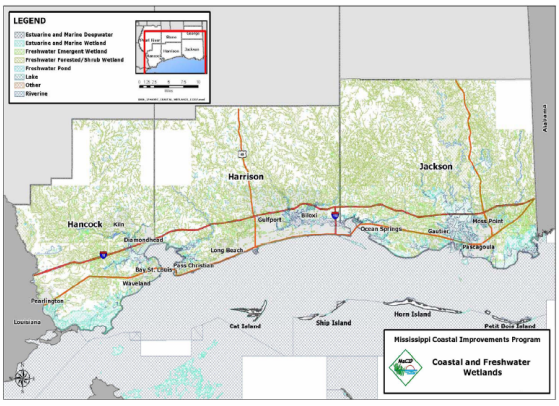
Final Independent External Peer Review Report for the Mississippi Coastal Improvements Program (MsCIP) Comprehensive Plan

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. DACW33-03-D-0004
Delivery Order No. DA02

November 7, 2008



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Mississippi Coastal Improvements Program (MsCIP) Comprehensive Plan

Prepared by

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Columbus, Ohio 43201

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EXECUTIVE SUMMARY

In the Third Emergency Supplemental to the Defense Appropriations Act, 2006, Congress directed the U.S. Army Corps of Engineers (USACE) to conduct an analysis and design for comprehensive improvements or modifications to existing improvements for the coastal Mississippi region. This analysis and design is required to address hurricane and storm damage reduction, prevention of saltwater intrusion, preservation of fish and wildlife, prevention of erosion, and other related water resource purposes. The Mississippi Coastal Improvements Program (MsCIP) Comprehensive Plan contains final recommendations on these topics from USACE. The report consists of an integrated main report/environmental impact statement (EIS) and supporting appendices that describe an integrated system of structural, nonstructural, and environmental measures.

Because of the importance of this project, USACE conducted an unbiased independent external peer review (IEPR) of the MsCIP Comprehensive Plan. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses. Battelle, as a 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 MsCIP Comprehensive Plan. The IEPR was conducted following guidance described in the Department of the Army, USACE, guidance *Peer Review of Decision Documents* (EC 1105-2-410) dated August 22, 2008, CECW-CP Memorandum dated March 30, 2007, and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* released December 16, 2004.

This final report describes the IEPR process, summarizes final comments of the IEPR panel, and describes the panel members and their selection. The results of this IEPR report will be taken into consideration in preparation of the final MsCIP Comprehensive Report.

Seven panel members (all from academe) were selected for the IEPR from nearly 20 identified candidates. Corresponding to the technical content of the MsCIP Comprehensive Plan, the areas of technical expertise of the 7 selected peer reviewers included: engineering (civil and geotechnical); geology/geomorphology; hydrology; hydraulics; coastal environmental science; water quality/resource management; floodplain management; meteorology/hurricanes; socio-economics; real estate; risk assessment; and modeling.

The peer reviewers were provided an electronic version of the MsCIP Comprehensive Plan documents, along with a charge that solicited their comments on specific sections of the documents that were to be reviewed. More than 400 individual comments were received from the IEPR panel in response to the charge questions. There was no communication between the IEPR panel and the authors of the MsCIP Comprehensive Plan during the peer review process.

Following the individual reviews of the MsCIP Comprehensive Plan documents by the IEPR panel members, a consensus discussion was conducted to review key technical comments, discuss charge questions for which there were conflicting responses, and reach consensus on the final comments to be provided to USACE. The final comments were documented according to a five-part format that included description of: (1) the nature of the comment, (2) the basis for the comment, (3) significance of the comment (high, medium, and low), (4) comment cross-referencing if related to other comments, and (5) recommendations on how to resolve the comment. Overall, 14 final IEPR comments were identified and documented. Of the final 14 comments, four were identified as having high significance (including one, comment 12, that was designated as "High/Medium"), eight were identified as having medium significance, and two comments were identified as having a low level of significance. Table ES-1 summarizes the final comments by level of significance. Detailed information on each comment is contained in Appendix A of this report.

Table ES-1. Overview of 14 Final Comments Identified by the MsCIP Comprehensive Plan IEPR Panel.

