear whether the Dredge Availability and Transiting Panama Canal variables were included in the risk register to properly account for the risk and uncertainties of the equipment and methodology selected for construction.

Significance – Medium

If alternate construction methods are determined to be more cost-effective than a hopper dredge, construction costs and resultant total project costs may change, thus affecting the benefit-to-cost ratios.

Recommendations for Resolution

1. Evaluate alternate construction methods:
   a. hydraulic cutterhead dredging with direct pipeline, or
   b. hydraulic cutterhead dredging with spider barge scow loading, scow towing, and scow offloading at receiver beach.
2. Rerun the risk register to include the Dredge Availability and Transiting Panama Canal variables and update the contingencies.
3. Update construction costs, risk register, total project costs, and benefit-to-cost ratios.

Final Panel Comment 9

The description of the existing conditions of ecologically valuable and impaired wetland resources does not meet National Environmental Policy Act requirements.

Basis for Comment

The description of wetland resources in the main report is limited and the section discussing wetlands as a natural resource within the project area is missing. The main report states (p. 206), "Marine habitats provide important linkages to adjacent coastal wetland and terrestrial ecosystems. Several ecologically valuable coastal wetlands occur within the region (Section 4.4.4)." However, there is no Section 4.4.4 in the report. Section 4.4.2 with Table 4.4-4 presents sediment quality data and not wetland resources. There is no further discussion of wetlands in the report, other than lists of several coastal wetlands in the project area that are on the 303(d) list for impaired water quality.

Several important wetland systems are within the study area, such as the San Elijo, Batiquitos, and Agua Hedionda Lagoons. These systems are discussed only in terms of cumulative impacts by providing smaller sand replenishment projects routinely as a result of maintenance dredging and sand bypassing of Oceanside Harbor. Wetlands are also discussed relative to threatened and endangered species habitats, but these systems are not included in a comprehensive description of the project area's wetland resources.

In addition, wetlands are not discussed in the affected environment section. Under NEPA, agency specialists must define and interpret potential resource impacts. The main report states (p. 505) that Executive Order 11990 "requires that governmental agencies, in carrying out their responsibilities, provide leadership and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands." This Order was considered in the development of alternatives. The action will have no permanent adverse effect on wetlands." Therefore, impacts to wetlands appear to have been evaluated for this project, but this discussion is not presented in the main report.

Significance – Medium

The missing section on wetland resources affects the completeness of the report in describing the project and does not allow confirmation that no impacts to these resources will occur.

Recommendations for Resolution

1. Develop the wetland resources section of the existing project description for natural resources and incorporate into the report.

Final Panel Comment 10

There were inconsistencies in the evaluation of the seawall alternative and some cost assumptions were not justified.

Basis for Comment

The use of seawalls to protect shoreline erosion has been well demonstrated and was considered in the alternative evaluation. On page 4 of Appendix C, the effectiveness of seawalls is noted: "Wherever part of a reach is protected by a seawall or revetment, marine erosion of the sea cliff is arrested as long as the shore protection is maintained and was properly designed and constructed." However, the seawall alternative is eliminated from consideration, partially due to cost assumptions. There are several places in the document where the evaluation of the different alternatives was inconsistent and the cost assumptions were not transparent or may not have been accurate, leading the Panel to question the elimination of the seawall alternative from consideration.

Inconsistency in Evaluating Alternatives

The main report provides a cost estimate for the expected relative maintenance needs and expected costs of each alternative, based on a five-year design life for notchfills and a 25-30 year design life for seawalls. The seawall alternative cost analysis included constructing seawalls only at parcels that are currently unprotected. Cost analysis results showed that the seawall alternative did not generate recreation benefits, had a benefit to cost ratio less than 1.0 as required for federal economic justification, and, therefore, was eliminated from further consideration. While it was not the only reason for eliminating seawalls as an alternative (see list on p.107), the benefit to cost ratio was the primary one.

However, in Appendix E (p. E-74), it is stated that the notch fill alternative also did not have a justified benefit to cost ratio. Yet, the notch fill alternative hybrid was carried through to the final analyses, while the seawall alternative was eliminated. Both seawalls and notch fills provide additional support to reduce bluff failure and are complementary approaches to beach nourishment. The justifications for alternative elimination should be consistent and has implications for the selection of the recommended plan.

