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Final Independent External Peer Review Report for the Brevard County, Florida Mid-Reach Shoreline Protection Project Draft Integrated General Re-evaluation Report (GRR) and Supplemental Environmental Impact Statement (SEIS)

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
Baltimore District

Contract No. W911NF-07-D-0001
Task Control Number: 09-213
Delivery Order: 0770

December 9, 2009

SHORT TERM ANALYSIS SERVICE (STAS)

on

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by

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505 King Avenue
Columbus, OH 46201

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Scientific Services Program

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INDEPENDENT EXTERNAL PEER REVIEW REPORT

of the

Brevard County, Florida Mid-Reach Shoreline Protection Project
Draft Integrated General Re-evaluation Report (GRR) and
Supplemental Environmental Impact Statement (SEIS)

EXECUTIVE SUMMARY

A general re-evaluation report for Brevard County, Florida was authorized by the Water Resources Development Act of 2000. The Brevard County General Re-evaluation Report (GRR) will present the results of a coastal storm damage reduction study for the 7.8-mile Mid-Reach Segment of Brevard County, Florida. In the Feasibility Report with the Final Environmental Impact Statement (EIS) for Brevard County (1996), the Mid-Reach was removed from the recommended plan due to environmental concerns. This GRR will determine if all or a portion of the Mid-Reach is acceptable for addition into the Brevard County Shore Protection Project. The Mid-Reach Segment is evaluated as a stand-alone project in this report, although some reduced costs may be realized by combining construction activities with the other portion of the Brevard County Shore Protection Project. The GRR will determine if the project is technically sound, environmentally acceptable, and economically justified.

Located on the east coast of Florida just south of Cape Canaveral, the Mid-Reach consists of approximately 7.8 miles of the Brevard County shoreline, from the south end of Patrick Air Force Base to just north of the city of Indialantic (from Department of Environmental Protection (DEP) monument R75.4 to R118.3). This length is recommended rather than the 7.6 miles previously cited in the study authorization in order to complete the entire length between Patrick Air Force Base and the constructed Brevard County South Reach Shore Protection Project. The municipalities of Satellite Beach, Indian Harbor Beach, and Melbourne are located within the project area in addition to portions of unincorporated Brevard County. The goal of the project is to reduce potential storm damages for coastal structures along the Mid-Reach by expanding the beach berm and stabilizing the dune or bluff feature.

USACE is conducting an independent external peer review (IEPR) of the Brevard County, Florida Mid-Reach Shoreline Protection Project GRR and Supplemental EIS (SEIS) (hereafter referred to as Brevard County GRR/SEIS). As a 501(c)(3), non-profit science and technology organization with experience in establishing and administering peer review panels for USACE, Battelle was engaged to coordinate the IEPR of the Brevard County GRR/SEIS. 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 (2008), USACE (2007) and OMB (2004). This final report details the IEPR process, describes the panel members and their selection, and summarizes final comments of the IEPR panel members.

Five panel members were selected for the IEPR from 30 identified candidates. Corresponding to the technical content of the Brevard County GRR/SEIS, the areas of technical expertise of the five selected peer reviewers were geotechnical engineering, economics, coastal engineering, biology, and plan formulation.

The panel members were provided electronic versions of the Brevard County GRR/SEIS documents, along with charge questions that solicited their comments on specific sections of the documents that were to be reviewed. Additionally, the panel members and Battelle were briefed by the Brevard County GRR/SEIS Project Delivery Team (PDT) during a kick-off teleconference. There was no communication between the panel members and the authors of the Brevard County GRR/SEIS during the peer review process.

Approximately 400 individual comments were received from the panel members in response to the charge questions. Following the individual reviews of the Brevard County GRR/SEIS documents by the panel members, a panel review teleconference was conducted 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. The Final Panel Comments were documented according to a four-part format that included description of: (1) comment statement; (2) the basis for the comment; (3) significance of the comment (high, medium, or low); and (4) recommendations on how to resolve the comment. Overall, 21 Final Panel Comments were identified and documented. Of the 21 Final Panel Comments, 11 were identified as having high significance, 6 were identified as having medium significance, and 4 were identified as having low significance.

Table ES-1 summarizes the Final Panel Comments by level of significance. Detailed information on each Final Panel Comment is contained in Appendix A of this report.

Table ES-1. Overview of Final Comments Identified by the Brevard County GRR IEPR Panel.

Significance – High	
1	The design analysis is deficient in that it underestimates the amount of sand that will move offshore during equilibration of the profile, has been based on SBEACH analysis of the existing profile that was not representative of the beachface fill that is proposed, and underestimates the beachface fill erosion rates over the life of the project.
2	The referenced SBEACH model report should be included in the GRR/SEIS to enable an evaluation of the cost to benefit ratios.
3	The tradeoffs between restoring the damaged sandy shore ecosystem and protecting the nearshore exposed rocks should be formally evaluated within the GRR/SEIS.
4	The reasons for protecting rock need to be compelling enough to justify the costs of failing to completely restore the sandy shore plus the expense of mitigation. Also, the agreed-upon limit of 3.0 acres of hardbottom burial needs a scientific justification.
5	The justification to screen out certain structural management measures is not valid based on project assumptions.
6	The assumption that all conventional fill would permanently cover all near shore hardbottom should be justified.
7	Benefits of beachface fill appear to have been significantly overestimated. More inclusive

	methods of storm damage reduction should be used and the benefits of all alternatives reevaluated.
8	The analysis of the availability of borrow material biases the economic analysis toward the preferred alternative by assuming only two borrow areas offshore near Cape Canaveral, but does not describe other potential offshore sands closer to the project, including those recently identified by the State in the vicinity of the Mid-Reach project.
9	The justification for the beach nourishment design should include a description and evaluation of the alongshore sediment transport and a sediment budget for the system.
10	Due to the application of incorrect coastal processes analyses in plan formulation, and lack of consideration in the variability of exposed hardbottom, the risk and uncertainty analysis is inaccurate and needs to be revised based on appropriate input parameters.
11	The GRR/SEIS needs to address the potential that more than the estimated three acres of nearshore hardbottom could be covered by sand from the maintenance renourishment program.
Significance – Medium	
12	The justification for using 2004 as a baseline year for hardbottom coverage or as part of the basis for beachface fill plan selection does not address concerns regarding a reduction in the area of exposed hardbottom.
13	The Economic Conditions section (Section 2.4) of the GRR/SEIS needs to be expanded to include recreational benefits.
14	The accuracy of the sea level rise calculations is outdated and the current policy (EC-1165-211) should be used.
15	Further justification is required for using articulated concrete mats, since their performance in similar environments is not known, and the placement of the mats above the depth of closure (17-20 ft) may subject the low profile units to burial.
16	More clarification on the description of cost estimation is necessary, including defining terminology such as Average Annual Equivalent (AAEQ).
17	More details on the 2008 profile data and template designs should be included to enable verification of quantities as part of justifying the engineering design.
Significance – Low	
18	The report includes errors regarding species identification and scientific names which brings into question the credibility of species listings.
19	The specific Environmental Operating Principles (EOPs) that are referenced need to be identified and described in greater detail.
20	The use of a discount rate and two-year duration to maximum habitat equivalency is not adequately justified and may affect the Habitat Equivalency Analysis (HEA) process.
21	The GRR/SEIS needs to clarify that as the shoreline migrates landward the hardbottom will attenuate a greater percentage of the wave energy.

The panel members generally agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" in the GRR/SEIS document. The following statements provide a summary of the panel member's findings, which are described in more detail in the Final Panel Comments (see Appendix A).

The panel members generally agreed that the project is technically sound from a geotechnical engineering perspective, and that the GRR/SEIS provides adequate detail of the design with respect to constructability. The panel members appreciated the amount of effort that went into gathering data (including identifying and characterizing the hardbottom) and seeking

concurrence among interested parties. However, the panel members expressed reservations about the technical soundness and economic justification of the project, and indicated concerns about the environmental tradeoffs between rock and sand systems.

Engineering: The major concern involved the assumption that placing enough fill to widen only the beachface will have the same performance as conventional beach nourishment that places enough sand to fill the entire profile out to the depth of closure. The SBEACH model results were correctly applied to evaluate the Future Without Project Alternative, i.e. No Action. These results were also correctly applied to assess the conventional fill alternative that widens the entire profile. However, these results were incorrectly applied to the beachface fill alternative which only widens the upper portion of the profile. The GRR/SEIS did not discuss the subject of perching and of sand migration to offshore, but estimated volume needs and design performance based on a perched profile despite evidence that previous fills had shown movement of sand past the rock. In general, the GRR/SEIS underestimates the extent of erosion that can be expected to occur for the beachface fill alternative, which may impact the economic justification of the project. Furthermore, there were concerns about the borrow site sand, and that other borrow locations closer to the project area as well as other means of sand transport should have been considered.

Economics: The economic analysis may be flawed in that, contrary to the assumed performance, the beachface fill will erode more in a storm, have less recovery after a storm, and experience higher long-term erosion than was estimated. Therefore the benefits will be lower than have been estimated. Further, it was noted that the construction costs for this project ($50+ per cubic foot [cf]) are very expensive compared to similar projects. There was also concern about the value of beach visits used in the economic analysis, which was substantially lower than anticipated, and concerns about the adequacy of the values used for evaluating property losses and the calculation of storm surge protection benefits.

Environmental: The main concern raised over environmental issues was the general lack of consideration of sandy shore ecosystems, whereas the rock system is handled rigorously in comparison. It was generally agreed upon that the sand system is not appreciated and that the intent of the project was to protect nearshore hardbottom at the expense of fully restoring a sandy shore ecosystem. This sacrifice of the sand system and mitigation of buried rock should be justified. Sand does have some ecological value and there should be some explanation of why it is acceptable to allow for sand erosion that exposes rock. The GRR/SEIS should discuss tradeoff between sand and rock ecosystems, and the effects of sacrificing the sand systems.

Plan Formulation: Overall, the plan formulation needs to be revisited to include a more accurate assessment of the expected erosion and an investigation of the feasibility and appropriateness of obtaining borrow site sand from other locations than those identified in the GRR/SEIS. By not providing the SBEACH Model section, it is challenging to assess the report's conclusions regarding cost to benefit ratio of the recommended plan.

Note that during the IEPR review process, several individual panel comments (in response to charge questions) pertained to inaccuracies in the estimation of erosion of the beachface fill. Instead of developing one Final Panel Comment encompassing all the issues related to this topic, the panel decided to present the issues in four separate comments: Final Panel Comments 1, 2, 7,

and 10. Each of these Final Panel Comments may appear to be redundant in discussing inaccuracies in estimating erosion of beachface fill; however, each Final Panel Comment has subtle differences.

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LIST OF ACRONYMS

AAEQ	Average Annual Equivalent
ATR	Agency Technical Review
cf	cubic feet
COI	Conflict of Interest
DEP	Department of Environmental Protection
FFWCC	Florida Fish and Wildlife Conservation Commission
EC	Engineering Circular
EIS	Environmental Impact Statement
EOP	Environmental Operating Principle
GRR	General Reevaluation Report
HEA	Habitat Equivalency Analysis
IEPR	Independent External Peer Review
MCZM	Massachusetts Coastal Zone Management
NOAA	National Oceanic and Atmospheric Administration
NTP	Notice to Proceed
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
P.E.	Professional Engineer
PDT	Project Delivery Team
SEIS	Supplemental Environmental Impact Statement
UMAM	Uniform Mitigation Assessment Method
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
WRDA	Water Resources Development Act

1. INTRODUCTION

A general re-evaluation report for Brevard County, Florida was authorized by the Water Resources Development Act of 2000. The Brevard County General Re-evaluation Report (GRR) will present the results of a coastal storm damage reduction study for the 7.8-mile Mid-Reach Segment of Brevard County, Florida. In the Feasibility Report with the Final Environmental Impact Statement (EIS) for Brevard County (1996), the Mid-Reach was removed from the recommended plan due to environmental concerns. This GRR will determine if all or a portion of the Mid-Reach is acceptable for addition into the Brevard County Shore Protection Project. The Mid-Reach Segment is evaluated as a stand-alone project in this report, although some reduced costs may be realized by combining construction activities with the other portion of the Brevard County Shore Protection Project. The GRR will determine if the project is technically sound, environmentally acceptable, and economically justified.

Located on the east coast of Florida just south of Cape Canaveral, the Mid-Reach consists of approximately 7.8 miles of the Brevard County shoreline, from the south end of Patrick Air Force Base to just north of the city of Indialantic (from Department of Environmental Protection (DEP) monument R75.4 to R118.3). This length is recommended rather than the 7.6 miles previously cited in the study authorization in order to complete the entire length between Patrick Air Force Base and the constructed Brevard County South Reach Shore Protection Project. The municipalities of Satellite Beach, Indian Harbor Beach, and Melbourne are located within the project area in addition to portions of unincorporated Brevard County. The goal of the project is to reduce potential storm damages for coastal structures along the Mid-Reach by expanding the beach berm and stabilizing the dune or bluff feature.

The objective of the work described here was to conduct an Independent External Peer Review (IEPR) of the Brevard County GRR/SEIS in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers Engineer Circular (EC) No. 1105-2-410, *Review of Decision Documents*, dated August 22, 2008 (USACE, 2008) and the Office of Management and Budget (OMB) *Final Information Quality Bulletin for Peer Review* released December 16, 2004 (OMB, 2004). Battelle, as a 501(c)(3) non-profit science and technology organization with experience in establishing and administering peer review panels for USACE, was engaged to coordinate the IEPR of the Brevard County GRR/SEIS. 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 panel members and their selection, and summarizes the Final Panel Comments of the IEPR panel on the existing environmental, economic, and hydrologic and hydraulic engineering analyses contained in the Brevard County GRR/SEIS. Detailed information on the Final Panel Comments is provided in Appendix A.

2. PURPOSE OF INDEPENDENT EXTERNAL PEER REVIEW

To ensure that USACE documents are supported by the best scientific and technical information, a peer review process has been implemented by USACE that utilizes IEPR to complement the Agency Technical Review (ATR), as described in USACE (2008) and USACE CECW-CP Memorandum dated March 30, 2007 (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 report's assumptions, methods, analyses, and calculations; and 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 Brevard County GRR/SEIS was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) eligible under section 501(c)(3) of the U.S. Internal Revenue Code. Battelle is an independent objective science and technology organization with experience conducting IEPRs.

3. METHODS

This section describes the methodology followed in selecting the IEPR panel members and in planning and conducting the IEPR. The IEPR was conducted following procedures described in USACE's guidance cited in Section 2 of this report and in accordance with OMB (2004). Supplemental guidance on evaluation for conflicts of interest 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

In terms of planning, one of the first actions Battelle conducted after receiving the notice to proceed (NTP) was to hold a kick-off teleconference with USACE. The purpose of the teleconference was 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. Due dates for milestones and deliverables in the table below are based on the NTP date of August 20, 2009. Table 1 defines the schedule followed in execution of the IEPR.