Significance – High	
1	More refined analysis is recommended in certain areas before design and build can be conducted.
2	The preliminary evaluations of the Hurricane Storm Damage Reduction, erosion control, and ecosystem restoration need more explanation. For example it is unclear if dynamic habitat models and geomorphic evolution are considered.
3	The redevelopment scenarios should include a range of possible outcomes for the economy.
4	Adaptive management processes should be a more integral part of the Comprehensive Plan and must include a strong monitoring and feedback mechanism.
Significance – Medium	
5	The extent of inclusion of recommendations from the public and agency engagement process into the plan, and whether major controversies regarding the program plan exist, is unclear.
6	There needs to be a more in-depth discussion of the municipal and industrial waste and the future impact to the treatment facilities.
7	Human adaptation, as it relates to economic activities, needs more detail.
8	The effects of relative sea level rise need to be explained more explicitly, taking into account local effects in addition to global effects and incorporating recent studies.
9	It is unclear how relative sea level rise (RSL) is incorporated.
10	All of the physics-based models used need a better explanation, including inputs, outputs and assumptions.
11	The decision factors involved in using the models selected needs to be described. In some cases, updated modeling tools should be used.
12	Need to explain the rationale for selecting the oyster as a surrogate for other species.
Significance – Low	
13	The stated goal of the project to reduce loss of life by 100% is unrealistic.
14	The process for weighting metrics is unclear.

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1. INTRODUCTION

1.1 Background of Report Reviewed

In the Third Emergency Supplemental to the Defense Appropriations Act, 2006, Congress directed the U.S. Army of Engineers (USACE) "to conduct an analysis and design for comprehensive improvements or modifications to existing improvements" for the coastal Mississippi region. This analysis and design is required to address "hurricane and storm damage reduction, prevention of saltwater intrusion, preservation of fish and wildlife, prevention of erosion, and other related water resource purposes…" In addition, USACE was directed to "recommend a cost-effective project, but … not perform an incremental benefit-cost analysis to identify the recommended project." In particular, project recommendations were not to be "based upon maximizing net national economic development benefits." Based on this directive from Congress, the Mississippi Coastal Improvements Program (MsCIP) was initiated in January 2006, and the MsCIP Comprehensive Plan was developed.

The MsCIP project involves a multi-discipline team including members from the USACE Mobile District, Savannah District, South Atlantic Division, Environmental Research and Development Center, USACE Nonstructural Floodproofing Committee, Headquarters (HQUSACE), and Planning Centers of Expertise. The team extends to multiple Mississippi agencies, particularly the Mississippi Department of Marine Resources and Department of Environmental Quality, multiple academic groups and nongovernmental organizations, and several Federal agencies including the National Oceanic and Atmospheric Administration, U.S. Environmental Protection Agency, National Marine Fisheries Service, Federal Emergency Management Agency, U.S. Fish and Wildlife Service, National Park Service, U.S. Geological Survey, and the Natural Resources Conservation Service. Outside engineering and environmental firms are also involved in the MsCIP project. A feature of the study was the early engagement of the State of Mississippi, agencies, the public and other interest groups.

The MsCIP Comprehensive Plan report consists of an integrated main report/environmental impact statement (EIS) and supporting appendices that describe an integrated system of structural, nonstructural, and environmental measures. Specifically, the report includes: study area description; description of public and agency involvement; summary of the plan formulation activities including the application of a risk-informed decision framework; environmental impact statement; description of recommended plans; documentation of compliance with environmental requirements; and appendices on cost, engineering, environment, economic analysis, adaptive risk informed decision framework, plan formulation, and real estate.

1.2 Purpose of Independent External Peer Review

To help ensure that USACE documents are supported by the best scientific and technical information, a peer review process has been implemented by USACE that utilizes Independent External Peer Review (IEPR) to complement the Agency Technical Review (ATR), as described in the Department of the Army, U.S. Army Corps of Engineers, guidance *Peer Review of*

Decision Documents (EC 1105-2-410) dated August 22, 2008; and CECW-CP Memorandum dated March 30, 2007.

The purpose of peer review, in general, is to strengthen USACE's quality control processes for the development of decision documents in support of its Civil Works program. Independent external peer review provides an independent assessment of the technical analyses and recommendations included in a plan. In particular, the IEPR addresses the overall adequacy of the scope and structure of the report; the technical soundness of the report's assumptions, 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 MsCIP Comprehensive Plan was conducted and managed using contract support from an independent 501(c)(3) science and technology organization (Battelle Memorial Institute; hereafter Battelle) to ensure independent objectivity, along with a high degree of flexibility and responsiveness, which was essential for USACE to meet deadlines.