Construction Cost and Long-Term Maintenance Cost Assumptions

USACE estimated the cost for the seawall alternative at $13,360 per linear foot. As stated above, the calculation of long term costs for seawall analysis was a critical component of the alternative screening. The Preconstruction, Engineering and Design (PED), mitigation, and legal costs make up close to 40% of this unit cost. Instead of utilizing industry standard costing tools, the USACE relies on unnamed "experts in the field" to provide the seawall cost data. Reliable data are required to confirm the accuracy of the cost estimates.

On pg. 159 of the main report, the future seawall construction cost estimate is based on

the assumption that structures currently protected by seawalls over 8 feet in height would not suffer damages significant enough to affect any plan formulation or selection. It is also stated that the minimum design life of a seawall is 25 to 30 years, and even if damages occurred after that, these future damages, once discounted to present value, would be insignificant. Given the likelihood of increased climatic uncertainty and more severe individual storm events, this assumption does not seem justified. The possibility of wave impact from one severe storm event in the future destroying a whole section of seawall seems like a plausible scenario that should be considered as part of unforeseen conditions or climate change considerations. In addition, a significant bluff failure causing seawall destruction is possible. A conservative estimate for long term maintenance of seawall is warranted and contingency costs for emergency replacement of sections within the 25-30 years duration should be considered.

Armoring Plan Assumptions

In addition to the cost assumptions described above, the main report also made some assumptions about the future armoring of the coast that may be inconsistent. Current regulations require the California Coastal Commission to grant a permit for a seawall only when the primary structure is in “imminent danger”. It is stated in the main report (p.156) that the No Action Alternative assumes that the bluff will continue to be protected at the discretion of individual property owners under emergency and regular permits for new construction and maintenance. However, on page 320 the main report states that the No Action Alternative assumes that all remaining unprotected segments of shoreline in Encinitas and Solana Beach will be protected. Later in the document, it states that all remaining unprotected segments of shoreline in the project study area are assumed to be fully armored with seawalls by 2065. While these inconsistencies within the report are confusing and should be clarified, it is not clear how, given that the seawall alternative was eliminated from the final alternative screening, the assumption that all remaining unprotected segments of shoreline will be fully armored by 2065 is justified.

Significance – Medium

Clarification or additional justification for eliminating the seawall alternative is important to sufficiently analyze the alternatives; and cost estimating methods and assumptions need to be clarified in order to evaluate future with and without the project.

Recommendations for Resolution

1. Recalculate seawall costs and benefits based on the possibility of seawall failure during the project, and not based only on the 25-30 year design life.
2. Use a consistent method of cost estimating and identify the “experts in the field” that provided cost data.
3. Justify the assumption that all remaining unprotected segments of shoreline in the project study will be fully armored with seawalls by 2065.
4. Clarify why the notch fill alternative was carried through, yet the seawall alternative option was eliminated when the benefit to cost ratio for both alternatives was less than the 1.0 required for federal economic justification. Address this discrepancy in the alternative selection basis.

Final Panel Comment 11

Critical components of the economic analysis are based on data sources that are not well documented.

Basis for Comment

The sources of the information on number of beach visitors or overall recreational use numbers are not clearly defined. To determine if the estimates are reasonable, more information on the sources are necessary. The document states (pp. 71-72) that beach visitation data are based on the number of people recreating in the water or on the sand, and at adjacent picnic areas, parking lots, recreation concessions, and bike paths. They do not include people that merely transit on bikes or in cars. This number appears to be a rough order of magnitude estimate by lifeguards on duty.

Since recreational benefits are so critical for the economics analyses (and project justification), the subjectivity of estimates made by one or more lifeguards lacks rigor. Reliable visitation data are also important for determining whether the estimates exceed the 750,000 visitor/day threshold that triggers the requirement for a regional benefits estimation model. The source of future visitation rate estimates should also be clearly explained.

Significance – Medium

The potential subjectivity of visitation data estimates has implications for recreation benefit calculations, economic analyses, and ultimately the determination of project feasibility.

Recommendations for Resolution

1. Describe how the observers arrived at their estimates of beach visitors.
2. Provide greater detail and demonstrate that the visitation estimates are objective, consistently determined, and reliable.