Table 1. Brevard County GRR/SEIS IEPR Schedule

Task	Activity	Projected Date
1	NTP	August 20, 2009
	Review documents available	May 19, 2009 (Draft); August 26, 2009 (Final)
	*Prepare Draft Work Plan	September 3, 2009
	USACE provides comments on Draft Work Plan	September 10, 2009
2	*Recruit and screen up to 10 potential panel members; prepare summary information	September 10, 2009
	*Submit list of no more than 5 selected panel members	September 10, 2009
	USACE provides comments on list of panel members	September 17, 2009
	*Complete subcontracts for panel members	October 1, 2009
3	*Submit Draft Charge	September 3, 2009
	USACE provides comments on Draft Charge	September 10, 2009
	*Submit Final Work Plan, including Final Charge	September 17, 2009
	USACE approves Final Work Plan, including Final Charge	September 21, 2009
4	Kick-off meeting with USACE and Battelle	August 26, 2009
	Kick-off meeting with USACE, Battelle, and the panel members	October 6, 2009
5	Review documents and charge sent to panel members	October 2, 2009
	Panel members complete their review and provide written comments to Battelle	November 3, 2009
	Battelle merges individual comments and prepares talking points	November 10, 2009
	Convene panel review teleconference	November 13, 2009
6	Prepare final panel comments	November 23, 2009
	*Submit Final IEPR Report	December 9, 2009
7[c]	Input final panel comments to DrChecks	December 11, 2009
	USACE provides Draft Evaluator Responses via e-mail (Word document)	December 22, 2009
	Final panel comment teleconference with USACE, Battelle, panel members to discuss final panel comments, draft responses, and USACE clarifying questions	January 8, 2010
	USACE inputs Final Evaluator responses to Final Panel Comments in DrChecks	January 29, 2010
	IEPR Panel Responds to USACE Evaluator Responses (Backcheck responses)	February 19, 2010
	Submit pdf of DrChecks file and Closeout of DrChecks*	February 22, 2010
	Project Closeout	March 31, 2010

* Deliverable

[c] Task occurs after the submission of this report.

Note that the work items listed in Task 7 occur after the submission of this report. The 21 Final Panel Comments will be entered in to DrChecks by Battelle for review and response by USACE and the IEPR panel. USACE will provide Evaluator Responses to the Final Panel Comments and the IEPR panel will respond to the Evaluator Responses (via Backcheck responses). All USACE and IEPR panel responses will be documented by Battelle.

3.2 Identification and Selection of Independent External Peer Reviewers

Corresponding to the technical content of the GRR/SEIS and overall scope of the Brevard County project, the technical expertise areas for which the candidate panel members were evaluated focused on five key areas: geotechnical engineering, coastal engineering, biology, plan formulation, and economics.

Battelle initially identified more than 30 candidate panel members, evaluated their technical expertise, and inquired about potential conflicts of interest. Of those initially contacted Battelle chose seven of the most qualified candidates and confirmed their interest and availability. Of those seven candidates, five were proposed as the final panel and two were proposed as backup reviewers. The five proposed primary reviewers constituted the final panel. The remaining panel members were not proposed for a variety of reasons, including lack of availability, disclosed conflicts of interest, or because they did not possess the precise technical expertise required.

The candidates were screened for the following *potential* exclusion criteria or conflicts of interest (COI).[1] Participation in previous USACE technical peer review committees and other technical review panel experience was also considered.

- Involvement by you or your firm in any part of the Brevard County, Florida Mid-Reach Shoreline Protection Project including the General Re-evaluation Report (GRR) and Supplemental Environmental Impact Statement (SEIS), associated planning models, or Feasibility Report with Final Environmental Impact Statement (EIS) for Brevard County (1996).
- Current employment by the U.S. Army Corps of Engineers (USACE).
- Current or previous employee or affiliation with members of the cooperating agencies, including the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service, the Florida Department of Environmental Protection (DEP), the Florida Fish and Wildlife Conservation Commission (FFWCC), and the U.S. Fish and Wildlife Service (USFWS) or the Project Delivery Team (PDT), including Brevard County.
- Current or future interests in the subject project or future benefits from the project.

[1]Note: 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 the OMB memo 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."

- Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Jacksonville District.
- Current firm involvement with other USACE projects, specifically those projects/contracts that are with the Jacksonville District or Mobile District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and role.
- Previous employment by the USACE as a direct employee or contractor (either as an individual or through your firm) within the last 10 years, notably if those projects/contracts are with the Jacksonville District or Mobile District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Other USACE affiliation [e.g., scientist employed by USACE (except as described in NAS criteria, see EC 1105-2-410 section 8d)].
- Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning storm reduction damage projects involving shore protection or mitigation and include the client/agency and duration of review (approximate dates).
- Current or future financial interests in Brevard County Shore Protection Project-related contracts/awards from USACE.
- A significant portion (i.e., greater than 50%) of personal or firm revenues within the last 3 years came from USACE contracts.
- Participation in relevant prior Federal studies relevant to this project:
    a. Limited Reevaluation Report and Environmental Assessment, North Jetty Sand Tightening and Jetty Extension, Canaveral Harbor, Florida. USACE, Jacksonville (2003).
    b. Limited Reevaluation Report, Brevard County, Florida, Shore Protection Project. USACE, Jacksonville (1999).
    c. Feasibility Report with Final Environmental Impact Statement. USACE, Jacksonville (1996).
    d. Reconnaissance Report, Brevard County, Florida. USACE, Jacksonville (1992).
    e. Design Memorandum, Canaveral Harbor, Florida. USACE, Jacksonville (1992).
    f. Supplement to the General Design Memorandum, Sand Bypass System, Canaveral Harbor, Florida. US USACE, Jacksonville (1991).
    g. General and Detail Design Memorandum Addendum: Brevard County, Florida. USACE, Jacksonville (1978).
    h. General and Detail Design Memorandum: Brevard County, Florida. USACE, Jacksonville (1972).
    i. Beach Erosion Control Study on Brevard County, Florida (1967).
- Participation in relevant prior non-Federal studies relevant to this project:
    j. Assessment of Nearshore Rock and Shore Protection Alternatives Along the "Mid-Reach" of Brevard County, Florida. Olsen Associates (2003).

k. Independent Study Report, Brevard County, Florida Shore Protection Project. D. Kriebel, R. Weggel, R. Dalrymple. (2002).

- Participation in relevant adjacent projects:
    l. Brevard County Federal Shore Protection Project
    m. Canaveral Harbor Federal Navigation Project
    n. Patrick Air Force Base
    o. Brevard County Dune Restoration
- Any other perceived COI not listed, such as:
    - Paid or unpaid participation in litigation related to the work of the USACE
    - Any other perceived COI not listed

3.3 Preparation of the Charge and Conduct of the Peer Review

A preliminary charge document, including specific charge questions and discussion points, was drafted by Battelle, reviewed and approved by USACE, and provided to the panel members to guide their review of the Brevard County GRR/SEIS. The charge questions were developed by Battelle to guide the peer review, according to guidance provided in USACE (2008) and OMB (2004). The draft charge was submitted to the USACE for evaluation as part of the draft Work Plan. USACE provided minor clarifications to the final charge questions. In addition to a list of 123 charge questions/discussion points, the final charge included general guidance for the panel members on the conduct of the peer review (as provided in Appendix B of this final report).

Battelle planned and facilitated a final kick-off teleconference during which USACE presented project details to the panel members. Before the kick-off teleconference, the panel members were provided an electronic version of the Brevard County GRR/SEIS documents and the final charge. A full list of the documents that were reviewed by the panel members is provided in Appendix B of this report. The panel members were instructed to address the charge questions/discussion points within a comment-response form provided by Battelle.

3.4 Review of Individual Panel Comments

In response to the charge questions, approximately 400 individual comments were received from the panel members. Note that all panel members did not respond to all charge questions. Panel members only responded to those charge questions within the area of expertise. Battelle reviewed these individual comments to identify overall recurring themes, potential areas of conflict, and other impressions of the report. As a result of this review, Battelle developed a preliminary list of 49 overall comments and discussion points that emerged from the panel members' individual comments. Each panel member's individual comments were shared with the full panel in a merged individual comments table.

3.5 Independent Peer Review Panel Teleconference

Battelle facilitated a 3.5 hour teleconference with the panel members to provide for the exchange of technical information among the panel members, many of whom are from diverse scientific backgrounds. This information exchange ensured that this final IEPR report would accurately represent the panel member's assessment of the project, including any conflicting opinions. The panel review teleconference consisted of a thorough discussion of the overall negative comments, positive comments, and comments that appeared to be conflicting among panel

members. In addition, Battelle used the teleconference to confirm each comment's level of significance, add any missing issues of high-level importance to the findings, resolve whether to "agree to disagree" on the conflicting comments, and to merge related individual comments into one "Final Panel Comment." The main goal of the teleconference was to identify which issues should be carried forward as Final Panel Comments and to decide which panel member would serve as the lead author for the development of each Final Panel Comment.

In addition to identifying which issues should be carried forward as Final Panel Comments, the panel members discussed responses to 14 specific charge questions where there appeared to be disagreement among the panel members. The conflicting comments were resolved based on professional judgment of the panel members; each comment was either incorporated into a Final Panel Comment or determined to be a non-significant issue (i.e., either a true disagreement did not exist, or the issue was not important enough to include as a Final Panel Comment).

During the panel teleconference, the panel members identified 22 comments and discussion points that should be brought forward as Final Panel Comments.

3.6 Preparation of Final Comments

Following the teleconference, a summary memorandum documenting each Final Panel Comment (organized by level of significance) was prepared by Battelle and distributed to the panel members. The memorandum provided the following detailed guidance on the approach and format to be used in the development of the Final Panel Comments for the Brevard County GRR/SEIS:

- 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. Lead assignments were modified by Battelle at the direction of the panel members. To assist each lead author in the development of the Final Panel Comments, Battelle distributed merged individual comments in the comment-response form table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and a template for the preparation of the Final Panel Comments.
- Directive to the Lead: Each lead author was encouraged to communicate directly with other panel members as needed, 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 author was instructed to draft a new Final Panel Comment.
- Format for Final Comments: Each Final Panel Comment was presented as part of a four-part structure, including:
    1. Comment Statement (i.e., succinct summary statement of concern)
    2. Basis for comment (i.e., details regarding the concern)
    3. Significance (high, medium, low; see description below)
    4. Recommendation for resolution (see description below).
- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:

- *High*: Describes a fundamental problem with the project that could affect the recommendation or justification of the project
- *Medium*: Affects the completeness or understanding of the reports/project
- *Low*: Affects the technical quality of the reports but will not affect the recommendation of the project.

- Guidance for Developing the Recommendation: The recommendation was to include specific actions that the 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).

As a result of this process, 22 initial Final Panel Comments were prepared. However, after the panel review teleconference, Battelle determined that the scope of one of the prepared Final Panel Comments was inappropriate and was therefore not carried forward. Battelle reviewed and edited the remaining 21 Final Panel Comments for clarity, consistency with 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 members and USACE during the preparation of the Final Panel Comments. The Final Panel Comments were assembled and are presented in Appendix A of this report.

4. BIOGRAPHICAL INFORMATION PANEL MEMBERS

Potential peer review candidates were identified through Battelle's Peer Reviewer Database, targeted Internet searches using key words (e.g., technical area, geographic region), search of websites of universities or other compiled expert sites, and through referrals from candidates who declined. Battelle prepared a recommended list of potential panel members, who were screened for availability, technical background, and conflicts of interest, and provided the list to USACE for feedback on potential COI. The final list of peer reviewers was determined by Battelle.

An overview of the credentials of the five reviewers selected for the panel and their qualifications in relation to the technical evaluation criteria is presented in Table 2. More detailed biographical information regarding each candidate and his technical area of expertise is presented in the text that follows the table.

Table 2. Brevard County GRR IEPR Panel: Technical Criteria and Areas of Expertise

	Ramsey	Landry	Poff	Montague	Campbell
Geotechnical Engineer (one expert needed)					
Minimum 10 years of demonstrated experience in geotechnical studies and design of stabilizing dunes.	X				X
Minimum 10 years of demonstrated experience in geotechnical studies and design of bluffs.	X				
Minimum 10 years of demonstrated experience in geotechnical studies and design of beach berms.	X				X
Minimum M.S. degree or higher in geotechnical engineering.	X				
Familiar with geotechnical practices used in Florida.	X				X
Active participation in related professional societies.					
Economist (one expert needed)					
Minimum M.S. degree or higher in field of economics.		X			
Experience in coastal economic evaluation or flood risk evaluation		X			
Coastal Engineer (one expert needed)					
Registered professional engineer with a minimum 10 years experience in hydraulic engineering with emphasis on large public works projects.	X		X		X
Or professor from academia with extensive background in hydraulic theory and practice with a minimum of MS degree or higher in engineering.					
Active participation in related professional societies.	X		X		
Familiarity with USACE application of risk and uncertainty analyses in coastal damage reduction studies.	X		X		X
Familiarity with standard USACE hydrologic and hydraulic computer models and the SBEACH model.	X		X		X
Biologist (one expert needed)					
Minimum of 10 years demonstrated experience with project on the southern Atlantic coast of the United States.				X	
Knowledge of the ecological value of near-shore rock resources in coastal environments.				X	
Familiarity with Habitat Equivalency Analysis (HEA) model produced by NOAA as well as the Florida state required, Uniform Mitigation Assessment Method (UMAM).			X	X	
Plan Formulation Expert (one expert needed)					
Minimum 10 years demonstrated experience in planning.					X
Experience should include coastal planning.	X				X
Familiarity with USACE plan formulation standards and procedures					X

John Ramsey, P.E.

Role: This panel member was chosen primarily for his geotechnical engineering experience and expertise.
Affiliation: Applied Coastal Research and Engineering, Inc.

Mr. John Ramsey, P.E., is a senior coastal engineer at Applied Coastal Research and Engineering, Inc. (Applied Coastal) and has served as project manager and/or principal investigator for coastal embayment restoration projects, regional shoreline management plans, beach nourishment and coastal structure designs, geotechnical engineering and groundwater flow studies, hydrodynamic and sediment transport evaluations, and environmental studies required for permitting of coastal projects. Since 2000, Mr. Ramsey has served as the coastal engineering consultant to the Massachusetts Coastal Zone Management (MCZM) office. In this role, he has assisted MCZM with analysis and design guidance for offshore sand mining, beach nourishment and dune design, wave-induced flood damage assessments, and review of bluff erosion problems. Recently, he was an invited speaker at the MCZM Offshore Sand Mining Conference, where he discussed beach nourishment design for shore protection. Mr. Ramsey served as project manager for the evaluation of appropriate design wave climate studies as well as further design guidance needed to assure appropriate construction methodology and mitigation. His project experience includes shore protection design for Squantum Point, seawall repairs at Rocky Beach and Short Beach, emergency revetment design for Winthrop Beach, revetment re-design along the Lynn Harbor side of the Nahant Causeway, and design of the cobble berm at Point Allerton to reduce wave reflection and maintain the revetment foundation. In Florida, he managed and served as lead coastal engineer on the St. Lucie Inlet Federal Navigation Project and conducted a coastal processes analysis and assessment of shore protection alternatives for Jupiter Island. Mr. Ramsey serves as project manager for ongoing services related to beach nourishment monitoring and design for Dead Neck, Barnstable County, Massachusetts. His ongoing work has focused on management of beach materials migrating toward the west end of the barrier beach system. Possible management options for this work include dredging the western end of the island and using the material to maintain the integrity of the barrier beach/dune system adjacent to the eastern end (i.e., recycling of littoral sediments). He currently serves as the President of the Association of Coastal Engineers, is a member of the Coastal Zone Management Committee and Coastal Engineering Practice Committee for the American Society of Civil Engineers, and is a member of the Florida Shore and Beach Preservation Association and American Shore and Beach Preservation Association. He is a registered Professional Engineer in the Commonwealth of Massachusetts.

