



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, D.C. 20314-1000

North Atlantic Division -
Regional Integration Team

JAN 23 2015

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS) 108
ARMY PENTAGON, WASHINGTON, DC 20310-0108.

SUBJECT: New Jersey Shore Protection, Hereford Inlet to Cape May Inlet, Hurricane
and Storm Damage Reduction Study, Cape May County, NJ - Final USACE Response
to Independent External Peer Review.

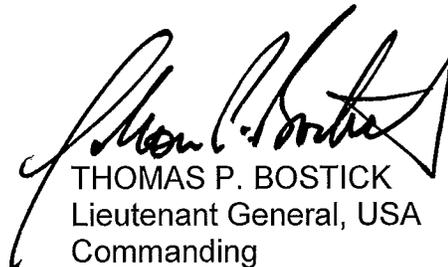
1. An Independent External Peer Review (IEPR) was conducted for the subject project in
accordance with Section 2034 of the Water Resources Development Act of 2007, EC
1165-2-214, and the Office of Management and Budget's Final Information Quality
Bulletin for Peer Review (2004).

2. The IEPR was conducted by Battelle Memorial Institute. The IEPR panel consisted of
five panel members with technical expertise in coastal engineering, economics, civil
works planning, geotechnical engineering and construction engineering.

3. The final written responses to the IEPR are hereby approved. The enclosed report
contains the final written responses of the Chief of Engineers to the issues raised and
the recommendations contained in the IEPR report. The IEPR report and the USACE
responses have been coordinated with the vertical team and are posted on the internet,
as required in EC 1165-2-214.

4. If you have any questions on this matter, please contact me or have a member of
your staff contact Catherine Shuman, Deputy Chief, North Atlantic Division Regional
Integration Team, at (202) 761-1379.

Encl



THOMAS P. BOSTICK
Lieutenant General, USA
Commanding

NEW JERSEY SHORE PROTECTION
HERFORD INLET TO CAPE MAY INLET, HURRICANE AND STORM
DAMAGE REDUCTION PROJECT
FINAL
FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT

US Army Corps of Engineers Response to
Independent External Peer Review
April 2014

An Independent External Peer Review (IEPR) was conducted for the subject project in accordance with Section 2034 of the Water Resources Development Act of 2007, EC 1165-214 and the Office of Management and Budget's Final Information Quality Bulletin for Peer Review (2004).

The goal of the U.S. Army Corps of Engineers (USACE) Civil Works program is to provide the most scientifically sound and sustainable water resource solutions for the nation. The USACE review processes are essential to ensuring project safety and quality of the products USACE provides to the American people. Battelle Memorial Institute (Battelle), a non-profit science and technology organization with experience in establishing and administering peer review panels for USACE, was engaged to conduct the IEPR of the Hereford Inlet to Cape May Inlet Hurricane and Storm Damage Reduction General Investigations study.

The Battelle panel reviewed the Draft Final Report and the Draft Environmental Analysis (EA), as well as supporting documentation. The Final IEPR Battelle Report was issued in February of 2014 and is included as Enclosure (1).

Fifteen comments were received from the IEPR team. Of the 15 comments, 4 were identified as having high significance, 1 was identified as having medium/high significance, 5 had medium significance, 3 had medium/low significance and 2 had low significance.

'High': Describes a fundamental problem with the project that could affect the recommendation or justification of the project.

'Medium': Affects the completeness or full understanding of the reports/project.

'Low': Affects the technical quality of the reports but will not affect the recommendation of the project."

The following report presents the USACE Final Response to the 15 comments.

1. IEPR Comment – *High Significance*: A complete understanding of the processes that drive erosion and accretion in the project area, specifically near Hereford Inlet, is not sufficiently demonstrated; therefore, the recommended plan may underestimate future renourishment quantities.

The comment had one recommendation, which was adopted as discussed below. The comment expresses concerns that more detail is needed on the erosion and accretion process in order to determine construction requirements.

USACE Response: Adopted

Action Taken: The IEPR Panel recommended the report include an additional description of how data analysis, numerical models, or prior experience provide reasonable certainty that erosion and accretion rates applied to develop the TSP adequately account for the influence of Hereford Inlet. In response, Section 2.6.10 of the report was revised and expanded upon to reflect the inlet processes that drive coastal change in the study area. Data analysis and prior experience indicates that the Hereford Inlet complex goes through long term erosion and accretion cycles in conjunction with Stone Harbor Point to its north, across the inlet. The processes at Hereford Inlet correlate well with inlet sediment by-passing processes described in the reviewed literature

2. IEPR Comment - *High Significance*: The magnitude of observed beach volume changes along the fill and borrow areas, including recent beach fill activities, are not explicitly stated for recent conditions and may impact the project's predicted performance and economic benefits.