Final Panel Comment 12

The Preconstruction Engineering and Design costs for the Encinitas and Solana Beach project segments are disproportionately higher than industry standard construction costs.

Basis for Comment

The Preconstruction Engineering and Design (PED) costs for Encinitas and Solana Beach are 30% and 23%, respectively, of the construction costs. Based on the Panel's experience, industry standard PED costs for beach nourishment projects of this magnitude are significantly less than the PED cost percentages used for this project. No rationale is provided for why the percentages are so much higher than industry standard or why they are different between segments.

There are also inconsistencies within the review documents. For example, the PED cost percentages per segment in the Main Report (p. 178) and Appendix E (p. E-100) are reversed. That is, $21,748,000 and $8,164,000 are the two Segments PED costs and in one location they are Encinitas and Solana, respectively, and in the other they are Solana and Encinitas, respectively. In addition, in the Main Report (p. 501), the PED costs are on the order of 10% of the construction costs, as opposed to the percentages of 30 and 23% referred to in the rest of the documents.

Significance – Medium

A change in PED costs may affect total project costs, thus affecting the benefit-to-cost ratios.

Recommendations for Resolution

1. Compute accurate PED costs using industry standards/percentages.
2. Update total project costs based on accurate PED costs.
3. Update benefit-to-cost ratios.

Final Panel Comment 13

The impacts on public safety are difficult to assess given that the bluff failure data are spread throughout the report and the failure locations are not correlated with project segments.

Basis for Comment

Improving public safety is an important planning objective and opportunities to demonstrate that the selected plan provides positive and measurable public safety impacts should be included. The main report provides detailed documentation of bluff failures and incidents of injuries and fatalities, but does not identify locations in sufficient detail to correlate them with project segments or reaches. It is unclear if the current data (2000-2011) on bluff failures, presented in Appendix E, were taken into account in the plan formulation process described in the Main Report. Accordingly, it is difficult to determine whether the alternatives considered and the recommended plan will address and reduce the public safety threats described in historical, existing, and Future Without Project conditions.

Significance – Medium

Without additional detail on bluff failure data, it cannot be determined whether the planning objective of public safety has been achieved.

Recommendations for Resolution

1. Provide more specific locations for the historical episodic bluff failures.
2. Correlate them to project segments and reaches to the extent practical.
3. Confirm that the 2000-2011 bluff failure data were used in the plan formulation process and update the Main Report accordingly.
4. Identify how the alternatives considered and the recommended plan achieves the planning objective.

Final Panel Comment 14

There is little documentation provided in the report on the Economic Model's assumptions, limitations, and how risk and uncertainty are incorporated.

Basis for Comment

There is little documentation on the Economic Model (as described in Appendix E and Attachment 1) and its development, assumptions, and limitations. Without additional information on this model, the Panel was unable to assess the adequacy and acceptability of the model for use in this study.

A rigorous and thorough discussion of the technical underpinnings of the Economic Model is needed, and it should detail how the model incorporates risk and uncertainty. The panel needs to understand what variables contribute the most to the uncertainty of the without and with project conditions and how uncertainty affects project justification.

Significance – Medium

The lack of documentation on the Economic Model affects the assessment of model effectiveness and the determination of its appropriateness for use in the study.

Recommendations for Resolution

1. Provide clear and thorough documentation of the model's assumptions, intended usage, and limitations.
2. Provide details on the technical underpinnings of the model and how it incorporates risk and uncertainty.

Final Panel Comment 15

Watershed management measures to address sediment starvation are not included as part of a long-term strategy.

Basis for Comment

Watershed management measures, including efforts to address the sediment starvation of coastal areas and subsurface bluff erosion, would be beneficial to this project, complementary to the beach renourishment plan, and strengthen the project from a sustainability approach.

While increasing the natural sediment sources is outside the scope of the alternatives, it seems prudent to include this as part of a long-term strategy. The main report (p. 68) states that the current problems of beach and bluff erosion are due primarily to historically poor watershed management practices and the construction of Oceanside Harbor, which have curtailed sediment-heavy flood waters and disrupted the natural alongshore littoral transport. Hence, the need for the beach nourishment project. The historical summary on page 68 states that prior to 1940, the San Diego County coast experienced periods of relatively abundant sand supply injections from river floods, due to the absence of upland channel concretization and damming. The main report also states that “it has been estimated that a fluvial delivery reduction of approximately 75 percent has occurred within the Oceanside Littoral cell as a result of these flood control restrictions.” The coastal oceanographic processes cannot transport sand alongshore if there is no sand to transport. While the Encinitas-Solana Beach Coastal Storm Damage Reduction project may achieve the desired objective of sustaining protective beach widths over the duration of the project life, any effort to increase upland sediment delivery would contribute to project success.