Craig Landry

Role: This panel member was chosen primarily for his economics experience and expertise.
Affiliation: East Carolina University

Dr. Craig Landry is an associate professor in the Department of Economics at East Carolina University, as well as the assistant director for the Center for Natural Hazards Research. He received his Ph.D. from the University of Maryland. Previous work experience includes positions with the U.S. Environmental Protection Agency and the H. J. Heinz III Center for Economics, Policy, and the Environment. Dr. Landry's primary research areas are environmental and natural resource economics, non-market valuation, experimental economics,

and coastal resource management. His dissertation research was on the application of optimal control theory to the coastal erosion management problem. He has published 12 academic papers on economic aspects of coastal erosion, beach quality, beach recreation, property markets, and coastal hazards, with another nine working papers and proceedings publications. Notable publications discuss the coastal housing market response to amenities and risk and an economic evaluation of beach erosion management alternatives. He has five current research projects dealing with coastal erosion, beach recreation, property markets, and coastal flooding hazards. Dr. Landry has given 15 research talks on coastal erosion, beach recreation, property markets, and coastal hazards. He has received three external research grants (NSF, NOAA, State of North Carolina) and four internal research grants for work on coastal erosion, property markets, and coastal hazards; one external research grant (NSF) is currently under review. He has directed graduate students in research on topics in coastal hazards and beach recreation, and teaches a split graduate/undergraduate course in Coastal Resource Economics. He serves as Guest Associate Editor of Natural Hazards Review, is a member of the Albemarle-Pamlico Science and Technical Advisory Committee, and is an expert panelist on the National Academies of Science/GAO: "Coastal Ecosystem Vulnerability to Climate Change".

Michael Poff, P.E.

Role: This panel member was chosen primarily for his coastal engineering experience and expertise.
Affiliation: Coastal Engineering Consultants, Inc**.**

Mr. Michael Poff, P.E., has over 20 years of engineering experience with civil, coastal, survey, and environmental projects. He has provided project management, civil design, coastal engineering design, environmental permitting, and marine survey services throughout the Gulf coast states including Charlotte County Erosion Control, Blind Pass Restoration, and Big-New Pass Inlet Management (all in Florida). 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. Mr. Poff has conducted and provided control for marine surveys consisting of navigation channels, beach profiling, hardbottom mapping, and vibracore sampling. His environmental permitting projects include dredge and fill, coastal construction control, sea turtle and manatee protection, mitigation planning, and beach restoration and maintenance. As part of the Barataria Basin Barrier Shoreline Restoration Feasibility Study, Mr. Poff served as principal engineer for the Engineering Appendix of the USACE Plan Formulation Phase for the restoration of the Caminada Headland. Specific duties include overseeing the beach, dune, and marsh restoration design; and coastal processes modeling. As part of the Terrebonne Basin Barrier Island Shoreline Restoration Feasibility Study, Mr. Poff is serving as principal engineer for the USACE Decision Document under their 6-Step Planning Process to restore the barrier islands within Terrebonne Basin. Specific tasks include overseeing the beach, dune, and marsh restoration design; borrow area design; coastal processes modeling; cost estimating; habitat acres computations; incremental cost analysis; and stakeholder/USACE liaison. Mr. Poff is familiar with the USACE application of risk and uncertainty analyses in coastal damage reduction and is using it as part of the Terrebonne Feasibility Study. Specific modeling experience includes ADCIRC, which predicts water level elevations using measured data to calibrate the forcing function coefficients including storm surge; SBEACH, which predicts storm induced cross-shore

sediment transport, and STWAVE, which predicts wave refraction/diffraction patterns over varying bathymetry including the simulation of response to structures or borrow areas. Mr. Poff also oversees the development of endangered species protection plans and environmental surveys. He is a member of the Florida Shore and Beach Preservation Association, American Shore and Beach Preservation Association, Association of Coastal Engineers, and the Florida Engineering Society/Florida Institute of Consulting Engineers Leadership Institute. He is a registered Professional Engineer in Florida and Louisiana.

Clay Montague

Role: This panel member was chosen primarily for his biology experience and expertise.
Affiliation: University of Florida

Dr. Clay Montague is an associate professor in the Department of Environmental Engineering Sciences at the University of Florida. His teaching and research interests focus on coastal and estuarine ecology, systems ecology, ecological modeling, and environmental science. He received his Ph.D. from the University of Georgia. He is familiar with NOAA's Habitat Equivalency Analysis (HEA) model, and has worked with the State of Florida-required Uniform Mitigation Assessment Method (UMAM). He has served as an expert witness in systems ecology in defense of the State of Florida's intent to issue a beach nourishment permit to the Town of Palm Beach, Florida. His testimony and written reports included an analysis of UMAM calculations. In the Palm Beach case, the UMAM process was applied to determine the amount of rocky outcrop that needed to be constructed as mitigation for submerged rock habitat that would be buried by beach nourishment. The application of the UMAM procedure to rocky outcrops was new, as UMAM was designed specifically for wetlands. There were some difficulties in interpretation and some discussion of alternative ways to compute the UMAM score. Prior to his involvement, three different groups had computed UMAM scores and three rather different mitigation estimates resulted. The expense of mitigating rocky outcrop is large. As part of a written report to the court and oral testimony of his opinion, he demonstrated the UMAM calculation procedure. Dr. Montague's calculations showed the sensitivity of the UMAM score to uncertainties in required estimates, and to alternative interpretations of the requirements themselves. Additionally, Dr. Montague has served as a member of the Coastal Engineering Technical Advisory Committee, Office of Beaches and Coastal Systems, Florida Department of Environmental Protection. He also has published numerous journal articles, including a reevaluation of beach nourishment as an essential tool for ecological conservation along Florida's Atlantic Coast.

Tom Campbell, P.E.

Role: This panel member was chosen primarily for his plan formulation experience and expertise.
Affiliation: Coastal Planning & Engineering, Inc.

Mr. Tom Campbell, P.E., is the president and one of the founders of Coastal Planning & Engineering, Inc. He has directed environmental and physical monitoring, coastal engineering analysis, design, geotechnical surveys and numerical modeling for beach restoration projects for over 30 years and has practical experience in beach design on the East and Gulf coasts of the U.S. Mr. Campbell has demonstrated experience in planning of coastal projects on Federal and

non-Federal projects. He has extensive experience with USACE plan formulation standards and procedures. He has written a number of General Design memorandums, General Reevaluation Reports (GRR), and Limited Reevaluation Reports (LRR) to demonstrate economic viability of federal designs for beach nourishment. Working with the New York District in the late 1980s, Mr. Campbell led the coastal design team in the development of a General Design Memorandum for Section 1 of the Atlantic Coast of New Jersey Beach Erosion Control Project. During the 1990s, Mr. Campbell directed the preparation of a number of planning documents for Florida beach nourishment projects including GRRs for Captiva Island, Delray Beach, Boca Raton, and Lee County. In 2003, Mr. Campbell supervised the preparation of a GRR and Environmental Impact Statement for the Broward County, Florida Shore Protection Project, Segments II and III. In 2008, he supervised the preparation of the latest LRR for North Boca Raton Second Periodic Renourishment project. In addition, Mr. Campbell has significant experience in designing dunes and beach berms for Federal and non-Federal projects. Mr. Campbell has used a number of models to evaluate storm recession of existing and proposed cross sections to evaluate the benefits of beach fill. In Broward County 2003 GRR and Boca Raton 2008 LRR, SBEACH was used to analyze storm recession. Mr. Campbell has supervised a number of coastal restoration projects in Louisiana over the past five years in which SBEACH was used to evaluate the size of the berms and dunes that would be effective in providing storm protection for island restoration. These projects include Pelican Island, Chaland Headland, and East Grand Terre. He is a registered Professional Engineer in Florida, Texas, Virginia, North Carolina, and New York, heads the Scientific Advisory Committee for the American Shore and Beach Preservation Association, is a Director of the Florida Shore and Beach Preservation Association, and is on the editorial board of the Journal of Coastal Research, and the FSBPA publication, Shore and Beach.

5. RESULTS – SUMMARY OF PEER REVIEW COMMENTS

The panel members generally agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" in the GRR/SEIS document. The following statements provide a summary of the panel's findings, which are described in the Final Panel Comments presented in Table 3 and discussed in more detail in Appendix A.

The panel members generally agreed that the project is technically sound from a geotechnical engineering perspective, and that the GRR/SEIS provides adequate detail of the design with respect to constructability. The panel members appreciated the amount of effort that went into gathering data (including identifying and characterizing the hardbottom) and seeking concurrence among interested parties. However, the panel members expressed reservations about the technical soundness and economic justification of the project, and indicated concerns about the environmental tradeoffs between rock and sand systems.

Engineering: The major concern involved the assumption that placing enough fill to widen only the beachface will have the same performance as conventional beach nourishment that places enough sand to fill the entire profile out to the depth of closure. The SBEACH model results were correctly applied to evaluate the Future Without Project Alternative, i.e. No Action. These results were also correctly applied to assess the conventional fill alternative that widens the entire profile. However, these results were incorrectly applied to the beachface fill alternative which

only widens the upper portion of the profile. The GRR/SEIS did not discuss the subject of perching and of sand migration to offshore, but estimated volume needs and design performance based on a perched profile despite evidence that previous fills had shown movement of sand past the rock. In general, the GRR/SEIS underestimates the extent of erosion that can be expected to occur for the beachface fill alternative, which may impact the economic justification of the project. Furthermore, there were concerns about the borrow site sand, and that other borrow locations closer to the project area as well as other means of sand transport should have been considered.

Economics: The economic analysis may be flawed in that, contrary to the assumed performance, the beachface fill will erode more in a storm, have less recovery after a storm, and experience higher long-term erosion than was estimated. Therefore the benefits will be lower than have been estimated. Further, it was noted that the construction costs for this project ($50+ per cubic foot [cf]) are very expensive compared to similar projects. There was also concern about the value of beach visits used in the economic analysis, which was substantially lower than anticipated, and concerns about the adequacy of the values used for evaluating property losses and the calculation of storm surge protection benefits.

Environmental: The main concern raised over environmental issues was the general lack of consideration of sandy shore ecosystems, whereas the rock system is handled rigorously in comparison. It was generally agreed upon that the sand system is not appreciated and that the intent of the project was to protect nearshore hardbottom at the expense of fully restoring a sandy shore ecosystem. This sacrifice of the sand system and mitigation of buried rock should be justified. Sand does have some ecological value and there should be some explanation of why it is acceptable to allow for sand erosion that exposes rock. The GRR/SEIS should discuss tradeoff between sand and rock ecosystems, and the effects of sacrificing the sand systems.

Plan Formulation: Overall, the plan formulation needs to be revisited to include a more accurate assessment of the expected erosion and an investigation of the feasibility and appropriateness of obtaining borrow site sand from other locations than those identified in the GRR/SEIS. By not providing the SBEACH Model section, it is challenging to assess the report's conclusions regarding cost to benefit ratio of the recommended plan.

Note that during the IEPR review process, several individual panel comments (in response to charge questions) pertained to inaccuracies in the estimation of erosion of the beachface fill. Instead of developing one Final Panel Comment encompassing all the issues related to this topic, the panel decided to present the issues in four separate comments: Final Panel Comments 1, 2, 7, and 10. Each of these Final Panel Comments may appear to be redundant in discussing inaccuracies in estimating erosion of beachface fill; however, each Final Panel Comment has subtle differences.

Table 3. Overview of Final Comments Identified by the Brevard County GRR IEPR Panel.

Significance – High	
1	The design analysis is deficient in that it underestimates the amount of sand that will move offshore during equilibration of the profile, has been based on SBEACH analysis of the existing profile that was not representative of the beachface fill that is proposed, and underestimates the beachface fill erosion rates over the life of the project.
2	The referenced SBEACH model report should be included in the GRR/SEIS to enable an evaluation of the cost to benefit ratios.
3	The tradeoffs between restoring the damaged sandy shore ecosystem and protecting the nearshore exposed rocks should be formally evaluated within the GRR/SEIS.
4	The reasons for protecting rock need to be compelling enough to justify the costs of failing to completely restore the sandy shore plus the expense of mitigation. Also, the agreed-upon limit of 3.0 acres of hardbottom burial needs a scientific justification.
5	The justification to screen out certain structural management measures is not valid based on project assumptions.
6	The assumption that all conventional fill would permanently cover all near shore hardbottom should be justified.
7	Benefits of beachface fill appear to have been significantly overestimated. More inclusive methods of storm damage reduction should be used and the benefits of all alternatives reevaluated.
8	The analysis of the availability of borrow material biases the economic analysis toward the preferred alternative by assuming only two borrow areas offshore near Cape Canaveral, but does not describe other potential offshore sands closer to the project, including those recently identified by the State in the vicinity of the Mid-Reach project.
9	The justification for the beach nourishment design should include a description and evaluation of the alongshore sediment transport and a sediment budget for the system.
10	Due to the application of incorrect coastal processes analyses in plan formulation, and lack of consideration in the variability of exposed hardbottom, the risk and uncertainty analysis is inaccurate and needs to be revised based on appropriate input parameters.
11	The GRR/SEIS needs to address the potential that more than the estimated three acres of nearshore hardbottom could be covered by sand from the maintenance renourishment program..
Significance – Medium	
12	The justification for using 2004 as a baseline year for hardbottom coverage or as part of the basis for beachface fill plan selection does not address concerns regarding a reduction in the area of exposed hardbottom.
13	The Economic Conditions section (Section 2.4) of the GRR/SEIS needs to be expanded to include recreational benefits.
14	The accuracy of the sea level rise calculations is outdated and the current policy (EC-1165-211) should be used.
15	Further justification is required for using articulated concrete mats, since their performance in similar environments is not known, and the placement of the mats above the depth of closure (17-20 ft) may subject the low profile units to burial.
16	More clarification on the description of cost estimation is necessary, including defining terminology such as Average Annual Equivalent (AAEQ).
17	More details on the 2008 profile data and template designs should be included to enable verification of quantities as part of justifying the engineering design.

Significance – Low	
18	The report includes errors regarding species identification and scientific names which brings into question the credibility of species listings.
19	The specific Environmental Operating Principles (EOPs) that are referenced need to be identified and described in greater detail.
20	The use of a discount rate and two-year duration to maximum habitat equivalency is not adequately justified and may affect the Habitat Equivalency Analysis (HEA) process.
21	The GRR/SEIS needs to clarify that as the shoreline migrates landward the hardbottom will attenuate a greater percentage of the wave energy.