This comment had two recommendations; one was adopted and the other was not adopted, as discussed below. The comment indicates that a more detailed description of recent conditions in the study area is needed.

USACE Response: Adopted

Action Taken: The IEPR Panel recommended that the relevant, recent (1998-2003) volumetric changes along the project shoreline's specific fill area be described. In response, a more detailed description of the relevant and recent (1998-2003) volumetric changes along the study area was added to the Feasibility Report and a table of recent beachfill activity was included in section 2.5.1.

USACE Response: Not Adopted

The IEPR Panel recommended that the project's predicted erosion and renourishment requirements relative to recently observed and deducted rates be justified. In response, it was indicated that the 1998-2003 time frame is not typical of how the study area shoreline has historically responded. The long-term history of shoreline data and the volumetric changes derived from the data was analyzed, and more weight was given to longer time periods when it came to describing what the prevailing existing conditions within the study area are, and also when it came time to comparing re-nourishment values against existing conditions.

3. IEPR Comment – *High Significance*: Project alternatives that include a groin or groin field with the sand backpassing plan may provide additional project benefits and performance, but such alternatives are not quantitatively assessed.

This comment had four recommendations; two were adopted and two were not adopted as described below: The comment indicated an analysis was needed to determine if additional structures could provide further benefits and improve performance.

USACE Response: Adopted

Action Taken: The IEPR Panel recommended that conceptual alternatives be developed to include a site-specific, functional groin or groin field between the beach fill area borrow area shorelines, in conjunction with sand backpassing and beach/dune construction, to retard the rate of sediment loss along the fill area and accretion along the borrow area. In response, Section 2.6 of the report was revised to include a Rough Order of Magnitude (ROM) planning estimate for a groin field. It indicates that although a groin field could reduce renourishment requirements, it would also cause negative consequences by limiting sediment transport and causing erosion to existing structures.

The IEPR Panel also recommended that conceptual alternatives be developed for a site-specific, functional groin at the north end of the beach fill, to retard the rate of sediment loss from the fill area into the inlet. In response to the comment, A ROM cost estimate was developed using parametric cost data from a previous beach fill job where groins were employed to retain sand in a highly erosive area. The structure was not carried forward due to a number of reasons: 1) The volume of losses into Hereford Inlet, as indicated by the sediment budget, are minimal when compared to the potential sediment gains from Hereford Inlet, 2) A similar project in the vicinity has indicated that the structure does not stabilize the shoreline as intended, 3) The structure would be cost prohibitive, and 4) It would interrupt the natural sand bypass system.

USACE Response: Not Adopted

The IEPR Panel recommended that a model be developed, calibrated and employed in order to evaluate the performance of the project with and without groins. The model development was not performed as performance could already be ascertained with known historical data, and also would be cost prohibitive.

The report was revised in section 4.6 to illustrate the analysis on the efficacy and costs implication of a groin. This is summarized below.

The Philadelphia District similarly performed a groin analysis as part of the Absecon Island Feasibility Study in 1996. The analysis examined whether the construction costs was offset by the savings due to reduction in re-nourishment. Four groins were analyzed for possible placement south of Atlantic City, NJ. The four groins were each extended several hundred feet seaward of Mean High Water (MHW). The beach widths there are smaller than the Wildwoods, but the overall coastal processes and setting is very similar. It was determined that 20,000 cy of sand was saved for a 6-yr re-nourishment interval. This savings varied and increased slightly as the re-nourishment interval got longer. Below a 5-yr cycle, there was no savings. The groins reduced re-nourishment from 540,000 cy to 520,000 cy every 6 yrs.

A Rough Order of Magnitude ROM cost estimate was developed using parametric cost data from a previous beach fill job where groins were employed to retain sand in a highly erosive area. This estimate was done using bid results from a previous beach fill and the design parameters from Engineering Manual 1110-2-1617.

Based on this estimate the range of potential costs for a stone groin field would be cost prohibitive.

4. IEPR Comment- *High Significance*: The model used to predict the renourishment quantity does not provide sufficient information to fully understand its development, application and impact on the project's performance.