While large watershed scale changes may make a greater impact on sediment delivery, small watershed scale strategies may be easier to achieve and still contribute to the success of the project. For example, addressing bluff top erosion could reduce the safety risks of bluff collapse. While bluff bases are vulnerable to damage from wave impact and coastal erosion, the risk of subsurface erosion at the top of the bluff is also high. Water infiltration from rainfall and landscape irrigation through the porous upper, weakly-cemented sandstone has contributed to bluff top erosion, a contributing factor to localized bluff failures. The report recommends best management practices and watershed management methods to reduce risks leading to potential failure. For example, page 92 of the main report explains “The local sponsors have already implemented a regime of codes and ordinances to enforce Best Management Practices (including prohibitions on landscape irrigation within 100 ft of the bluff edge) to reduce runoff and infiltration that may impact slope stability.” Strict enforcement of these codes and ordinances in addition to implementation of other aggressive watershed-level measures should be seen as complementary to beach nourishment as increasing the long term success of this project.

Significance – Low

Identifying opportunities to naturally increase the sediment sources and/or reduce water infiltration on the bluff would contribute watershed scale improvements that would increase the overall project benefits and potential long term success of the project.

Recommendations for Resolution

1. Identify locations where potential exists for removal of upland channel concretization and damming.
2. Target drainage basins that currently are extensively regulated by the presence of dams and reservoirs and identify opportunities that may exist for ecosystem restoration that would provide multiple system benefits and restore some natural sediment input to the system.
3. Incorporate and enforce watershed scale irrigation practices and seek other ways to provide maximum benefit to the system by minimizing all water infiltration from rainfall and landscape irrigation which contributes to bluff top erosion

Final Panel Comment 16

While adaptive management elements have been considered, it is unclear how they have been incorporated into the total project cost summary and the National Economic Development Plan.

Basis for Comment

Throughout the main report, a variety of adaptive management elements have been considered:

- If future monitoring reveals impacts, the beach fills will be redesigned to address them.
- If sea level rise varies from the selected rate, additional beach fill volume will be placed in future renourishment events.

It is unclear how the total project cost summary and National Economic Development (NED) Plan include the recommended adaptive management components for future adjustments of beach fill templates and volumes for sea level change and mitigation. The main report does not include a detailed Adaptive Management Plan (AMP); rather, the elements are discussed in various report sections.

The application of the results of monitoring environmental impacts and sea level change are needed to better understand how the project will be adapted in the future to ensure the desired project benefits are achieved.

Significance – Low

The lack of a fully described and integrated AMP affects the technical quality of the report and does not provide guidance for the subsequent phases of the project from construction through operations and maintenance.

Recommendations for Resolution

1. Establish procedures and processes to learn from and adjust to new information generated from monitoring activities.
2. Prepare a detailed AMP to include these procedures and processes for future adjustments of beach fill templates and volumes.
3. Incorporate the AMP into the total project cost summary and NED Plan.

Final Panel Comment 17

It is not clear how the Del Mar reach was used in the National Economic Development benefit analysis.

Basis for Comment

Section 1.5.10 of Appendix E describes Del Mar as a relatively short reach and states that it is included in the National Economic Development (NED) benefits calculations for soft-placement alternatives. From the discussion and data presented in Sections 4 and 5, it appears that the relatively small amount of damage reduced is incidental, but since the Del Mar reach is outside the study area, it is not clear that it should be included.

The report needs to better describe the NED impacts of the Del Mar reach and how it contributes to overall performance, or describe the rationale for not delineating Reach 9 and Segment 2 to include Del Mar.

This potentially indicates that the identification and delineation of the study area may not have been, to the extent practical, inclusive of all areas affected by the Future Without Project condition problems and opportunities.

Significance – Low

The clarity of the report is affected by the incomplete description of the Del Mar reach and how it was treated in the NED benefits analysis.