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Appendix A

Final Panel Comments
of the

Brevard County, Florida Mid-Reach Shoreline Protection Project
Draft General Re-evaluation Report (GRR) and
Supplemental Environmental Impact Statement (SEIS)

Final Panel Comment 1:

The design analysis is deficient in that it underestimates the amount of sand that will move offshore during equilibration of the profile, has been based on SBEACH analysis of the existing profile that was not representative of the beachface fill that is proposed, and underestimates the beachface fill erosion rates over the life of the project.

Basis for Comment:

The GRR/SEIS estimates of project performance have a number of deficiencies (GRR/SEIS, pgs. 14, 15, 16, 69, 70, 82, 135; Appendix A pgs. 9, 10, 11, 12-19, 21, 34, 36, 42, 43; Appendix B pgs. 13, 14) which result in underestimates of erosion and overestimate the storm protection afforded by the project. The proposed beachface fill is a significant departure from standard beach nourishment design practice that normally places enough fill to widen the entire profile from the berm to the depth of closure of the profile. The beachface fill will be trucked in and placed mostly on the dry beach and allowed to be reshaped by wave action to an equilibrium profile. The assumption that sand from the constructed profile will move seaward only as far as the rocky outcrop platform (GRR/SEIS pg. 102 [Figure 5-2] and pg. 142 [Figure 6-3]) and not to the depth of closure, as is standard in beach nourishment performance, is not correct and in conflict with Appendix A pg. 43 section 93 which describes the expected equilibration of the profile. The relatively low volumes placed to achieve the 10 ft and 20 ft designs (Pg. A43, section 96) and the minor equilibrium adjustments shown on page 142 Figure 6-3 further support the concept that the designers have incorrectly estimated profile intercepts above the depth of closure. For example the beach has demonstrated a significant exchange of material from the dry beach to the offshore in storms and subsequent recovery after storms. This observed process suggests that the active profile includes the area beyond the rocky platform and that any new sand would not be perched but instead be shared by the entire profile as would be expected in conventional beach fill design. Appendix A pg. 28 sections A-57 also shows that the rock does not have significant impacts on the stability of the beach. The movement of sand to the offshore to equilibrate the entire profile would result in an erosion mechanism that is not considered or accounted for in the design.

The SBEACH analysis for the project was apparently performed on the existing full profile and not the proposed beachface fill and most likely underestimates the storm response of the proposed profile. As described in Appendix B (pg. B20) the only parameter used in the storm benefits analysis was the amount of shoreline widening; the same benefits were therefore incorrectly computed for beachface fill as full profile fill. The beachface fill is further out of equilibrium than the existing profile because the sand is stacked on the dry beach steepening the profile. Therefore SBEACH would predict higher recession for the beachface fill than the existing profile if it were run as it should have been. In addition it is also important to note that because equilibration occurs much more rapidly than the background erosion process it is highly likely that the shoreline widening that was assumed for the SBEACH storm recession analysis would not be in place at the time of the storm.

The erosion rate of the beachface fill has not been adequately analyzed and has been underestimated for the Mid-Reach Project because of a number of factors. The erosion rate developed in the appendices is based on preliminary analysis of the performance of the post storm fills after recent hurricanes but no data or profiles are presented (Appendix A pg. 43, sections A93-A95). This is too short of a time period on which to base the future erosion rate of a project that will involve multiple nourishments over a 50 year time frame. The panel does not agree with section A92 which predicts an erosion rate of the beachface fill somewhere between the dry beach erosion and that of the entire profile. It is probable that the beachface fill will erode faster than the rate of the full profile to prevent over-steepening of the profile and because of equilibration of the placed sand. The beachface fill will erode to compensate for erosion of the entire profile over time especially after multiple nourishments have occurred. If this did not happen the profile would steepen unnaturally as the dry beach was maintained and the submerged profile continued to erode; this is very unlikely to happen. Therefore the beachface fill over time would erode at least at the rate of the full profile but in addition erode as sand moves offshore to equilibrate the profile. The long term rate of erosion of the beachface fill would therefore be higher than the full profile rate (not somewhere between the dry beach and full profile rates as suggested in A92).

Finally the acceleration of sea level rise will increase the background rate of erosion in the future. Although the GRR/SEIS includes estimates of accelerating sea level rise, the effects of the accelerating seal level rise on the erosion rates of the project are not included in the estimates of erosion of the beachface fill. Based on estimates of median future sea level rise as presented in Appendix A page 12 section A32 this would increase the rate of sea level rise from the historic 2.41mm/yr to 3.87mm/yr which would result in a 33% increase in the full profile erosion rate.

Significance – High:

The problems with the erosion and storm analysis described above are very significant as they affect project formulation, storm benefits and the selection of the recommended plan for erosion control.

Recommendations for Resolution:

To resolve these concerns, the report would need to be expanded to include:

- *A re-evaluation of the erosion rate of the beachface fill options to include the erosion of the full profile, plus the erosion due to equilibration of the beachface fill and the contribution of accelerating sea level rise.*
- *An analysis of the beachface fill using SBEACH on the steepened beachface profile to determine the expected storm response. A determination should be made if the beachface fill would reasonably be expected to be in place when the storm hit because of rapid equilibration before the storm.*

Final Panel Comment 2:

The referenced SBEACH model report should be included in the GRR/SEIS to enable an evaluation of the cost to benefit ratios.

Basis for Comment:

The SBEACH model is an adequate and acceptable model to estimate beach profile response to storm events. The results of SBEACH enable plan formulators to compare alternatives in terms of storm damage reduction benefits. However, the GRR/SEIS does not include the detailed analysis of the SBEACH modeling for the final array of alternatives. For example, there is no reference provided as to how the Storm Frequency Chart (Table 2-4) was derived. Later in the text and in the appendices there are references to a SBEACH Model section; however this section does not exist in the GRR/SEIS. Rather, in Appendix B there is one sentence that refers to the 1996 Feasibility Study SBEACH analysis which is not included either. It is inferred that Table 2-4 came from this 1996 study.

Based on the limited data provided in the GRR/SEIS, the following is understood. The benefits for the fill alternatives were computed using the mean high water extension feature of the Storm Damage Model. The SBEACH recession analysis that drives the Storm Damage Model was the 1996 Feasibility Study SBEACH analysis. The 1996 analysis included SBEACH model runs on the existing profiles within the project area to establish the amount of storm recession expected for the design storms.

These results were correctly applied to evaluate the Future Without Project Alternative, i.e. No Action. These results were also correctly applied to assess the conventional fill alternative that widens the entire profile. However, these results were incorrectly applied to the beachface fill alternative which only widens the upper portion of the profile. Contrary to the assumed performance, the beachface fill will erode more in a storm, have less recovery after a storm, and experience higher long term erosion compared to the conventional fill alternative. Therefore the costs may be higher and the benefits lower than have been estimated for the beachface fill alternative.

It is also not clear if the 1996 analysis model runs included the version of SBEACH that enables consideration of the nearshore hardbottom.

In the absence of the SBEACH model details, the storm damage reduction benefits cannot be fully evaluated. The recommended fill volume is 573,000 cubic yards (cy). Dividing this by the total length of 7.8 miles equates to an average fill density of approximately 14 cy/linear foot. The report concludes the recommended plan will provide storm damage reduction ranging from the 5-year to the 75-year storm frequency. While noting the modest background erosion rate along the Mid-Reach project area, the proposed fill volume may not provide such a high level (e.g., 75-year storm event) of storm damage reduction benefit. Further, the report does not indicate the level of storm damage reduction benefit for each Reach.

Significance – High:
By not including the detailed SBEACH analyses, an evaluation of the cost to benefit ratios presented in the report cannot be verified. Thus a determination that the project is technically sound or economically justified cannot be made.
Recommendations for Resolution:
To resolve these concerns, the report should be expanded to include: ▪ *The SBEACH model detailed analyses including 1996 Feasibility Study SBEACH analysis and analysis performed on the final array of alternatives including the results for each Reach.* ▪ *A new SBEACH analysis of the proposed beachface fill templates using the appropriate version of SBEACH that considers nearshore hardbottom, including equilibration of the beachface fill over the full profile.* ▪ *A recomputation of benefits based on results of new beachface fill model runs, and a reassessment of cost to benefit ratios.*

Final Panel Comment 3:

The tradeoffs between restoring the damaged sandy shore ecosystem and protecting the nearshore exposed rocks should be formally evaluated within the GRR/SEIS.

Basis for Comment:

The primary environmental constraint associated with the recommended plan appears to be the protection of nearshore hardbottom, but this constraint needs to be balanced against the loss of sandy shore ecosystem, as well as the recreational values of sandy shore. Rock has limited recreational value to beachgoers. A fair consideration of the sandy shore ecosystem and recreational values could alter the outcome of plan selection in two ways: it could add benefits to plans that apply more sand with less frequency, and it could reduce the amount of rock mitigation reef thought to be required. If so, then plans that provide more sand would have higher benefits, both from an environmental and recreational perspective, than were used in the alternatives analysis. In addition, a lower mitigation ratio for lost hardbottom could result if benefits of added sand were considered appropriately in the Uniform Mitigation Assessment Method (UMAM). The proposed mitigation reef is very costly.

Evidence is given that sandy shore ecosystem has eroded in the reach. Paragraph A-38 of Appendix A states that the "dune is not able to migrate landward as the rest of the beach recedes... thus the dune steadily loses volume" and that "many locations along the project area have little or no dune/bluff left to provide protection during a storm." Yet the recommended plan does not describe a fully functioning dune ecosystem that supports southeastern beach mice in a foredune, nesting shorebirds and gopher tortoises in the swale and backdune, and diverse dune plants. Because land-based predators may not venture over open terrain as readily, wide dune fields may reduce sea turtle nest predation by increasing the distance of open terrain between nests and land (Montague 2008). Tall dunes block light from the landward side, which may help direct hatchling sea turtles toward the ocean horizon. Such functions of dune systems have not been discussed. However, the GRR/SEIS document indicates that continued erosion of the Mid-Reach Project area will reduce remaining sea turtle nesting habitat, and that beach nourishment will add considerably to available nesting habitat (GRR/SEIS, pg. 176, paragraph 1; pg. 182, Section 7.2.3.9).

To make an evidence based assessment, several quantities are needed: the amount of missing sandy shore habitat; the amount of nearshore hardbottom exposed by recent erosion; and the relative values of sandy shore ecosystem compared to the rocky shore ecosystem. These quantities are not included in the recommended plan. Relative ecological value can be judged with a combination of ecological production, diversity, habitat for endangered and threatened species, and presence of alternative habitats for species of concern.

In general, the scientific treatment of the sandy shore ecosystem should be comparable in scope to that given the rocky shore ecosystem. Useful references include McLachlan and Brown (2006), and Johnson and Barbour (1990). A great deal of attention is focused on

the algae growing on rock, for example, but little text is devoted to the plants that occur or could occur in the dunes. A species list of possible dune plants is needed. Dune plants that are now absent in Mid-Reach could even include endangered species found to the south: *Okenia hypogaea* (burrowing four-oclock) and *Jacquemontia reclinata* (beach clustervine). Much attention is given to the fish that use rocks, but none is given in a comparable way to the fish that use sand. No comparison of bird, reptile, and mammal use is given on rock versus sand. No evidence is given that fishing is better on rock than it is on sand. A rationale for making the ecological choice to protect rock at the expense of the sandy shore ecosystem as a whole should come from this kind of comparison, but the comparison and rationale are missing. It is understood that the National Marine Fisheries Service (NMFS) has indicated that the nearshore hardbottom represents a Habitat of Particular Concern; however, it is not clear whether the recommended plan assesses the value of the sandy shoreline in a similar fashion (e.g., whether the loss of sandy beach habitat is critical to the nesting turtle population).

References

Johnson, A.F., and M.G. Barbour. 1990. Dunes and maritime forests. Chapter 13 (pp. 429-480) in Myers, R.L., and J.J. Ewel (eds)., Ecosystems of Florida. (Orlando: University of Central Florida Press) 765 pp.

McLachlan, A, and A.C. Brown. 2006. The ecology of sandy shores, 2nd edition. (Boston: Academic Press (Elsevier)). 373 pp.

Montague, C.L. 2008. Recovering the Sand Deficit from a Century of Dredging and Jetties along Florida's Atlantic Coast: A Reevaluation of Beach Nourishment as an Essential Tool for Ecological Conservation. Journal of Coastal Research 24(4):899-916.

Significance – High:

The selection of the recommended plan could be different if the effects on the sandy shore ecosystem and recreational values were appropriately considered.

Recommendations for Resolution:

To resolve these concerns, the report would need to be expanded to include:

- *An identification of the tradeoff between protecting nearshore rock and restoring a complete sandy shore ecosystem. State that the tradeoff exists. Give some quantitative or qualitative basis for deciding the amount of sandy shore ecosystem to restore and the amount of rocky shore to protect.*
- *A section on the sandy shore ecosystem that includes a back dune, foredune, dry berm, intertidal zone and subtidal zone to the depth of closure. Include all aspects in a way that is directly comparable to the treatment given to nearshore rock habitat.*
- *A discussion of sandy shore ecosystem restoration in plan selection and mitigation.*
- *An identification of the amount of sandy shore ecosystem that has been eroded.*
- *An identification of the amount of nearshore rock that has been exposed by erosion.*
- *An assessment of the likelihood that some or all of the nearshore rock was entirely covered by sand in earlier times when a complete dune/beach system was present.*
- *A species list of dune plants that could occur in Mid-Reach with an indication of those now known to be present in Mid-Reach.*

Final Panel Comment 4:

The reasons for protecting rock need to be compelling enough to justify the costs of failing to completely restore the sandy shore plus the expense of mitigation. Also, the agreed-upon limit of 3.0 acres of hardbottom burial needs a scientific justification.

Basis for Comment:

The outcome of plan selection is entirely dependent on the justification for protecting the nearshore rock in Mid-Reach and limiting burial of rock to 3 acres. The costs of failing to fully restore the entire sandy shore and the expense of mitigating buried rock are huge. Yet a compelling justification for accepting these costs is not evaluated and discussed. Specific benefits might include protecting a list of species known to occur in Mid-Reach hardbottom that are managed under authority of designations such as Essential Fish Habitat, Category 1 Resource, or Habitat Area of Particular Concern.

Whatever the reasons for protecting hardbottom, they should: 1) apply specifically to nearshore hardbottom in Mid-Reach; and 2) be evaluated against the lost opportunity for a more completely restored sandy beach and the expense of mitigating buried rock.

The limit of 3-acres of rock burial was set by negotiation, but the scientific basis for that negotiation is not apparent. The basis should be included and likewise evaluated against opportunity costs and mitigation costs.

Studies that show why Mid-Reach nearshore rock is essential to managed species of fishes and other organisms should be cited. If studies from areas outside of Mid-Reach must be used, then an evaluation of how well they apply to Mid-Reach rock is needed.

Striped croaker (*Bairdiella sanctaeluciae*) is the only species identified as dependent on nearshore rock as habitat. It is not clear whether this species can be managed under a specific designation such as Essential Fish Habitat, whether Mid-Reach rock is actually used by this species, or whether the shallow rock in Mid-Reach is a significant fraction of the total rock habitat available for this fish.