This comment had three recommendations and the USACE adopted all three. The comment indicated that additional information was necessary to document the project model.

USACE Response: Adopted

Action Taken: The IEPR Panel indicated that additional information was needed on the background erosion rate, diffusion coefficients, overfill ratio and various other input parameters used in the model application. In response, the requested information was added to the report in section 5.1.2 to describe the details of the use of the model.

The IEPR Panel also indicated that a description was needed for the extent to which the model considered the proximity of the fill area to the adjacent downdrift borrow area and to the adjacent inlet. In response, as the Planform Evolution Model (PEM) is a grid based model, and to account for end losses and diffusion of the beachfill, the grid was extended to the south. It was assumed at the time the PEM analysis was done that the borrow area would have minimal impact on the fill area given the distance between the northern most outfall as shown on Plan Sheet 2 and end of the fill area as shown on Plan Sheet 1 (Magnolia Drive).

Lastly, the IEPR Panel recommended that the predictions of the model and renourishment requirements be correlated with observed beach loss rates and predicted sediment transport rates. In response to the comment, the beachfill remaining percentage was slightly lowered to 60% in order to account for the location of the beachfill in relation to Hereford Inlet, and the 60% was then applied to the initial quantity used in the model. An explanation of why the PEM did not consider the proximity of the borrow area and Hereford Inlet to the fill area and also an explanation of why renourishment rates appear significantly smaller than recent existing conditions was added to the report.

5. IEPR Comment –*Medium/High Significance*: The application of SEDTRAN instead of a more robust tool, such as GENESIS, to estimate longshore transport limits the ability to demonstrate an understanding of existing conditions and reliably predict project performance.

The comment had two recommendations and neither was adopted. The comment expressed concerns that the use of SEDTRAN instead of a more robust model limits the adequacy and reliability of the study.

USACE Response: Not Adopted

Action Taken: In response to the IEPR Panel comment regarding the development and application of a GENESIS model, the report was revised in Section 2.6.7 to explain why GENESIS was not used for this study. Given the limitations inherent to GENESIS, the selected plan would not have been changed its application. Based upon experience using GENESIS in the past for other investigations, the model will not zero-in on nourishment requirements any better than the methodology used for this study.

The IEPR Panel also recommended that a 2-D spectral wave model be developed and applied to further demonstrate understanding of inlet wave and sediment transport dynamics. In response, a 2-D wave model such as STWAVE was considered but determined to be unnecessary for a feasibility-level of effort. Reliance on observed shoreline data and experience of district personnel gained the last twenty years of conducting similar coastal storm-damage reduction projects would be sufficient to select a plan. This explanation of why STWAVE was not developed was added to the report.

6. IEPR Comment- *Medium Significance*: The SBEACH model results were not compared to observed erosion as a result of Hurricane Sandy; therefore, confidence in the model's application within the storm damage modeling and its estimated outputs is limited

This comment had two recommendations; one was adopted and the other was not adopted. The comment indicated that, due to a lack of comparison to observed data, the reliability of the model is limited.

USACE Response: Adopted

Action Taken: The IEPR Panel recommended the inclusion of supplemental information on model calibration in the report. In response, calibration plots from previous storms were added to the Feasibility report to show how the project model outputs compared to the post storm profiles.

USACE Response: Not Adopted

Action Taken: The IEPR Panel indicated that an SBEACH simulation for Hurricane Sandy should be conducted with comparisons to measured post-storm profiles in order to demonstrate the model's ability to reproduce storm erosion events. In response, the report was revised in Section 3.1.5 to include a table comparing the surveyed sand volume lost above MHW from the pre- and post Sandy surveyed profiles versus the predicted sand volume lost from a 20- and 50-year storm taken from the existing W/O project SBEACH analysis. The analysis showed that the SBEACH sand losses for the 20-50 year events reasonably predicted the measured sand losses from the pre and post storm surveys from Hurricane Sandy.

7. IEPR Comment- *Medium Significance*: The sediment grain size for the proposed beach fill construction may indicate that the beach fill template slope is too steep, thus increasing the risk that the project will not perform as intended or expected.

The comment had one recommendation, which was adopted. The comment indicated that the beach fill design may be improper for the sediment grain size.

USACE Response: Adopted

Action Taken: The IEPR Panel indicated that the sediment size for the beach fill may indicate that the beach fill template is too steep. In response, the slope was revised in the cross sections and design criteria to 1:30 for the final report.