Recommendations for Resolution

1. Describe in better detail how the Del Mar reach was treated in the NED benefits analysis.
2. Describe in better detail why Reach 9 should not be extended to include Del Mar.

APPENDIX B

Final Charge to the Independent External Peer Review Panel as Submitted to USACE on February 7, 2013

on the

Encinitas-Solana Beach Feasibility Study and EIS/EIR

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Charge Questions and Guidance to the Peer Reviewers for the Independent External Peer Review of the Encinitas-Solana Beach Feasibility Study and EIS/EIR

BACKGROUND

The Cities of Solana Beach and Encinitas, California, are located along the Pacific Ocean in San Diego County, California. The City of Encinitas is approximately 10 miles south of Oceanside Harbor, and 17 miles north of Point La Jolla. The Encinitas shoreline is about 6 miles long. It is bounded on the north by Batiquitos Lagoon and on the south by San Elijo Lagoon. The 4,920 feet-long southernmost segment of the Encinitas shoreline is a low-lying barrier spit fronting the San Elijo tidal lagoon. Immediately south of the City of Encinitas is the City of Solana Beach. Solana Beach is bounded by San Elijo Lagoon to the north and on the south by the City of Del Mar. It is approximately 17 miles south of Oceanside Harbor, and 10 miles north of Point La Jolla. Solana Beach's shoreline is about 2 miles long. Nearly all of the shoreline in the study area except Cardiff (8 miles total) consists of narrow sand and cobble beaches fronting nearshore bluffs.

Over the past 15 to 20 years, the Solana Beach-Encinitas shoreline has experienced accelerated erosion of the beaches and coastal bluffs. Since the late 1970s and early 1980s, southern California has experienced a series of unusual weather patterns when compared to the rest of the century. In addition to shoreline erosion processes, fluvial delivery has also been significantly reduced due to river damming and inland sand mining activities. The cumulative effects of these impacts have produced erosion of the once-wide, sandy beaches.

As a result of the severe winter storms caused by El Nino in the 1982-1983 and the extreme storm of 1988, most of the thin sand lens on the Encinitas beaches was lost even prior to the El Nino event in 1997-1998. Within Solana Beach, the chronically denuded beach condition was also worsened after the 1997-1998 season. It is apparent that beach sands were stripped away and lost from the littoral system during that season.

With the loss of the wide sandy beaches, storm waves attack the toe of the bluff and eventually form a notch. As the notch depth increases, it eventually triggers an upper bluff failure. The timing of bluff failures is difficult to predict; they often occur several months after storms. As a result, damages occur to bluff top structures and infrastructure when bluffs collapse. This has prompted property owners atop the bluffs to armor or otherwise try to protect their property before structural damage occurs. Approximately half of the shoreline in the study area has been modified with some type of bluff protection structure, at significant cost. These seawalls provide piecemeal protection at varying levels. In addition, the bluff failures are a safety hazard and have caused the loss of life. The Encinitas-Solana Beach Shoreline Protection Project Integrated Draft Feasibility Study and Environmental Impact Statement/Environmental Impact Report (EIS/EIR) focuses on a more comprehensive solution over the study area.

The loss of beach has also severely degraded recreational value in all reaches of the study area.

In addition, the undercutting of the bluffs creates dangerous overhangs, which pose a threat to the public. There have been fatalities in recent years caused by sudden bluff collapse in the study area and adjacent beaches.

The critical areas of the study area were delineated in two segments. Segment 1 (Reaches 3, 4, and 5) exists within the City of Encinitas and extends from the 700 Block of Neptune Avenue to Swami's Reef and is approximately 2.0 miles in length; Segment 2 exists within the City of Solana Beach and stretches from Table Tops Reefs to the southern limit of Solana Beach (Reaches 8 and 9) and is approximately 1.4 miles in length.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Encinitas-Solana Beach Shoreline Protection Project Integrated Draft Feasibility Study and Environmental Impact Statement/Environmental Impact Report (EIS/EIR) (hereinafter: Encinitas-Solana Beach EIS/EIR) in accordance with the Department of the Army, USACE, Water Resources Policies and Authorities' *Civil Works Review* (EC 1165-2-214, December 15, 2012), and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

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

The purpose of the IEPR is to assess the "adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (EC 1165-2-214, p. D-4) for the Encinitas-Solana Beach EIS/EIR documents. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) with extensive experience in Civil Works planning, economics, environment/biology, and coastal engineering issues relevant to the project. They will also have experience applying their subject matter expertise to coastal storm damage reduction and protection.