Juvenile reef fishes reported on nearshore rock have alternative inshore habitats, and also may not fall under the authority provided by the Essential Fish Habitat designation. Species mentioned that are so managed, such as shrimp and red drum, clearly do not require rock so close to shore in order to complete their life cycle. In fact these habitats may be dangerous to such organisms. Moving into estuaries may enhance survival. Fishes that remain in the nearshore rock rather than moving on to estuaries may be more susceptible to damage by pounding waves, stranding, and perhaps predation. Estuaries are more commonly thought of as essential for juvenile red drum and shrimp. Moreover, these species occur throughout the southeast in areas devoid of nearshore rock (Larson et al. 1989; Muncy 1984; Reagan 1985; Baron et al. 2004).

References

Baron, R.M., K.B. Jordan, and R.E. Spieler. 2004. Characterization of the marine fish assemblage associated with the nearshore hardbottom of Broward County, Florida, USA. Estuarine, Coastal, and Shelf Science 60: 431-443.

Larson, S.C., M.J. Van Den Avyle, and E.L. Bozeman, Jr . 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (South Atlantic)--brown shrimp. U.S. Fish Wildl. Serv. Biol. Rep. 82(11.90). U.S. Army Corps of Engineers TR EL-82-4. 14 pp.

Muncy, R.J. 1984. Species profiles: 1ife histories and environmental requirements of coastal fishes and invertebrates (South Atlantic) -- white shrimp. U.S. Fish Wildl. Serv. FWS/OBS-82/11.27. U.S. Army Corps of Engineers, TR EL-82-4. 19 pp.

Reagan, R.E. 1985. Species profiles: 1ife histories and environmental requirements of coastal fishes and invertebrates (Gulf of Mexico) -- red drum. U.S. Fish Wildl. Serv. Biol. Rep. 82(11. 36). U.S. Army Corps of Engineers, TR EL-82-4. 16 pp.

Significance – High:

The entire project design approach appears to be based on protecting nearshore rock in Mid-Reach, and does not consider the expense of mitigation or the opportunity cost of protecting rock in evaluating alternatives.

Recommendations for Resolution:

To resolve these concerns, the report would need to be expanded to include:

- *A list of species of concern that would be harmed by rock burial.*
- *Justification for including each species on the list of species that would be harmed by rock burial. This would include any federal or state designations that are appropriate for each species of concern.*
- *An evaluation of whether those species of concern are likely to be present in Mid-Reach rock.*
- *The scientific reasons for limiting the project to 3 acres of rock burial, likewise with references to applicable studies.*
- *An examination for applicability in Mid-Reach of all literature used to justify protecting nearshore rock.*

Final Panel Comment 5:

The justification to screen out certain structural management measures is not valid based on project assumptions.

Basis for Comment:

For the beach nourishment measures it was assumed that 100% of the hardbottom would be covered (and mitigated for) within the footprint of the fill template and predicted equilibrated toe of fill.

The justification to screen out the groin management measure is not adequately supported. Additional data/information should be provided to validate why the groin measure would require additional mitigation beyond the beach nourishment measures. Otherwise, the groin measure should be carried forward and analyzed as an alternative. Specifically the groin measure should be analyzed when combined with beach nourishment, noting that the description of this measure includes the statement "the construction of groins would have to be supplemented with nourishment" (GRR/SEIS pg. 91), although the screening discussion is specific to the use of groins only, without nourishment.

Further the impacts identified with the submerged artificial reef management measure (GRR/SEIS pg. 92) may be considered equal to the impacts identified with the conventional fill measure, which was carried forward. The potential exists for the use of a submerged artificial reef to perch the design fill and significantly minimize the seaward transport of placed fill during equilibration. This would allow for placement of a larger volume(i.e., greater density) of fill which would yield more benefits but result in the same approximate 3 acres of impact of the recommended plan. Additional data/information should be provided to validate why the submerged artificial reef measure would require additional mitigation beyond the beach nourishment measures, or the submerged artificial reef measure be carried forward and analyzed as an alternative when combined with beach nourishment.

Additional data/information should be provided to justify screening out the breakwater measure., Otherwise, the measure be carried forward and analyzed as an alternative, specifically when combined with beach nourishment, noting that the description of the breakwater measure discusses the combination of breakwaters and beach nourishment (GRR/SEIS pg. 93) but the screening discussion is specific to the use of breakwaters without nourishment.

Breaking the project area into reaches is understandable especially when describing the hardbottom areas and defining potential impacts. However, this segmenting infers that the reaches may be independent, and they are not. The screening methodology discussion (GRR/SEIS pg. 97) of the 13 alternatives and 6 reaches should state that the reaches are not independent (e.g., adjacent reaches are more similar than Reach 1 is to Reach 6). Further, some of the alternatives are mutually exclusive, or nearly so, and it is

recommended that the screening methodology discussion state which alternatives are mutually exclusive and which are not.

In addition, several reasonable measures were not analyzed including the following:

- A feeder beach measure could have been evaluated. This would increase the beach fills in the North and South project reaches where the extents of hardbottom are significantly reduced, and allow natural processes to transport sand laterally to nourish the Mid-Reach project area.

- A measure that includes overfilling Reach 1 and Reach 2 could have been evaluated. This would result in coverage of the remaining 0.5 acres of hardbottom in these two reaches; however, the benefits could increase substantially both directly to the properties and upland resource habitats (e.g., sea turtle and shorebird nesting area) as well as the adjacent segment (Reach 3) through fill diffusion during south to north directed transport periods.

Significance – High:

The outcome of plan selection could be affected if additional measures were combined to formulate alternatives with higher benefit to cost ratios.

Recommendations for Resolution:

To resolve these concerns, the report would need to be expanded to include:

- *A validation of why the use of groins would require additional mitigation to adequately screen this measure out, or combine this measure with beach nourishment into an alternative and advance it through plan formulation.*
- *A demonstration of how the use of submerged artificial reef is more impactive than conventional fill to adequately screen this measure out, or combine this measure with beach nourishment into an alternative and advance it through plan formulation.*
- *More details to adequately screen the breakwater measure out, or combine this measure with beach nourishment into an alternative and advance it through plan formulation.*
- *The use of both "discretionary" and "exclusionary" criteria in the screening process. For example, screening of alternatives should incorporate exclusionary (e.g. seawalls and revetments are not consistent with state and/or local laws; therefore, can be eliminated from further consideration) and discretionary (e.g. dune restoration alone cannot provide appropriate storm damage protection) criteria to clarify the evaluation matrix shown in Table 5-1.*
- *An improvement of the description of the screening methodology by discussing that the subreaches are not independent (e.g., adjacent subreaches are more similar than Reach 1 is to Reach 6), and some of the measures are mutually exclusive, or nearly so.*
- *A consideration of the two additional measures, i.e. feeder beach and overfill of Reaches 1 and 2, in plan formulation.*

Final Panel Comment 6:
The assumption that all conventional fill would permanently cover all near shore hardbottom should be justified.
Basis for Comment:
Conventional fill options were eliminated from consideration on the basis of lower benefit cost ratios and greater damage to hardbottom. Damage to hardbottom, however, was counted twice against an option: once in the cost of mitigation, and a second time as a stand-alone consideration (owing to the major project constraint of minimizing damage to hardbottom). Hence, the analysis is sensitive to error in the estimates of hardbottom damage. All of the conventional fill options assumed 100% loss of nearshore hardbottom. If one or more of these options actually would not cover 100% of the rock, 100% of the time, then they might still be viable alternatives at Step 4 of the elimination process (GRR/SEIS pg. 115). No justification was given for the assumption of 100% loss of hardbottom. Furthermore, the use of rock protection measures during construction, such as coffer dams, was not discussed. On page 99, various reasons for the 100% loss assumption were alluded to, but the specifics and rationale were lacking. Suggestions included an unspecified effect of the intertidal location of hardbottom, unnamed aspects of pumpout equipment, and an unidentified effect of the liquefied nature of fill. How these aspects cause complete damage to rock ecosystems regardless of project size was not described. Yet it seems reasonable that different fill volumes should produce different durations and amplitudes of rock burial and different rates and durations of rock re-exposure in the future. An explanation is needed. Also on page 99 of the GRR/SEIS is the statement: "…it was evident that some levels of [hardbottom] impact would be environmentally unacceptable regardless of mitigation potential." No such evidence was given, however.
Significance – High:
By assuming 100% loss of hardbottom regardless of conventional fill volume (Alternatives S-3B), some of the conventional fill alternatives may have been prematurely dismissed in some subreaches.

Recommendations for Resolution:
To resolve these concerns, the report would need to be expanded to include: ▪ *A thorough explanation of how even the smallest of the conventional fill options necessarily causes 100% loss of hardbottom 100% of the time throughout the 50 year analysis time frame.* ▪ *An accurate representation of hardbottom damage as a function of conventional fill volume.* ▪ *A reconsideration of conventional fill options that cannot be eliminated from consideration when a more accurate representation of damage to hardbottom is included.* ▪ *Evidence that forms the basis for an area or percentage of hardbottom impact that would be environmentally unacceptable regardless of mitigation potential, as stated on pg. 99 of the GRR/SEIS.*

Final Panel Comment 7:

Benefits of beachface fill appear to have been significantly overestimated. More inclusive methods of storm damage reduction should be used and the benefits of all alternatives reevaluated.

Basis for Comment:

In order to provide accurate estimates of project benefits, the storm damage reduction analysis needs to be revised. Current analysis of the beachface fill employs previously estimated shoreline recession rates that are biased downward due to the assumption that the beachface fill would perform as a conventional fill. Moreover, the storm damage reduction analysis did not account for acceleration of erosion due to sea level rise. The storm damage reduction analysis fails to clearly articulate the process by which parcels threatened by erosion and storm damage are identified. A cost approach is used to value threatened parcels, but an assessment of land value is not explained. Storm damage reduction apparently does not take account of diminution in storm surge flooding.

The storm damage model needs to be revised to more accurately reflect performance of the beachface fill. Storm damage reduction benefits are primarily based on the difference between the storm damages expected with and without the proposed improvements. Storm damages with the beachface fill have been underestimated because the storm recession model was based on analysis of the pre-construction profile that would erode less during a storm than the steepened beachface fill profile. Secondly the damages were underestimated because the equilibration of the beachface fill profile was underestimated and the width of equilibrated beach would be narrower than was considered.

Details and justification of cost approach to valuation are needed. The cost approach is most valid and reliable for newer construction. The analysis should address the appropriateness of this method for Brevard County. The analysis should describe the process by which parcels were included in structural inventory, clearly indicating that all properties likely to be affected by storms and erosion (with and without the project) are accounted for. No details are provided for the assessment of land values. In accounting for erosion and flooding, the analysis would require separate estimates of land and structure value, as both can be lost to erosion (some land loss is not temporary).

The storm damage simulation should account for storm surge, flooding, and erosion. The benefits of beach maintenance include protection from erosion and storm-induced flooding. The Storm Damage Model apparently does not account for the latter, which will bias benefit estimates downward.

Significance – High:

Benefit estimation is critical to the selection of the recommended plan and project justification.

Recommendations for Resolution:
To resolve these concerns, the storm damage model would need to be revised to: ▪ *Re-evaluate storm damage reduction benefits associated with beachface fill considering the steeper profile that will be created and the narrower beach expected after equilibration.* ▪ *Include all parcels that would be affected by erosion, storm surge, and flooding in with and without project conditions.* ▪ *Account for damage reduction due to inhibition of storm surge and flooding.*

Final Panel Comment 8:

The analysis of the availability of borrow material biases the economic analysis toward the preferred alternative by assuming only two borrow areas offshore near Cape Canaveral, but does not describe other potential offshore sands closer to the project, including those recently identified by the State in the vicinity of the Mid-Reach project.

Basis for Comment:

The assumption that the Cape Canaveral borrow areas can be used for the Mid-Reach project is well thought out and appropriate for the selected alternative (Appendix E, section 3). However large sediment deposits have been identified directly offshore that may contain beach quality sand are not discussed or explored (URS and CPE 2007). These closer borrow sites, if verified, would be appropriate for conventional hydraulically placed fill and could be dredged at significantly less cost for conventional beach nourishment options that would provide enough fill to widen the full profile. It is important to properly evaluate the least cost of all options to provide a fair economic comparison of various options.

The current approach may bias the conclusions toward selection of the recommended plan inappropriately and may mask opportunities that could provide more benefits at lower cost.

References

URS and CPE, 2007. Florida Central Atlantic Coast Reconnaissance Offshore Sand Search (ROSS). Prepared for FDEP, 280p.

Significance – High:

Neglecting other borrow areas relates directly to the formulation of the NED plan and therefore has high significance.

Recommendations for Resolution:

To resolve these concerns, the report would need to be expanded to include:

- *A complete discussion of offshore sand resources that includes the potential borrow areas closer to the Mid-Reach project.*
- *An economic evaluation of the beach nourishment options that would use sand closer to the Mid-Reach project.*
- *Further geotechnical investigations that explore the sand resources offshore from the project area to confirm or exclude those areas from further consideration.*

Final Panel Comment 9:

The justification for the beach nourishment design should include a description and evaluation of the alongshore sediment transport and a sediment budget for the system.

Basis for Comment:

The GRR/SEIS states the project eroded at 50,000 cubic yards per year (Appendix A, pg.43); however, this statement is unsupported as no sediment budget was provided. In addition, the engineering analysis did not include model simulations (e.g., GENESIS) of wave-induced alongshore sediment transport and/or shoreline change. These types of models are critical for predicting the anticipated performance of the proposed beach nourishment design.

If prior project performance results are available for either beach nourishment projects on adjacent beaches or dune nourishment projects within the Mid-Reach Project area, they should be utilized for predicting future project performance including profile equilibration and longevity. This information should be included in any future sediment budget calculations, as well as form the basis for calibration of a shoreline change model.

Significance – High:

The outcome of plan selection (i.e., the cost to benefit ratio) could be affected by the anticipated performance of each beach nourishment alternative based on a quantitative evaluation of the sediment budget and alongshore sediment transport/shoreline change.

Recommendations for Resolution:

To resolve these concerns, the report would need to be expanded to include:

- *A presentation of a sediment budget for the system.*
- *The development of an appropriate calibrated and validated model of alongshore sediment transport and shoreline change to serve as the basis for numerically evaluating the anticipated performance of beach nourishment alternatives.*
- *An incorporation of the sediment budget and alongshore sediment transport modeling results into the evaluation of benefits associated with project longevity to be used as part of plan selection.*

Final Panel Comment 10:

Due to the application of incorrect coastal processes analyses in plan formulation, and lack of consideration in the variability of exposed hardbottom, the risk and uncertainty analysis is inaccurate and needs to be revised based on appropriate input parameters.