This final report describes the IEPR process, summarizes final comments of the IEPR panel, and describes the panel members and their selection. The results of this IEPR report will be taken into consideration in preparation of the final MsCIP Comprehensive Plan. Detailed information on the final comments of the panel is provided in Appendix A.

2. METHODS

This section describes the methodology followed in selecting independent external peer reviewers (hereafter: peer reviewers), and in planning and conducting the IEPR. The IEPR was conducted following procedures described in USACE's guidance as cited in Section 1.2 of this report and in accordance with the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review*, released December 16, 2004. Supplemental guidance on evaluation for conflicts of interest used the National Academies' *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports*, dated May 12, 2003.

2.1 Planning and Schedule

Table 1 defines the schedule followed in execution of the IEPR.

Table 1. Schedule.

Task	Action	Due Date
Task 1	Identification of ~20 potential peer reviewers (including expertise/conflict of interest assessment and recruitment)	December 5, 2007
Task 2	Draft charge developed based on preliminary draft MsCIP comprehensive report	December 7, 2007
	Revised MsCIP report documents received and draft charge revised	September 8, 2008*
	Final charge approved by USACE	September 18, 2008
Task 3	Peer reviewers selected	December 5, 2007
	Subcontracts for peer reviewers completed	January 2008 (initial contracts)/ September 2008 (modified contracts)
Task 4	MsCIP documents for IEPR received	September 19, 2008*
	Kick-off meeting with IEPR Panel	September 24, 2008
	IEPR Panel members review MsCIP Comprehensive Plan and submit individual comments in response to charge	September 24 - October 15, 2008
Task 5	Battelle identifies list of strawman key issues (based on individual comments) and distributes to IEPR Panel	October 20, 2008
	Consensus teleconference – facilitated IEPR Panel discussion of key issues; agreement on consensus issues	October 22, 2008
	IEPR Panel prepares final consensus comments using formatted structure and submits to Battelle	October 30, 2008
	IEPR Panel reviews the Final IEPR Report (prepared by Battelle and incorporating the final consensus comments)	November 3-5, 2008
	Battelle submits the Final IEPR Report to USACE	November 7, 2008
Task 6	Final consensus comments from IEPR Panel are posted to DrChecks (Design Review and Checking System) web-based design review tool	November 7, 2008
	MsCIP authors provide responses to final consensus comments using DrChecks	November 12, 2008
	Peer reviewer provide feedback (i.e., BackChecks) on MsCIP author responses to consensus comments	November 18, 2008

* The release of the MsCIP Comprehensive Plan was delayed by approximately nine months from the initial expected release date, delaying the preparation of the final charge and conduct of the peer review process.

2.2 Identification and Selection of Peer Reviewers

In the formation of the MsCIP Comprehensive Plan IEPR Panel, Battelle sought to recruit highly qualified reviewers according to the following general criteria:

- Scientific and technical stature – Evidence of stature in the broad scientific and technical community (invited contributions to workshops, conferences or panels; evidence of scientific and technical leadership; awards, membership, or important committee assignments in prestigious organizations).
- Advisory experience – Experience advising top managers and promoting constructive uses of science and technology, especially in arenas relevant to water and sediment management and/or ecosystem restoration.
- Technical publications – A strong record of publication in peer-reviewed scientific literature or other appropriate venues in an area of expertise relevant to the issues at hand.
- Relevant knowledge – Evidence of extensive and/or intensive working knowledge of a scientific or technical field related to the specific issues of concern.
- Reputation for achieving balance – Evidence of ability to weigh issues in a balanced manner when in an advisory capacity.
- Interdisciplinary skills – Evidence of ability to work and think across disciplines, and/or experience in working with and advising on complex issues that integrate multiple disciplines.

In addition, the technical credentials of the peer reviewers were evaluated according to the overall scope of the MsCIP Comprehensive Plan, with the goal of comprising an IEPR panel of multiple technical disciplines covering a broad area of study, including the following disciplines and experiences:

- Engineering – including but not limited to structural, cost, mechanical, and geotechnical engineering expertise;
- Hydrology and hydraulics;
- Geology and geomorphology;
- Coastal environmental science/wetland ecology;
- Meteorology and hurricane expertise;
- Water resources decision-making and decision analyses
- Water quality;
- Floodplain management;
- Nonstructural flood damage reduction alternatives;
- Socio-economics;
- Real estate;
- Risk assessment; and
- Modeling.

The peer reviewers were also screened for the following *potential* exclusion criteria or conflicts of interest.