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

DOCUMENTS PROVIDED

These are the review documents for this IEPR:

- Encinitas-Solana Beach Coastal Storm Damage Reduction Project Integrated Feasibility Study & Environmental Impact Statement/Environmental Impact Report (EIS/EIR), San Diego County, California (588 pages)
    - Appendix A—Agency Coordination and Public Involvement (98 pages)
    - Appendix B—Coastal Engineering (368 pages)
        - Appendix BB to Appendix B—Beach Profiles (126 pages)
    - Appendix C—Geotechnical Engineering (78 pages)
    - Appendix D—404(b)(1) Evaluation (16 pages)
    - Appendix E—Economics (147 pages)
        - Attachment E1 to Appendix E—Economic Model (43 pages)
    - Appendix F—Cost Estimate (9 pages)
    - Appendix G—Real Estate (23 pages)
    - Appendix H—Potential Impacts to Nearshore Resources and 8 Mitigation and Monitoring Plan (57 pages)
    - Appendix I—Air Quality Analysis (20 pages)
    - Appendix J—Coordination Act Report (CAR) (86 pages)
    - Appendix K—Distribution List (5 pages)
    - Appendix L—Response to Comments (pages pending)
    - Appendix M—Mitigation Strategy (25 pages)
- Approach to Incorporate Projected Future Sea Level Change into the Encinitas & Solana Beach Shoreline Protection Feasibility Study and CEQA and NEPA Compliance Efforts (13 pages)

Documents for Reference

- USACE guidance *Civil Works Review*, (EC 1165-2-214, December 15, 2012)
- CECW-CP Memorandum (March 31, 2007)
- Office of Management and Budget's Final Information Quality Bulletin for Peer Review (December 16, 2004).

SCHEDULE

This draft schedule is based on the January 2, 2013 receipt of the final review documents.

Task	Action	Days to Complete Action	Due Date
Conduct Peer Review	Battelle sends review documents to Panel	Within 3 days of Battelle receiving review documents	1/7/2013
	Battelle convenes kickoff meeting with Panel	Within 2 days of Battelle receiving review documents	1/4/2013
	USACE/Battelle convenes kickoff meeting with Panel	Within 2 days of Battelle receiving review documents	1/4/2013
	Battelle convenes site visit for Panel to view project specific locations and ask clarifying questions of USACE	Three days after review begins	1/10/2013
	Panel members complete their individual reviews	Within 20 days of Panel receiving review documents	2/5/2013
Prepare Final Panel Comments and Final IEPR Report	Battelle provides Panel merged individual comments and talking points for Panel Review Teleconference	Within 4 days of panel members completing their review	2/11/2013
	Battelle convenes Panel Review Teleconference	Within 5 days of panel members completing their review	2/12/2013
	Panel members provide draft Final Panel Comments to Battelle	Within 6 days of Panel Review Teleconference	2/21/2013
	Battelle finalizes the Final Panel Comments	Within 7 days of receipt of draft Final Panel Comments	3/4/2013
	Battelle provides Final IEPR Report to Panel for review	Within 2 days Final Panel Comments being finalized	3/6/2013
	Panel provides comments on Final IEPR Report	Within 2 days of receipt of Final IEPR Report	3/8/2013
	Battelle submits Final IEPR Report to USACE	Within 14 days of panel members providing draft Final Panel Comments to Battelle	3/13/2013