Basis for Comment:

In general, the USACE implemented the methods for plan formulation and evaluating the risks and uncertainties appropriately. However, key coastal processes inputs to the risk and uncertainty analysis (GRR/SEIS Appendix A-2) were flawed such that the outputs were similarly flawed. The key inputs that need to be fixed include:

- Profile equilibration (GRR/SEIS p. 102 {Fig 5-2}, page 142 {Fig 6-3}, and Appendix A p. 43) – profiles will equilibrate to the depth of closure not to a shallower depth suggested by the GRR/SEIS
- Profile response to storm erosion (GRR/SEIS p. 15 and 16 {Table 2-4}, Appendix A, and Appendix B p. B20) – storm response is underestimated for the steeper beachface fill
- Application of background erosion (GRR/SEIS Section 2.2 and Appendix A) – background erosion should be based on the full profile erosion rate
- Renourishment volumes (GRR/SEIS Sections 6.1 through 6.3 and Appendix A) – renourishment volumes should include increased erosion caused by accelerating sea level rise

The proposed beachface fill measure was analyzed and treated as standard beach nourishment which it is not. Beachface fill is a significant departure from the standard beach nourishment design; therefore there is a higher level of uncertainty in predicting the project performance of beachface fill. Application of the correct coastal processes analyses described above will reduce this uncertainty and improve the results of the risk and uncertainty analysis.

The amount of hardbottom that will be covered has a high level of uncertainty and this should be emphasized in the risk and uncertainty analysis. For example, the coverage at time of construction could be ~ 40% higher and the mitigation quantity increased or the fill template reduced accordingly.

Significance – High:

By correcting the key inputs, the outcome of the risk and uncertainty analysis will change and could affect the costs and related cost to benefit ratios.

Recommendations for Resolution:
To resolve these concerns, the report would need to be expanded to include: ▪ *A correction of the coastal processes analyses and an update of the beachface fill performance parameters (volumes, costs, benefits).* ▪ *A change in the Risk from "unlikely" to "very likely" due to the variability in exposed rock (Appendix A-2 page 64).* ▪ *A rerun of the risk and uncertainty analysis, and a revision of the costs, benefits, etc. per the new outputs.*

Final Panel Comment 11:

The GRR/SEIS needs to address the potential that more than the estimated three acres of nearshore hardbottom could be covered by sand from the maintenance renourishment program.

Basis for Comment:

Clearly, the frequency and duration of rock exposure and reburial is not adequately known. As stated in the GRR/SEIS (pg.155-156), the decision to mitigate for 3.0 acres of rock burial was negotiated and not based on scientific data, since insufficient data are available. Furthermore, the profile models (i.e., SBEACH) did not explicitly include the hardbottom within the beach profile simulations. The GRR/SEIS states "placement of the sand is anticipated to impact approximately 3.0 acres of nearshore rock hardbottom by direct and indirect cover of which 1.4 acres is expected to include some temporal variation as the advanced nourishment erodes." (GRR/SEIS pg. i) This indicates that as little as 1.6 acres may be permanently buried, as initially covered rock is re-exposed by erosion. However, repeated addition of sand during maintenance renourishment may ultimately fill the profile to the depth of closure, thereby covering more hardbottom than the originally estimated 3.0 acres.

The mitigation reef is very expensive per acre. If more than 3.0 acres is ultimately covered by the project, or if the mitigation reef itself becomes buried, contingency plans (not yet developed) may require additional mitigation. Estimating the contingency likelihood that additional hardbottom could be covered by the maintenance renourishment program could have a substantial influence on benefit-cost ratio and, therefore, plan selection.

Significance – High:

The amount of contingency mitigation reef potentially needed from future burial of more hardbottom could be estimated through an analysis of beach profile equilibration associated with the maintenance renourishment program, which could affect the benefit cost ratio and therefore plan selection.

Recommendations for Resolution:

To resolve these concerns, the report would need to be expanded to include:

- *Model predictions of post-renourishment (i.e., following maintenance dredging events) sand equilibration, from the dunes through the rock zone to the depth of closure (and explicitly including the hardbottom profile in the model).*
- *Consideration of a long term, high frequency (monthly or quarterly) assessment of rock exposure and burial at Mid-Reach that begins a year before the project and continues through at least two renourishment cycles.*
- *A contingency plan for mitigation reef.*
- *An estimate of the likelihood of needing contingency reef as part of each plan.*

Final Panel Comment 12:

The justification for using 2004 as a baseline year for hardbottom coverage or as part of the basis for beachface fill plan selection does not address concerns regarding a reduction in the area of exposed hardbottom.

Basis for Comment:

Nourishment placed adjacent to and within the Mid-Reach Project area since 2000 could have reduced the area of exposed hardbottom within Mid-Reach in 2004. Proposed beachface fill alternatives may also cover nearshore hardbottom during equilibration and maintenance renourishment. These concerns are not clearly addressed as part of the justification for using 2004 as a baseline year for hardbottom coverage, or as part of the basis for beachface fill plan selection, as described in the GRR/SEIS.

The 2004 estimate of hardbottom appears to be the basis for quantifying the area; however, a significant reduction since 2001 also is indicated (GRR/SEIS pg.37). The GRR/SEIS should provide some type of explanation and/or analysis to ensure this reduction in hardbottom extent has not been exacerbated by the 2001-2006 and 2008 nourishment programs along adjacent areas or the 2004/2005, 2006, and 2008 dune restoration projects in the Mid-Reach Project area. Specifically, the January 2001 aerial photography indicated an estimated 51.4 acres of hardbottom within the Mid-Reach Project area, where the 2004 survey indicated 31.2 acres (GRR/SEIS pg.37).

Significance – Medium:

It is important to provide sufficient documentation to verify the potential influence of adjacent projects on hardbottom extent.

Recommendations for Resolution:

To resolve these concerns, the report would need to be expanded to include:

- *An analysis of monitoring data associated with the beach and dune nourishment programs conducted on adjacent beaches, as well as within the Mid-Reach Project area, between 2001 and 2008 to indicate whether sediment losses from these projects impacted hardbottom in the Mid-Reach.*
- *If analysis indicates that these projects influenced hardbottom coverage, a methodology should be presented in the GRR/SEIS to discern impacts associated with other projects from the work proposed directly for the Mid-Reach Project.*

Final Panel Comment 13:

The Economic Conditions section (Section 2.4) of the GRR/SEIS needs to be expanded to include recreational benefits.

Basis for Comment:

Very little information is provided on existing economic conditions. The narrow focus on property inventory and value estimates appears to reflect a pre-conceived notion that this aspect of the coastal economy is deserving of attention in benefit-cost analysis, without consideration for other factors. All potential costs and benefits should be specifically identified, rather than limiting the list as the present discussion does.

Recreational benefits need to be included. Appendix B, Attachment 2 includes details on recreational visitation in Brevard County. A description of current and predicted visitation patterns and the recreational capacity for the Mid-Reach beaches should be included in the 'Economic Conditions' section. This description should include any unique recreational aspects associated with the Mid-Reach, such as the role of hardbottom rock resources in recreation activities or the presence of popular accommodations in the area (hotels, recreation facilities), if appropriate. This will provide an understanding of the relative importance of Mid-Reach beaches and the context for understanding recreational opportunities.

Estimates of non-market value for beach use need to be better justified in light of existing estimates in the economics literature (see Bin et al. 2005; Kildow et al. 2009), which are all considerably higher than the chosen $2.35 per day ('transferred' from surrounding Florida beach value estimates) and should be included in the 'Economic Conditions' section. Defensible recreational benefits estimates are necessary to compare the entire array of management options (if warranted), are required to assess whether incidental recreational benefits are 'large' relative to overall project benefits, and are prudent as they may be cited and used in a different analysis or application. Limitations imposed by available parking play an important role in benefit estimation, and this aspect of the analysis needs to be introduced in the 'Economic Conditions' section.

Lastly, any available information on tourist expenditures and the importance of tourism in the local economy should also be included (e.g., jobs provided, rental income earned, tax revenue generated).

References

Bin, O., C.E. Landry, C. Ellis, and H. Vogelsong. 2005. "Some Consumer Surplus Estimates for North Carolina Beaches" *Marine Resource Economics* 20(2): 145-61.

Kildow, J.T., C.S. Colgan, and J. Scorse. 2009. *State of the U.S. Coastal and Ocean Economies*, Chapter 4; National Ocean Economic Program: http://www.oceaneconomics.org/NationalReport/

Significance – Medium:
While recreation capacity does not vary across the array of options currently evaluated in detail, recreational use could be adversely affected by some of the other options considered in the screening phase.
Recommendations for Resolution:
To resolve these concerns, the report would need to be expanded to: ▪ *Include information from Appendix B, Attachment 2, and any additional information that addresses recreation opportunity and recreation value.* ▪ *Explain why user-value days for surrounding Florida beaches are lower than estimates typically produced in the travel cost model literature.*

Final Panel Comment 14:
The accuracy of the sea level rise calculations is outdated and the current policy (EC-1165-211) should be used.
Basis for Comment:
Current USACE policy for plan formulation (EC-1165-2-211) issued in July 2009 requires that planning studies and engineering designs consider alternatives that are developed and assessed for the entire range of possible future rates of sea level change. Due to uncertainties in predicting sea level rise, a range of predicted rates are to be evaluated on the final array of alternatives. The ranges of resulting benefits for the different rates are to be considered in the selection of the recommended plan. In order to identify and justify the project benefits, it is critical to detail both how sea level change affects the coastal system and how to protect the environment and sustain the storm damage reduction benefits. Further, quantification of the range of benefits enables development of adaptive management strategies to incorporate into future renourishment events to account for changes in sea level over time.
Significance – Medium:
Incorporating this guidance will result in more accurate risk-informed alternatives that minimize adverse consequence while maximizing benefits.
Recommendations for Resolution:
To resolve these concerns, the report would need to be expanded to include: ▪ *An application of the new guidance to predict project benefits for the range of possible future rates of sea level change specified in EC-1165-2-211.* ▪ *An assessment of whether the outcome, that is, the selection of the recommended plan, would change based on the range of benefits that could be experienced.* ▪ *An improvement of report sections to describe that the plan formulation and alternatives analysis assessed the range of possible future rates of sea level change.*

Final Panel Comment 15:

Further justification is required for using articulated concrete mats, since their performance in similar environments is not known, and the placement of the mats above the depth of closure (17-20 ft) may subject the low profile units to burial.

Basis for Comment:

The use of articulated mats in this environment should be considered experimental and requires further discussion, design, and possibly a test section constructed with monitoring. Monitoring would include surveys of the test installation to determine if it has settled or has been covered by sand moving from the beach or dunes. The test installation would also need to be monitored for structural failure and displacement of the units.

The mat design needs to be evaluated structurally to determine the diameter and materials to be used in the cables that connect the units and the durability of the unreinforced concrete units. Providing two layers at the edges to address scour and differential settlement may make sense, but again is experimental and should be tested in some way. The design considerations for the articulated mats are repeated in many locations in the document. Sections of Appendices A and F are relevant and should be referenced on pg. 139 and 140 of the GRR/SEIS.

It is also probable that the equilibration of the profile has been underestimated and more fill will move offshore than has been estimated out to the depth closure (17-20 feet), which would potentially cover the low profile units (i.e., articulated mats) with sand.

Significance – Medium:

This is a mitigation requirement and does not affect the project performance directly, however, if the mats are buried the amount of mitigation expected would not be provided.

Recommendations for Resolution:

To resolve these concerns, the report would need to be expanded to include:

- *Further structural analysis of cables and unreinforced units.*
- *A discussion of other installations in similar environments.*
- *A discussion of a test section constructed and monitored in Brevard County offshore area.*

Final Panel Comment 16:

More clarification on the description of cost estimation is necessary, including defining terminology such as Average Annual Equivalent (AAEQ).

Basis for Comment:

While accounting costs (i.e., expected project expenditures) are appropriate for budgeting and planning, reasonable measures of true economic cost are required for benefit-cost analysis. Economic costs must reflect the opportunity cost of all inputs utilized in the project and the economic value of any external impacts. For explicit costs (e.g., payments for labor, fuel, etc.) market prices provide a reasonable measure of opportunity cost, but for implicit costs (e.g., payments for use of capital equipment) opportunity cost can be more difficult to measure. The economic value of external impacts requires the use of non-market valuation. The current discussion and presentation of cost estimation is unclear (GRR/SEIS, pg. 139; Appendix A). It is difficult to tell whether all explicit, implicit, and external costs of the project have been accounted for in each phase (i.e., planning, dredging, transport, placement, monitoring, etc.).

The GRR/SEIS should provide details on what resources are utilized in each phase of the project. Resources used as inputs into the project should be clearly identified, and methods used to estimate the quantity and cost per unit should be explained. For explicit costs this should be straightforward; for implicit costs it can be more complicated. For example, the GRR/SEIS mentions 'interest during construction' as a method of accounting for opportunity costs of capital (OCC) (GRR/SEIS, pg. 152), but the GRR/SEIS should explain how the interest payment is calculated (i.e., what is the principal?)

Non-market impacts should be included as costs. Loss of hardbottom habitat is an external project cost. If the economics literature includes estimates of non-market value for this type of resource, benefit transfer can be used to account for it. Alternatively, new estimates can be made if resources are available to support such an endeavor. While mitigation attenuates the cost of lost hardbottom habitat, it does not completely compensate. Moreover, accounting for the economic cost of lost habitat would allow for an assessment of the efficient level of mitigation, specifically addressing the question of whether expensive mitigation measures are economically justified in light of the economic value of existing hardbottom. Other non-market costs include loss of beach recreation during construction (120 – 180 days for initial phase; 45 - 60 days for periodic renourishment).

Terminology needs to be defined and explained. Apparent conventions of USACE analysis need to be defined and explained, including 'Average Annual Equivalence Units', 'unit costs' (units are unclear) (GRR/SEIS, pg. 97), and 'total first cost' (GRR/SEIS pg. 110). Many costs are listed in percentage terms, but it is unclear what the basis is.

Significance – Medium:

Clarification and explanation of cost estimation will enhance understanding and lend credibility to the analysis, but may have only a minor influence on cost estimates.

Recommendations for Resolution:
To resolve these concerns, the report would need to be expanded to include: ▪ *Brief details on resource use (inputs) for each phase of the project, an estimate of the quantity, and the unit cost (whether explicit or implicit).* ▪ *An accounting of non-market costs and their estimated value (if possible, or if not, a brief explanation of why not).* ▪ *Clarification of terminology and methods.*

Final Panel Comment 17:
More details on the 2008 profile data and template designs should be included to enable verification of quantities as part of justifying the engineering design.
Basis for Comment:
The USACE Planning Guidance Notebook (ER1105-2-100) includes the requirement to provide engineering design data used in the plan formulation and plan selection processes. There is sufficient documentation to support the design of the construction profile; however, there is insufficient documentation to verify the fill volumes (Sections 5.4.1.3, 5.5 [Table 5-12], 5.6, 6.3 [Fig 6-1 and Fig 6-2], and Appendix A). Further, it is unclear if background erosion was included in the fill volumes. That is, since the basis of the volume estimates was the 2008 survey profiles, approximately two years of background erosion as determined by the sediment budget should be included in the construction volume to account for two years of background erosion until construction commences, which is projected to be in 2010.
Significance – Medium:
If background erosion was not incorporated in the beach nourishment alternatives, then the volumes and costs are underestimated and the cost to benefit ratios are overestimated for the beach nourishment alternatives.
Recommendations for Resolution:
To resolve these concerns, the report would need to be expanded to include: ▪ *Several representative 2008 profiles/design templates for each Reach.* ▪ *Two years of background erosion, as determined by the sediment budget, should be included in the construction quantities to account for the projected losses from the date of the design survey to the projected date of construction to be able to construct the desired fill template.*

Final Panel Comment 18:

The report includes errors regarding species identification and scientific names which brings into question the credibility of species listings.