8. IEPR Comment- *Medium Significance*: Factors contributing to risk are not described, and the uncertainty associated with the Hereford Inlet effects on the project performance is not fully developed or stated.

The comment had three recommendations and the USACE adopted all three. The comment expresses concerns about risk and uncertainty of study factors.

USACE Response: Adopted

Action Taken: The IEPR Panel recommended that the variables that contribute to uncertainty be described, and those with the greatest effect on uncertainty be identified. It also requested that the steps taken to reduce uncertainty be explained, and recommended a discussion of how seawall structure affects the risk that the project may not perform as expected. In response, the portions of the document that contain the Risk and Uncertainty (R&U) analysis in Section 5.5.1 were revised to rank the variables that have the highest to lowest impact on risk and uncertainty. These variables were compared against the most likely scenario for the selected plan to show which had the greatest impact on project outputs and then listed in the order of greatest impact to the least impact. The effects of the seawall structure on project risk is discussed in the R&U analysis in the high risk scenario in Figure 125 in the R&U analysis which was included in the Empirical Simulation Technique (EST) output in Table 90 of the main report. The frequency at which the bulkhead failed was modified to incorporate uncertainty into the analysis. These fluctuations caused the project outputs (Average Annual Damages-AAD) to increase as a result of increased water levels and storm damage at more frequent events, and less AAD when the bulkhead failed at less frequent events. Overall, the performance of the seawall structure had a large impact on project outputs when varied in the Risk and Uncertainty Analysis.

9. IEPR Comment- *Medium Significance*: The ratios used to establish content-to-structure values are low and could underestimate both future without-project condition damages and benefits attributable to the project.

This comment had two recommendations and the both were adopted. The comment indicates that the tools used to estimate damages and benefits would be inadequate.

USACE Response: Adopted

Action Taken: The IEPR Panel requested greater detail on the data used to establish Content to Structure Value Ratios (CSVRs), and also indicated that the report should contain an assessment and discussion of the reliability and applicability of the empirical data referenced in the

Economics appendix. In response, the data used to establish the CSVR was cited in the revised report in the Economic Appendix. The content-to-structure ratio is low when compared to some other flood damage reduction studies. However, previous site-specific interviews have determined the ratio used in the Hereford Inlet DFR to be suitable. The empirical data referenced in the Economics Appendix is considered applicable because it included a portion of the Hereford Inlet study area. The data are reliable because it is based on field observations in addition to interviews with local residents as a primary source.

10. IEPR Comment- *Medium Significance*: The economic analyses and calculations use various price levels and discount rates, which makes it difficult to compare values and confirm the validity of the analyses

This comment had three recommendations and the USACE adopted all three. The comment identified the need for consistency in price levels and discount rates in order to confirm validity.

USACE Response: Adopted

Action Taken: The IEPR Panel indicated the need to use the 3.75% discount rate throughout the report, the need to update all tables and discussion of costs and benefits use 2013 dollars, and the need to ensure that Unit Day Value (UDV) values used in the analysis represent those in Economic Guidance Memorandum 13—3 (USACE, 2013). In response, the economic analysis in the report used the prevailing price level and discount rate available during the study period. The benefits are stated in the same price level as the plan alternatives costs prepared by the cost engineer. The benefits for the tentatively selected plan have been updated for price level for comparison to the selected plan costs using the CWCCIS EM1110-2-1304 (Civil Works Construction Cost Index System). The FY2013 discount rate of 3.75% was also used for the selected plan. (*This was subsequently updated to FY 14 PL and a discount rate of 3.5% for the 12/20/14 report*) Any UDV values used in the analysis represent the Economic Guidance Memorandum 13-03 (USACE, 2013).

11. IEPR Comment-*Medium/Low Significance*: The granulometric data necessary to demonstrate the compatibility and overfill value of the proposed borrow area and native beach sediments are not presented, so the adequacy of the dredge and fill volume cannot be assessed.

This comment had two recommendations and both were adopted. The comment expressed concerns over the adequacy of construction volumes.

USACE Response: Adopted

Action Taken: The IEPR Panel recommended that the cumulative Grain Size Distribution curve (GSD) of the borrow area and fill area beach sediments be graphically presented, and that the computed composite distribution of the borrow area and fill area beach sediments be plotted and contrasted. In response, a plot illustrating the comparison between the native beach and borrow material was included for the report Geotechnical Appendix in Volume II. Cumulative GSD Plots were generated for the borrow areas and the native beach samples collected. Cumulative GSD plots, for the borrow area and the native beach sediments, were included in the report to

provide additional information in evaluating the compatibility and overfill values, for the borrow area and the beach material. A composite grain size analysis plot was also included to illustrate the compatibility of the materials.