Task	Action	Days to Complete Action	Due Date
Comment/ Response Process	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process (if necessary)	Within 2 days of submittal of Final IEPR Report	3/15/2013
	USACE provides draft PDT Evaluator Responses to Battelle	Within 10 days of receipt of Final IEPR Report	3/27/2013
	Battelle provides the Panel the draft PDT Evaluator Responses	Within 2 days of receipt of draft PDT Evaluator Responses	3/29/2013
	Panel members provide Battelle with draft comments on draft PDT Evaluator Responses (i.e., draft BackCheck Responses)	Within 3 days of receipt of draft PDT Evaluator Responses from Battelle	4/3/2013
	Battelle convenes teleconference with Panel to discuss draft BackCheck Responses	Within 1 day of receipt of draft BackCheck Responses	4/4/2013
	Battelle convenes teleconference with Panel and USACE to discuss Final Panel Comments and draft responses	Within 7 days of USACE providing draft PDT Evaluator Responses	4/5/2013
	USACE inputs final PDT Evaluator Responses in DrChecks	Within 10 days of Final Panel Teleconference	4/19/2013
	Battelle provides PDT Evaluator Responses to Panel	Within 3 days of final PDT Evaluator Responses being available	4/24/2013
	Panel members provide Battelle with final BackCheck Responses	Within 3 days of receipt of final PDT Evaluator Responses	4/29/2013
	Battelle inputs the Panel's BackCheck Responses in DrChecks	Within 10 days of notification that USACE final PDT Evaluator Responses have been posted in DrChecks	5/3/2013
	Battelle submits pdf printout of DrChecks project file	Within 1 day of DrChecks closeout	5/6/2013

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the Encinitas-Solana Beach EIS/EIR IEPR documents are credible and whether the conclusions are valid. The Panel is asked to determine whether the technical work is adequate, competently performed, 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 Encinitas-Solana Beach EIS/EIR IEPR documents. Please focus your review on the review materials assigned to your discipline/area of expertise and technical knowledge. Even though there are some sections with no questions associated with them, that does not mean that you cannot comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition, please note the following guidance. Note that the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-214, Appendix D).

1. Your response to the charge questions should not be limited to a “yes” or “no.” Please provide complete answers to fully explain your response.
2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.
3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluating economic or environmental impacts of the proposed project.
4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.
5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.
6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable
7. Please focus the review on assumptions, data, methods, and models.

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

1. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Independent Technical Review.
2. Please contact the Battelle Project Manager (Corey Wisneski, wisneskic@battelle.org) or Program Manager (Karen Johnson-Young (johnson-youngk@battelle.org) for requests or additional information.
3. In case of media contact, notify the Battelle Program Manager, Karen Johnson-Young (johnson-youngk@battelle.org) immediately.
4. Your name will appear as one of the panel members in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form to Corey Wisneski, wisneskic@battelle.org, no later than February 5, 2013, 10 pm ET.

Independent External Peer Review of the Encinitas-Solana Beach Coastal Storm Damage Reduction Project Integrated Draft Feasibility Study and Environmental Impact Statement/ Environmental Impact Report (EIS/EIR)

Charge Questions and Relevant Sections as Supplied by USACE

General Questions

1. To what extent has it been shown that the project is technically sound?
2. Are the assumptions that underlie the engineering and environmental analyses sound?
3. Are the engineering and environmental methods, models and analyses used adequate and acceptable?
4. Were all models used in the analyses used in an appropriate manner with assumptions appropriately documented and explained?
5. Were risk and uncertainty sufficiently considered?
6. Was the process used to select the recommended alternative rational and was the process implemented in a reasonable manner given the project constraints?
7. Does the EIS satisfy the requirements of NEPA? Were adequate considerations given to significant resources by the project?
8. Assess the recommended alternatives from the perspective of systems. It should also include systemic aspects being considered from a temporal perspective, including the potential effects of climate change.

Safety Assurance Review Questions

9. Were the methods used to evaluate the condition of the structure adequate and appropriate given the circumstances?
10. Have the appropriate alternatives been considered and adequately described for this project and do they appear reasonable?
11. Do the project features adequately address redundancy, resiliency, or robustness with an emphasis on interfaces between structures, materials, members, and project phases?
12. Are the quality and quantity of the surveys, investigations, and engineering sufficient to assess expected risk reduction?
13. Have the hazards that affect the structures been adequately documented and described?

14. Are the models used to assess hazards appropriate?

15. Are the assumptions made for the impacts appropriately documented and explained?

16. Is there sufficient information presented to identify, explain, and comment on the assumptions that underlie the engineering analyses?

17. Are there any additional analyses or information available or readily obtainable that would affect decisions regarding the structures?

18. Does the physical data and observed data provide adequate information to characterize the structures and their performance?