Basis for Comment:

Scientific credibility of the report may be questioned when species identifications are inaccurate and spelling of species names incorrect. Spelling is relatively easy to verify. When an unusual species is reported for a given area, the identification should be checked, and a confirmatory statement included in the text.

In the section describing dune vegetation (GRR/SEIS, pg. 22), several spelling errors and a possible identification error occur. For example, American beach grass (*Ammophila breviligulata*) is listed only as far south as South Carolina in the USDA Plants Database (http://plants.usda.gov/about_plants.html) and is not listed in the Atlas of Florida Vascular Plants (http://www.florida.plantatlas.usf.edu/). Perhaps it has been confused with *Panicum amarum* (bitter panicgrass), which is another large beach grass known in Brevard County. In any case, the species name is misspelled.

The genus of morning glory is also misspelled (should be *Ipomoea*). The species *purpurea* (with a purple flower, and called tall morning glory) is listed in the Atlas of Florida Vascular Plants, but not *purpurescens*. The panel suspects that other morning glories, especially the beach morning glory (*I. imperati*; which has a white flower) might be found in Mid-Reach. The correct spelling of the sea purslane mentioned is *Sesuvium portulacastrum*.

The list of dune plant species does not seem very complete. Several other species may be present now in the Mid-Reach, or may have been lost due to dune erosion. If the list of likely species is much longer than the list of documented species then the need for dune restoration could be greater than assumed.

Significance – Low:

The corrections to species identifications and names will improve the technical quality of the report.

Recommendations for Resolution:

To resolve these concerns, the report would need to be expanded to include:

- *A confirmatory statement if the identification of American beach grass in Brevard County is correct.*
- *Accurate spelling of all scientific names of animals and plants.*
- *A more complete list of plant species now found in Mid-Reach.*
- *A complete list of plant species likely to be found on fully developed dunes and dune swales in Brevard County, Florida.*

Final Panel Comment 19:
The specific Environmental Operating Principles (EOPs) that are referenced need to be identified and described in greater detail.
Basis for Comment:
The USACE Environmental Operating Principles (EOPs) are mentioned as providing guidance in plan formulation, but are not identified or described. Thus, the extent to which EOP played a role in the analysis cannot be evaluated (GRR/SEIS, pgs. 125-6). The GRR/SEIS should describe how plans were compared and selected based on EOPs. It should be clear whether the EOPs apply to protecting affected habitat, preserving threatened and endangered species, cooperation with other agencies, or some other principles. It is not clear if the EOPs address consideration of habitat protection, mitigation, and restoration as part of the plan formulation process, or how potential impacts to the sandy shore ecosystem were evaluated vis-à-vis impacts to hardbottom habitat. Also, it is not clear if the EOPs address consideration of endangered and threatened species.
Significance – Low:
The EOPs are important for management and consistency, and should be included to improve the technical quality of the GRR/SEIS
Recommendations for Resolution:
To resolve these concerns, the report would need to be expanded to include: ▪ *The EOPs and a discussion of how they influence plan formulation.*

Final Panel Comment 20:

The use of a discount rate and two-year duration to maximum habitat equivalency is not adequately justified and may affect the Habitat Equivalency Analysis (HEA) process.

Basis for Comment:

Two methods were used to determine the hardbottom mitigation area required: Habitat Equivalency Analysis (HEA, given in Appendix K, Subappendix SEIS-H) and the Uniform Mitigation Assessment Method (UMAM, given in Appendix K, Subappendix SEIS-G). Documentation of the UMAM process was far more transparent and complete.

On p. 3 of Subappendix SEIS-H for the HEA is the statement: "The present value of lost services in each year, through perpetuity, is the associated current value discounted through future years at 3.0% per year." The appropriateness of using a discount rate concept for habitat equivalency was not explained or justified in the documentation. The selection of 3.0% per year as the discount rate through perpetuity was not justified except to say that it is historically used and that 6.5% has sometimes been used. Reasons for a given choice were not provided. Moreover, two years were assumed to be needed for the mitigation reef to reach its maximum habitat equivalency, which was assumed to be 75% of the natural rock habitat value. The 75% value was discussed somewhat and seemed equivalent to that used in the UMAM, but the two year time frame was not justified and most importantly is incongruent with the time lag used by the UMAM. In the UMAM, a one year time lag was justified somewhat on page 30 of Subappendix SEIS-G: "Time lag was estimated at 1 year (T=1.0) based on field observations conducted in Indian River County at the mitigation reef approximately 50 km (30 miles) south of the Mid Reach, other Florida artificial reef assessments, monitoring, and literature."

A sensitivity analysis was done for discount rate and for maximum habitat equivalency percentage used in the HEA. No sensitivity was reported for use of different time lags.

A one-year lag will significantly reduce the HEA estimate of mitigation needed. This perhaps points to a flaw in one of the analyses or the other. When both analyses require the same input data, the same number should be used. On the other hand, since the discount rate concept is not used in the UMAM, it would be informative to overtly manipulate it in the HEA to obtain equivalent results. This could be followed by a discussion of the meaning of such a discount rate and a comparative assessment of the HEA procedure with the UMAM.

Significance – Low:

The use of both UMAM and HEA is informative, but the similarity of results given incongruent rationale and the lack of justification of some aspects of the HEA brings the process into question.

Recommendations for Resolution:
To resolve these concerns, the report would need to be expanded to include: ▪ *Justification of the use of a discount rate in HEA assessment.* ▪ *Justification of the 3.0% discount rate, and a two year lag time in the HEA.* ▪ *Use of a one-year time lag in both the HEA and UMAM, or overt justification of the use of different time lags.* ▪ *Inclusion of a sensitivity analysis of the time lag time in the HEA.* ▪ *Evaluation of the HEA against the UMAM when both use the same data and the discount rate is overtly adjusted so the HEA results agree with the UMAM.*

Final Panel Comment 21:
The GRR/SEIS needs to clarify that as the shoreline migrates landward the hardbottom will attenuate a greater percentage of the wave energy.
Basis for Comment:
The elevation of the nearshore hardbottom is fixed; therefore, it is unclear whether the wave attenuation provided by the rocky substrate would change as beach erosion continues. Since the hardbottom is generally not contiguous and relatively narrow in the cross-shore direction, the wave attenuation associated with this feature is anticipated to be relatively minor. Any changes in nearshore wave climate associated with landward migration of the shoreline likewise will be minor or perhaps negligible.
Significance – Low:
It is important to provide appropriate justification for anticipated future changes to the wave climate at the shoreline that could influence project performance even though it will not affect the outcome of plan selection.
Recommendations for Resolution:
To resolve these concerns, the report would need to be expanded to include: ▪ *Either a simple quantitative assessment illustrating how the future hardbottom conditions relative to shoreline position would affect the nearshore wave climate in a manner that justifies the GRR/SEIS statement or perhaps removal of this statement from the document (p. 72).*

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Appendix B

Charge to the Independent External Peer Review Panel

of the

Brevard County, Florida Mid-Reach Shoreline Protection Project Draft General Re-evaluation Report (GRR) and Supplemental Environmental Impact Statement (SEIS)

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Final Charge Guidance and Questions to the Peer Reviewers
for the
Independent External Peer Review of the Brevard County, Florida
Mid-Reach Shoreline Protection Project

BACKGROUND

A general re-evaluation report for Brevard County, Florida was authorized by the Water Resources Development Act of 2000. The Brevard County General Re-evaluation Report (GRR) will present the results of a coastal storm damage reduction study for the 7.8 mile Mid-Reach Segment of Brevard County, Florida. In the Feasibility Report with Final Environmental Impact Statement (EIS) for Brevard County (1996), the Mid-Reach was removed from the recommended plan due to environmental concerns. This GRR will determine if all or a portion of the Mid-Reach is acceptable for addition into the Brevard County Shore Protection Project. The Mid-Reach Segment is evaluated as a stand-alone project in this report, although some reduced costs may be realized by combining construction activities with the other portion of the Brevard County Shore Protection Project. The GRR will determine if the project is technically sound, environmentally acceptable, and economically justified.

The Mid-Reach is located on the east coast of Florida just south of Cape Canaveral. The Mid-Reach consists of approximately 7.8 miles of the Brevard County shoreline, from the south end of Patrick Air Force Base to just north of the city of Indialantic (from Department of Environmental Protection (DEP) monument R75.4 to R118.3). This length is recommended rather than the 7.6 miles in the study authorization in order to complete the entire length between Patrick Air Force Base and the constructed Brevard County South Reach Shore Protection Project. The municipalities of Satellite Beach, Indian Harbor Beach, and Melbourne are located within the project area in addition to portions of unincorporated Brevard County. The goal of the project is to reduce potential storm damages for coastal structures along the Mid-Reach by expanding the beach berm and stabilizing the dune or bluff feature.

OBJECTIVES

The objectives of this work are to: conduct an IEPR of the Brevard County, FL Draft Integrated GRR (Draft GRR) and Supplemental EIS (SEIS) in accordance with the Department of the Army, U.S. Army Corps of Engineers, *Peer Review of Decision Documents* (EC 1105-2-408) and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (16 December 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, the validity of the research design, the quality of data collection procedures, the robustness of the methods employed, the appropriateness of the methods for the hypotheses being tested, the extent to which the conclusions follow from the analysis, and the strengths and limitations of the overall product.

This IEPR will analyze the adequacy and acceptability of economic, engineering, and environmental methods, as well as the models, data and analyses employed. The independent review will be limited to technical review and will not be involved in policy review. The peer review will be conducted by subject matter experts with extensive experience in engineering, economics, plan formulation, and environmental issues associated with coastal flood risk management. The subject matter experts will be "charged" with responding to specific technical questions as well as providing a broad technical (engineering, economic, planning, and biological) evaluation of the overall project.

The subject matter experts (i.e., peer review panel members) will identify, recommend, and comment upon assumptions that underlie the analyses and evaluate the soundness of models and planning methods. The panel members will evaluate whether the interpretations of analyses and conclusions are technically sound and reasonable, provide effective review in terms of both usefulness of results and of credibility, and have the flexibility to bring important issues to the attention of decision makers. The panel members may offer opinions as to whether there are sufficient technical analyses upon which to base the ability to implement the project. The panel members will address factual inputs, data, the use of geotechnical, hydrologic, and hydraulic models, analyses, assumptions, and other scientific and engineering tools/methodologies to inform decision-making.

DOCUMENTS PROVIDED

The following is a list of documents and reference materials that will be provided for the review. **The documents and files presented in bold font are those which are to be reviewed.** All other documents are provided for reference.

- **Draft General Re-evaluation Report and Supplemental EIS for the Mid-Reach Segment of the Brevard County, FL Hurricane and Storm Damage Reduction Project (March 2009)**
- **Draft Appendices to the Draft General Re-evaluation Report and Supplemental EIS for the Mid-Reach Segment of the Brevard County, FL Hurricane and Storm Damage Reduction Project (March 2009)**
- USACE guidance, *Peer Review of Decision Documents* (EC 1105-2-410), dated August 22, 2008
- CECW-CP Memorandum, dated March 31, 2007
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review*, released December 16, 2004

SCHEDULE

IEPR Task	Activity	Projected Date
4	Kick-off Meeting	October 6, 2009
5	Review documents and charge sent to panel members	October 2, 2009
	Panel members complete their review and provide comments to Battelle	November 3, 2009
	Battelle provides merged individual comments and talking points for panel review teleconference	November 10, 2009
	Convene panel review teleconference	November 13, 2009
	Battelle provides final panel comment directive to panel	November 16, 2009
	Panel provides final panel comments to Battelle	November 23, 2009
	Battelle provides feedback to peer reviewers on final panel comments/panel provides revised final panel comments per Battelle feedback	November 25, 2009
6	Battelle distributes Final IEPR Report to panel for review	December 3, 2009
	Panel provides comments on Final IEPR Report	December 7, 2009
	Battelle submits Final IEPR Report to USACE	December 9, 2009
7	Battelle inputs final panel comments to DrChecks	December 11, 2009
	USACE PDT provides draft Evaluator responses/clarifying questions to Battelle	December 22, 2009
	Battelle provides Draft Evaluator Responses and clarifying questions to panel via e-mail (Word document)	December 23, 2009
	Peer reviewers provide Battelle with draft BackCheck responses; Battelle and panel teleconference to discuss	January 5, 2010
	Teleconference with Battelle, panel, and USACE to discuss final panel comments, draft responses, & USACE clarifying questions	January 8, 2010
	USACE inputs Final Evaluator responses in DrChecks (Battelle distributes Final Evaluator responses to panel)	January 29, 2010
	IEPR Panel sends Battelle their BackCheck responses	February 10, 2010
	Battelle inputs BackCheck responses in DrChecks; DrChecks closeout	February 19, 2010;
	Battelle submits pdf of DrChecks project file to USACE	February 22, 2010
	Project Closeout	March 31, 2010

CHARGE FOR PEER REVIEW

Members of this peer review panel are asked to determine whether the technical approach and scientific rationale presented in the Brevard County, FL Draft GRR and SEIS are credible and whether the conclusions are valid. The reviewers are 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 reviewers are not being asked whether they would have conducted the work in a similar manner.

Specific questions for the panel members, by report section, Annex, 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 Brevard County, FL Draft GRR and SEIS. Please focus on your areas 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 1 and 2 below per USACE guidance (EC 1105-2-410; Appendix D).

1. Assess the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analysis used.
2. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation for construction, authorization, or funding.
3. Identify, explain, and comment on assumptions that underlie economic, engineering, ecological, hydrological, plan formulation, or environmental analyses.
4. Evaluate whether the interpretations of analysis and conclusions are reasonable.
5. Please focus the review on scientific information, including factual inputs, data, the use and soundness of models, analyses, assumptions, and other scientific and engineering matters that inform decision makers.
6. 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.
7. If desired, panel members can contact one other. 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.

8. Please contact the Battelle Deputy Project Manager (Ken Cowen, cowenk@battelle.org) or Project Manager (Karen Johnson-Young, johnson-youngk@battelle.org) for requests or additional information.
9. In case of media contact, notify the Battelle Project Manager immediately.
10. 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 written comments in electronic form to Ken Cowen, cowenk@battelle.org, no later than November 3, 2009, 10 pm EDT.

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Brevard County, Florida Mid-Reach Shoreline Protection Project
Independent External Peer Review
Final Charge Questions

GENERAL QUESTIONS

1. Please comment on the extent to which it has been shown that the project is technically sound, environmentally acceptable and economically justified.

2. Are the assumptions that underlie the economic, engineering and environmental analyses sound?

3. Comment on the adequacy and acceptability of the economic, engineering, and environmental methods, models and analyses used.

4. In general terms, are the planning methods sound?

5. Are the interpretations of analysis and conclusions based on the analysis reasonable?

SECTION 1.0 – STUDY INFORMATION

1.1 Introduction

6. In your opinion, have all of the necessary critical issues been taken into account in the GRR?

1.2 Study Authority

No questions.

1.3 Purpose and Scope

No questions.

1.4 Location of the Study Area

No questions.

1.5 History of the Investigation

No questions.