12. IEPR Comment- *Medium/Low Significance*: The dangers to beach users associated with the potential effects of the beach face dredging operations are not presented.

This comment had two recommendations and both were adopted. The comment expressed concerns about identifying and communicating the dangers to beach users from the project.

USACE Response: Adopted

Action Taken: The IEPR Panel recommended that the report contain an acknowledgement that pitting, trenching, or over-steepening of the borrow area beach face after dredging may impact public safety, and also describe how that potential impact would be avoided. In response, the report was revised in section 5.1.3 to reflect the safety precautions to be taken at the construction site in order to eliminate/reduce impacts to public safety. The situation will be avoided during the construction phase with language in the specifications that the dredged profile should achieve particular slopes offshore and onshore and deep pits and trenches are to be smoothed to the design profile as indicated on the plans and cross sections in the report. Lastly, the report has been revised to acknowledge that pitting, trenching, or over-steepening of the borrow area beach face after dredging may impact public safety.

13. IEPR Comment- *Medium/Low Significance*: Although closure of Turtle Gut Inlet was cited as a major cause of sand accretion at Wildwood and Wildwood Crest beaches, the feasibility of reopening the Gut was not considered

This comment had three recommendations and all three were adopted. The comment identified the need to examine the feasibility of reopening Turtle Gut Inlet.

USACE Response: Adopted

Action Taken: The IEPR Panel recommended a discussion of methods to allow Turtle Gut Inlet to be reopened or relocated, a discussion of the potential costs of right-of-way acquisition and Gut reopening versus the cost of the selected plan, and environmental impacts of that action. In response, the report was revised in Section 4.4 of the Feasibility report to explain the reason for the omission of the reopening of Turtle Gut Inlet as a potential plan formulation measure. The costs of opening the inlet would likely exceed any benefit, and the opening of a tidal inlet could have negative implications to adjacent developed shorelines in Wildwood and Wildwood Crest and adjacent United States Fish and Wildlife Property in Lower Township.

14. IEPR Comment- *Low Significance*: Neither the potential for sea turtle nesting nor the presence/absence of critical habitat for protected species in the project area is addressed.

This comment had two recommendations and both were adopted. The comment identified the need to address sea turtle nesting and Critical Habitat in the project area.

USACE Response: Adopted

Action Taken: The IEPR Panel recommended the inclusion of a statement that sea turtles are not known to nest on area beaches and also that no Critical Habitat has been designated in the area by the U.S. Fish and Wildlife Service. In response, a statement was added to the document indicating that sea turtles do not nest on New Jersey beaches in Section 5.2.6, last paragraph and Section 5.3.6.2 of the Feasibility Report the Finding of No Significant Impact (FONSI) states that no critical habitat will be impacted by this project. The EA has determined that the hydraulic back-passing of sand from Wildwood and Wildwood Crest for beach nourishment and restoration activities in North Wildwood, Wildwood, Wildwood, Wildwood Crest and Lower Township would not likely jeopardize the continued existence of any species or the critical habitat of any fish, wildlife, or plant, which is designated as endangered or threatened pursuant to the Endangered Species Act of 1973, as amended by P.L. 96-159.

15. IEPR Comment- *Low Significance*: The recreation benefits analysis does not provide detail on how recreational users' willingness to pay for recreation opportunities was established.

The comment had two recommendations and both were adopted. The comment identifies the need to provide detail on willingness to pay for recreation opportunities.

USACE Response: Adopted

Action Taken: The IEPR Panel indicated that details should be provided on how the Contingent Value Study (CVS) used in the recreation analysis was conducted, and also indicated that the report should describe how the CVS is applicable to the project. In response, details about how the CVS study used in the recreation analysis was conducted were included in the report. The recreation benefit section (5.4.3.1) was revised to describe in more detail the applicability of the contingent value survey to the study area from Hereford Inlet to Cape May Inlet. The scope of the CVS was intended for use with the South Jersey shore feasibility studies. Additional details about the South Jersey beach contingent value survey methodology were included in the Economic Appendix. The survey was designed in accordance with the National Economic Development Procedures Manual – Recreation Volume II (A Guide for Using the Contingent Value Methodology in Recreation Studies).