Exclusion Criteria

- Current USACE employee;
- Involvement in developing or contributing to the development of the MsCIP Comprehensive Plan;
- A significant portion (i.e., greater than 50 percent) of personal or company revenues within the last three years came from USACE contracts;
- Current work or arrangements concerning future work in support of industries or other parties that could potentially be affected by developments or material presented in the MsCIP Comprehensive Plan;
- Any personal benefit or financial interest held by the reviewer (or employer, spouse or dependent child) that could be affected by participation in this matter; or
- Any publicly documented statement made by the reviewer or the reviewer's firm advocating for or against the MsCIP Comprehensive Plan.

Other Potential Conflicts of Interest

- Former USACE employee;
- Repeatedly served as USACE technical reviewer; or
- Other USACE affiliation, including research grants or cooperative agreements [Scientist employed by the USACE (except as described in NAS criteria, see EC 1105-2-4 Section 9d)][a].

Battelle initially identified approximately 20 highly qualified potential MsCIP peer reviewers with a broad range of technical expertise. Of those initially contacted, 9 IEPR candidates confirmed their interest and availability, and 11 candidates declined either due to the schedule and anticipated level of effort, disclosed conflicts of interest, or because they did not possess the technical expertise being sought.

In selecting final peer reviewers from the list of potential peer review candidates, an effort was made to select experts who best fit the criteria and factors described above. Based on these considerations, 7 reviewers, all from academe, were selected for the final peer review panel. (See Section 3 of this report for names and biographical information on the selected peer reviewers.) Battelle established subcontracts with the peer reviewers indicating their willingness to participate and documented the absence of conflicts of interest (through a signed conflict of interest form).

[a] Note: Battelle will be evaluating 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."

2.3 Preparation of the Charge and Conduct of the Peer Review

A charge for peer review, which contained specific questions regarding the MsCIP Comprehensive Plan, was developed to assist the IEPR panel. The draft charge was prepared by Battelle with input from USACE and guidance provided in USACE's guidance *Peer Review of Decision Documents* (EC1105-2-410) and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review*. A draft charge was submitted to the USACE for consideration and evaluation, and finalized by Battelle after minor clarifications were incorporated. The final charge included general guidance for the reviewers on conduct of peer review, as well as 61 questions/discussion points on specific sections of the Comprehensive Plan for the IEPR panel to respond to, as shown in Appendix B of this report.

The peer reviewers were provided an electronic version of the MsCIP Comprehensive Plan documents and the charge for review. A full list of the MsCIP Comprehensive Plan documents that were reviewed by the IEPR panel is provided in the charge in Appendix B of this report. Peer reviewers were instructed to submit responses to the charge questions. More than 400 comments were received from the individual IEPR panel members in response to the charge questions. There was no communication between the IEPR panel and the authors of the MsCIP Comprehensive Plan during the peer review process, but communication between Battelle and the reviewers, and among the reviewers, was conducted as needed.

2.4 Review of Individual Peer Review Comments

Battelle reviewed the more than 400 comments received from the individual IEPR panel members to identify overall recurring themes, potential areas of conflict, and other panel impressions of the report. As a result of this review, Battelle developed a preliminary list of 33 overall comments and talking points that emerged from the IEPR panelists' verbatim comments, including 23 negative comments, 6 positive comments, and 4 comments that were possibly conflicting among the various reviewers. Each reviewer's verbatim comments were shared with the full IEPR panel.

2.5 Peer Review Panel Consensus Discussion

Battelle facilitated a consensus discussion conference call with the IEPR panel. The purpose of the consensus discussion was to allow the exchange of technical information among the panel experts, many of whom are from diverse scientific backgrounds. This information exchange ensured that the IEPR report represents the consensus of the panel and avoided isolated or conflicting information and analyses. The main goal of the consensus discussion was to review the overall comments identified by Battelle and ascertain and confirm their importance to the IEPR panel, remove points having a lack of consensus, identify and add any missing issues of high-level importance to the IEPR panel, and finally, reach consensus on the final comments to be provided to USACE.

The panel discussion resulted in 14 overall consensus comments. Following the discussion, a summary memorandum documenting each consensus comment identified by the panel (and organized by level of significance) was prepared by Battelle and distributed to the IEPR panel.

The memorandum provided detailed guidance on the approach and format to be used in the development of the final IEPR comments for the MsCIP Comprehensive Plan.

In addition to reaching consensus on the final comments to be provided to USACE, the IEPR panel discussed responses to 4 specific charge questions where there appeared to be disagreement among the reviewers. The conflicting comments were resolved based on professional judgment of the panel members and the comment was either incorporated into the final comments 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 comment).