1.6 Prior Reports and Existing Projects

7. Have the authors captured all critically important prior studies performed relative to the study area?

1.7 Planning Process and Report Organization

8. Does the integrated GRR/SEIS fulfill the requirements of both a GRR and SEIS? If not, what is missing?

SECTION 2.0 – EXISTING CONDITIONS

2.1 General

No questions.

2.2 Physical Conditions

No questions.

2.3 Environmental and Historic Resources

9. Comment on the thoroughness and accuracy of the general environmental setting described for the project study area.

10. Please comment on the vegetative resources presented under existing conditions.

11. Have the plant species occurring in the study area been comprehensively and correctly identified?

12. Are the plant species described sufficiently to accurately characterize site-specific existing conditions?

13. Comment on the threatened and endangered species presented under existing conditions.

14. Have the threatened and endangered species occurring in the study area been comprehensively and correctly identified?

15. Are the threatened and endangered species identified described sufficiently to accurately characterize site-specific existing conditions?

16. Is the usage, meaning, distribution and interrelationship of the terms ‘nearshore rock outcrop,’ ‘hardbottom,’ ‘hardground,’ ‘coquina’ and ‘Sabellarild worm rock,’ readily apparent?

17. Is the environmental relevance and significance of these lithologies clearly explained?

18. In your opinion, is it appropriate to use the June 2004 estimate of 31.3 acres of nearshore hardbottom as a baseline for assessing impacts (noting that 51.4 acres were exposed in January 2001)?

19. Please comment on the extent to which seasonality and other factors might result in fluctuating proportionality of rock exposure/burial in high energy inter-tidal and sub-tidal zones.

20. In your opinion, if the extent of hard bottom near the time of construction is different from the baseline assumption of June 2004 that was used, would the results of the impact analysis vary?

21. Comment on the fish and wildlife resources presented under existing conditions.

22. Are the species discussed sufficiently descriptive to effectively characterize site-specific current conditions?

23. Does the description of fish and wildlife resources effectively capture spatial heterogeneity and its effects on ecological diversity?

24. Have species of birds that occur in the study area been comprehensively and correctly identified?

25. Does this section adequately characterize existing Essential Fish Habitat (EFH) for the purposes of the project? If not, what additional information should be included?

26. Based on your experience, will the project affect EFH in ways other than those described? If so, please describe how.

2.4 Economic Conditions

No questions.

SECTION 3.0 – FUTURE WITHOUT PROJECT CONDITIONS

3.1 General

No questions.

3.2 Physical Conditions

27. Comment on the accuracy of the calculations for determining sea level rise and the appropriateness of the assumptions associated with the sea level rise projections.

3.3 Property Owner Response

No questions.

3.4 Economic Analysis

28. Comment on the clarity and appropriateness of the approach used to calculate the future without project damages.

3.5 Environmental Resources

29. Based on your knowledge, are the stressors identified in the future without project condition reasonable and well justified?

30. Based on your knowledge, is the suggestion that hardbottom may slow long term shoreline recession rates reasonable?

SECTION 4.0 – PROBLEMS AND OPPORTUNITIES

4.1 Public Concerns

No questions.

4.2 Problems and Opportunities

31. Does the problem statement adequately describe the problem and the solution presented in the document?

4.3 Planning Objectives

32. Please comment on the comprehensiveness of the description of the state and local objectives. What, if anything, is missing?

4.4 Planning Constraints

No questions.

4.5 Related Environmental Documents

No questions.

4.6 Decisions to be Made

No questions.

4.7 Agency Goal or Objective

No questions.

4.8 Scoping and Environmental Issues

33. Please comment on the comprehensiveness of the list of environmental issues relevant to the proposed action.

34. Please comment on the impact measurement means listed.

35. Please comment on whether the list of 'issues eliminated from detailed analysis' is appropriate and comprehensive.

4.9 Permits, Licenses, and Entitlements

No questions.

SECTION 5.0 – FORMULATION AND EVALUATION OF ALTERNATIVE PLANS

5.1 Plan Formulation Rationale

No questions.

5.2 Management Measures

36. Please comment on whether all possible structural and non-structural management measures have been identified and evaluated. What, if anything, is missing?

37. Please comment on whether the criteria used to evaluate and screen the structural and non-structural management measures are appropriate. Was sufficient data available to eliminate some of the measures from further study?

5.3 Issues and Basis for Choice

38. Please comment on whether the management measure size variations listed in Table 5-2 are comprehensive.

39. Please comment on the screening methodology used to evaluate the 13 alternatives and 6 reaches.

5.4 Preliminary Array of Alternatives

40. Please comment on the accuracy and comprehensiveness of the discussion of hardbottom impacts.

41. Please comment on the cost and benefit evaluation methodology and assumptions.

42. Please comment on the discussion of available offshore material.

43. Please comment on the comprehensiveness of the construction cost estimates.

44. Are the calculations used to determine the amount of mitigation that would be necessary appropriate?

45. Please comment on whether the discussion of mitigation options is accurate, realistic, and comprehensive.

46. Please comment on the comprehensiveness, of the mitigation construction discussion.

47. Please comment on the accuracy and comprehensiveness of the mitigation cost estimates.

48. Please comment on the accuracy and comprehensiveness of the Average Annual Equivalent (AAEQ) costs and benefit calculations.

49. Please comment on the accuracy and comprehensiveness of the cost effectiveness analysis, including the benefit-cost ratios.

50. Please comment on the engineering concerns which led to the number of potential plans being decreased. Are these concerns realistic?

51. Please comment on the environmental concerns which led to the number of potential plans being decreased. Are these concerns realistic?

52. Please comment on the sensitivity of the plan selection to mitigation ratio.

5.5 Comparison of Final Array of Alternatives

53. Please comment on the accuracy and comprehensiveness of the fill volumes calculations (Table 5-12) used to describe the final array of alternatives.

54. Please comment on the accuracy and comprehensiveness of the calculation of construction costs (Table 5-13) used to describe the final array of alternatives.

55. Please comment on the accuracy and comprehensiveness of the calculation of net benefits (Table 5-14) used to describe the final array of alternatives.

56. Please comment on the accuracy and comprehensiveness of the calculation of level of erosion protection (Table 5-15) used to describe the final array of alternatives.

57. Please comment on the discussion of how the tradeoff analysis was conducted during the plan formulation process.

58. Please comment on the discussion of how the Environmental Operating Principles were considered during the plan formulation process.

59. Please comment on the accuracy and comprehensiveness of the direct and indirect impacts listed in Table 5-17.

60. Please comment on whether the impacts to environmental factors associated with the proposed action have been accurately and comprehensively described. What, if any, additional information should be included?

5.6 Plan Selection

No questions.

SECTION 6.0 – THE RECOMMENDED PLAN

6.1 Description of the Recommended Plan

61. Please comment on the extent to which the recommendations are consistent with and justified by the environmental impact analysis.

62. In your judgment, is the loss of 3.0 acres of nearshore rock out of 31.3 areas minimal and unavoidable?

6.2 Detailed Cost Estimates (MCACES)

No questions.

6.3 Design and Construction Considerations

63. Please comment on whether the potential impacts from the drainage outfalls located within the project area have been addressed.

64. Please comment on whether the potential anthropogenic causes of beach erosion such as existing (or proposed) seawalls has been given adequate consideration in the development of alternatives.

65. Do the model results support a "system" approach to the impact analysis and alternative design? If not, explain.

66. Please comment on whether the project setting and length, wave height, background erosion rate and sand characteristics have been adequately addressed in the project analysis for the development of the preferred alternative.

67. Has the feasibility of constructing the proposed measures within the various project reaches been adequately addressed?

68. Please comment on the construction methods and sequence outlined for the off-shore dredging, transportation and placement of the beach fill.

69. Please comment on the design and construction methods outlined for the articulated reef mat to be used as a reef structure mitigation measure.

70. Is there sufficient documentation to support the Construction Profile and the Initial Equilibrium Profile shown for the dune fill cross sections and the schematic typical beach fill sections?

71. Please comment on whether there is sufficient analysis to support a maximum longevity of the use of fill material presented in the "Quality Assurance for Beach Fill Sediment and Dredging Activities".

6.4 LERRD Considerations

No questions.

6.5 Operations and Maintenance Considerations

72. Does the project monitoring plan address the objectives listed in Section 6.5.2? If not, what if anything, is missing?

6.6 Summary of Accounts

No questions.

6.7 Risk and Uncertainty

73. Comment on the comprehensiveness of the risk and uncertainty analysis.

6.8 Implementation Requirements

No questions.

SECTION 7.0 – ENVIRONMENTAL CONSEQUENCES

7.1 Environmental Evaluation Methodology

74. Please comment on the accuracy and comprehensiveness of the methodology used to evaluate environmental consequences of the project.

75. Please comment on the adequacy of the data collected and/or analyzed for assessing environmental consequences. What, if anything, was missing?

76. Please comment on the use of the Uniform Mitigation Assessment Method (UMAM) and the Habitat Equivalency Analysis (HEA) during this project.

77. Please comment on the extent to which the impacts to coquina rock outcroppings have been avoided, and if not avoided, minimized?

78. Transects performed in 2001 through 2008, indicate that there is significant, natural dynamic fluctuation in the amounts and locations of exposed nearshore hardbottom along the project area. In your opinion, to what extent might the preliminary finding from these transects affect the impact assessment outcome?

7.2 Effects on Significant Resources

79. Comment on the description of anticipated effects of the project on significant resources.

80. Comment on the statement that the placement of beach fill material will not have adverse effects on water quality.

81. In your opinion, is the prediction that fill placement will initially impact about 3.0 acres of nearshore rock and that the rock will become increasing exposed over time ultimately reducing to 1.6 or 1.8 acres depending on the plan that is implemented reasonable?

82. Are the size, characteristics and placement of mitigation reefs appropriate to provide compensatory mitigation for environmental impacts to the nearshore rock resources?

83. Comment on the accuracy and comprehensiveness of the discussion on predicted effects of the NED Plan and LPP beach fill placement activities, and the No-Action Alternative on the significant resources identified the Mid-Reach Project study area.

84. Comment on the accuracy and comprehensiveness of the discussion on general impacts of the NED Plan and LPP beach fill placement activities, and the No-Action Alternative and on impacts to specific habitats and fauna.

85. Comment on the effects of the proposed project plans (NED Plan and LPP) on fish.

86. Comment on how the proposed project plans (NED Plan and LPP) affect birds.

87. Comment on the extent to which the socio-economic impacts are adequately described and justified.

88. Are you in agreement with the statement that the project area does not include lands within CBRS or within OPA units?

89. Please comment on whether the water quality impacts associated with each alternative have been accurately and comprehensively described. What, if any, additional information should be included?

90. Please comment on whether the public safety impacts associated with each alternative have been accurately and comprehensively described. What, if any, additional information should be included?

91. Please comment on whether the cumulative impacts to environmental factors associated with the proposed action, and previous and future actions, have been accurately and comprehensively described. What, if any, additional information should be included? Also see Appendix J.

SECTION 8.0 – PUBLIC INVOLVEMENT, REVIEW, AND CONSULTATION

8.1 Public Involvement Program

92. 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? If not, what additional public outreach and coordination activities should be conducted?

8.2 Institutional Involvement

No questions.

8.3 Additional Required Coordination

No questions.

8.4 Scoping and Draft SEIS

No questions.

8.5 Agency and Public Coordination

No questions.

8.6 List of Statement Recipients

No questions.

8.7 Comments Received and Response

No questions.

8.8 Circulation of Final SEIS

No questions.

SECTION 9.0 RECOMMENDATIONS

9.1 Draft Items of Local Cooperation

No questions.

9.2 Disclaimer

No questions.

9.3 Certification of Public Accessibility

No questions.

APPENDIX A – ENGINEERING DESIGN AND COST ESTIMATES

93. Comment on the clarity and appropriateness of the approach used to estimate project sand and rock volumes.

94. Comment on the adequacy of the proposed mitigation.

95. Please comment whether the proposed borrow material is well-suited for beach fill material from an engineering, economic and environmental standpoint?

96. Is the volume of available borrow material a factor in future nourishment activities?

97. Has the role of background erosion been adequately considered in the model analysis?

98. Is the projected timeframe needed to replenish the borrow material reasonable?

99. Based on past storm events (wave height and volume losses), please comment on the results from the SBEACH Model and the ability of the model to predict project success.

100. Please comment if the nearshore reef engineering challenges have been adequately assessed.

101. Comment on the appropriateness and sufficiency of the assumptions included in the MACES analysis.

102. Comment on the extent to which the identified costs are reasonable and the cost data are credible.

103. Comment on the extent to which the risk elements have been sufficiently identified and characterized.

104. Comment on the extent to which the total project cost summary is consistent with and supported by the cost and risk analysis.

105. Comment on the adequacy and appropriateness of the overall cost estimation approach.

APPENDIX B – ECONOMIC ANALYSIS AND BENEFIT ANALYSIS

106. Comment on the assumptions, data, and the adequacy and appropriateness of the approach used to determine the structure and content value at risk of storm damage.

107. Comment on the assumptions, data, and the adequacy and appropriateness of the approach used to the estimate the storm damage reduction benefits of the project.

108. Comment on whether all significant opportunity costs/benefits of the project have been identified and valued.

APPENDIX C – REAL ESTATE

109. Comment on the extent to which the real estate analysis adequately addresses economic and financial value.

APPENDIX D – PUBLIC USE DETERMINATION AND COST ALLOCATION

No questions.

APPENDIX E – GEOTECHNICAL REPORT

110. To what extent has the net impact of regional sea level and isostatic change been described with respect to submergence of the nearshore rock outcrops long term?

111. Are the nature and distribution of the locally critical geologic units described?

112. Please comment on the degree to which the characterization of occurrence and distribution of nearshore rock outcrops might affect the project.

113. To what extent is the stated project goal consistent with the objectives listed in the GRR?

114. Is the rationale used for identifying the most promising borrow areas clearly explained?

115. Has sufficient sampling and analysis has been performed to appropriately characterize the candidate borrow area materials? If not, what additional data are needed to characterize the borrow area materials?

116. Do you agree with the calculation of quantities of sand available? If not, explain.

117. Do you agree that the November 2005 USACE data are suitable for use in this project? What additional testing might be performed, if any?

118. Are the nature and distribution of native beach sediments sufficiently characterized given the intended purpose?

119. Do you agree with the interpretation of the data relative to transverse and alongshore uniformity?

120. Are the borrow materials suitable and compatible with the native beach deposits? If not, explain.

121. Do you agree that the borrow material could provide improved resistance to storm-induced erosion?

122. Is the overfill factor of 1.05 appropriate? If not, explain.

123. In your opinion have all of the critical factors been taken into account in evaluating and selecting the preferred borrow area? If not, what, if anything, is missing?

APPENDIX F – SECTION 404(B) EVALUATION

No questions.

APPENDIX G – COASTAL ZONE MANAGEMENT CONSISTENCY

No questions.

APPENDIX H – DRAFT COORDINATION ACT REPORT

No questions.

APPENDIX I – PERTINENT CORRESPONDENCE AND MAILING LIST

No questions.

APPENDIX J – CUMULATIVE EFFECTS ASSESSMENT

No questions.

APPENDIX K – ENVIRONMENTAL DOCUMENTATION

No questions.