19. Have all characteristics, conditions, and scenarios leading to potential failure, along with the potential impacts and consequences, been clearly identified and described? Have all pertinent factors, including but not necessarily limited to population-at-risk been considered?

20. Does the analysis adequately address the uncertainty given the consequences associated with the potential loss of life for this type of project?

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

22. Has anything significant been overlooked in the development of the assessment of the project or the alternatives?

23. Do the alternatives and their associated costs appear reasonable? Do the benefits and consequences appear reasonable?

Specific Charge Questions

Objectives

24. Is the purpose of the project adequately defined? If not, why?

25. Has the project need been clearly described?

26. Have the public concerns been identified and adequately described?

27. Are the specific objectives adequately described?

28. In your opinion, are there any other issues, resources, or concerns that have not been identified and/or addressed?

Alternatives

29. Have the criteria to eliminate plans from further study been clearly described?

30. Is each of the different engineering alternative plans clearly described?

31. Were the assumptions made for use in developing the future with-project conditions for each engineering alternative reasonable? Were adequate scenarios considered? Were the assumptions reasonably consistent across the range of alternatives and/or adequately justified where different?

32. Are the changes between the without- and with-project conditions adequately described for each engineering alternative?

33. Have comparative impacts been clearly and adequately described?

34. Are future Operation, Maintenance, Repair, Replacement, and Rehabilitation efforts adequately described and are the estimated cost of those efforts reasonable for each engineering alternative?

35. Are there any unmitigated environmental impacts not identified and if so could they impact project designs?

36. Please comment on the likelihood that the recommended engineering alternative will achieve the expected outputs.

37. Are residual risks adequately described and is there a sufficient plan for communicating the residual risk to affected populations?

38. Have the impacts to the existing infrastructure, including the existing flood risk management project, utilities, and transportation infrastructure, been adequately addressed?

Affected Environment

39. Is the description of the climate in the study area sufficiently detailed and accurate?

40. Is the description of wetland resources in the project area complete and accurate?

41. Is the description of aquatic resources in the project area complete and accurate?

42. Is the description of threatened and endangered species resources in the study area complete and accurate?

43. Is the description of the historical and existing recreational resources in the study area complete and accurate?

44. Is the description of the cultural resources in the study area complete and accurate?

45. Is the description of the historical and existing socioeconomic resources in the study area complete and accurate? Were specific socioeconomic issues not addressed?

Environmental Consequences

46. Have impacts to significant resources been adequately and clearly described?

47. To what extent have the potential impacts of the alternatives on significant resources been addressed and supported?

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

Cumulative Impacts

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

Mitigation

50. Are mitigation measures adequately described and discussed? If not, please explain.

Hydrology and Hydraulics

51. Was the hydrology discussion sufficient to characterize current baseline conditions and to allow for evaluation of how forecasted conditions (with and without proposed actions) are likely to affect hydrologic conditions.

52. Was the hydrodynamic modeling performed technically sound?

Geotechnical Engineering

53. Is the description of the geomorphic and physiographic setting of the proposed project area accurate and comprehensive?

54. Were the geotechnical analyses adequate and appropriate for the current level of design as presented in the report documentation?

Design

55. Have the design and engineering considerations presented been clearly outlined and will they achieve the objective?

56. Are any additional design assumptions necessary to validate the preliminary design of the primary project components?

57. Are the assumptions used to determine the cost of operations and maintenance for the proposed project adequately documented and explained?

Cost Estimates and Economics

58. Were the benefit categories used in the economic analysis adequate to calculate a benefit-to-cost ratio for each of the project alternatives?

59. Was the methodology used to determine the characteristics and corresponding value of the structure inventory for the study area adequate?

60. Were the methods used to develop the content-to-structure value ratios appropriate and were the generated results applicable to the study area?

61. Were the methods to develop the depth-damage relationships appropriate and were the generated results applicable to the study area?

62. To what extent have significant project construction costs been adequately identified and described?

63. Are the costs adequately justified?

Public Involvement and Correspondence

64. Based on your experience with similar projects, has adequate public, stakeholder, and agency involvement occurred to determine all issues of interest and to ensure that the issues have been adequately addressed to the satisfaction of those interested parties? Should additional public outreach and coordination activities be conducted?

FINAL OVERVIEW QUESTION

65. What is the most important concern you have with the document or its appendices that was not covered in your answers to the questions above?