2.6 Preparation of Final Comments

The IEPR panel used the 14 overall consensus comments as a basis for preparing the final comments. A memorandum was distributed to the IEPR panel providing detailed guidance on the approach and format to be used in the development of the final comments. A summary of the directive is provided below:

- Lead Responsibility: A lead reviewer who was responsible for coordinating the development of the final comment and submitting it to Battelle was assigned for each consensus comment. Lead assignments were modified by Battelle at the direction of the IEPR panel. To assist each lead in the development of the final comments, Battelle distributed individual verbatim comments in the comment-response table format, a summary detailing each consensus comment (in the memorandum), an example final comment following the five-part structure (described below), and a template for the preparation of the final comments.

- Directive to the Lead: Each lead was encouraged to communicate directly with other reviewers, as needed, to contribute to a particular consensus comment. If a significant comment was identified that was not covered by one of the original 14 overall consensus comments, the appropriate lead was instructed to draft a new consensus comment. If a consensus comment was related to another consensus comment, the lead was to cross-reference them.

- Format for Final Comments: Each final comment was presented as part of a five-part structure, including:
  1. Nature of comment (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. Comment cross-referencing
  5. Recommendation (see description below).

- Criteria for Significance: The following were used as criteria for assigning a significance level to each final 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 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, etc.).

As a result of this process 14 final comments were prepared by the peer review panel. Battelle reviewed and edited (with concurrence from the IEPR panel) all final comments for clarity and adherence to the requested final comment template format. There was no communication between the IEPR panel and the authors of the MsCIP Comprehensive Plan during the preparation of the final comments. The final IEPR comments were assembled and are presented in Appendix A.

3. BIOGRAPHICAL INFORMATION ON PEER REVIEWERS

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. A draft list of screened (for availability, technical background, conflict) potential reviewers was prepared by Battelle and provided to USACE. The final list of peer reviewers was determined by Battelle.

An overview of the credentials of the three reviewers selected for the IEPR 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 or her technical areas of expertise is presented following Table 2.

Table 2. MsCIP Comprehensive Plan IEPR Panel: Technical Criteria and Areas of Expertise.

Name	Affiliation	Primary Areas of Expertise									
		Engineering (civil, structural, cost, mechanical, geotechnical)	Hydrology/hydraulics	Geology/geomorphology	Meteorology/hurricanes/storm surge modeling	Coastal environmental science/wetland ecology/ water quality	Socio-economics	Real estate	Water resources decision-making/ Floodplain management	Risk Assessment	Modeling
	Totals →	3	2	2	2	3	2	1	3	2	4
Charles Aubeny	Texas A&M University	x		(x)							
Shuyi Chen	University of Miami				x						x
Peter Goodwin	University of Idaho	x	x			x			(x)		x
Scott Hagen	University of Central Florida	x	x		x	x					x
Jamie Kruse	East Carolina University						x	x	x	x	x
Douglass Shaw	Texas A&M University						x		x	x	
L. Donelson Wright	College of William and Mary			x		x					

Note: (x) in parentheses indicates this reviewer is not the primary expert recruited for this category, but has expertise in this area.

Charles Aubeny, Ph.D.
Role: This reviewer was chosen primarily for his expertise in geotechnical and civil engineering.
Affiliation: Texas A&M University, College Station, Texas

Dr. Aubeny is an Associate Professor in Civil Engineering in the Zachry Department of Civil Engineering at Texas A&M University. He teaches soil mechanics, geotechnical design, geotechnical testing, and numerical methods in geomechanics. His current research interests involve geotechnics of offshore foundations, anchors, and pipelines. Experience prior to his

current academic position includes 8 years with the Embankment Dams Branch at the U.S. Bureau of Reclamation Engineering and Research Center in Denver, and 7 years in private consulting in geotechnical engineering, dam engineering, levees, flood control, and geo-environmental engineering. Much of his consulting work centered on levee systems in the Sacramento-San Joaquin River Delta in central California. His experience includes geotechnical field investigations, laboratory testing, analysis, design, construction observations, and monitoring performance of structures during operation. Dr. Aubeny holds a Ph.D. in Civil Engineering from Massachusetts Institute of Technology. He is a licensed Professional Engineer, States of Texas and Colorado, and a Registered Civil Engineer, State of California.

Shuyi Chen, Ph.D.
Role: This reviewer was chosen primarily for her expertise in the areas of tropical meteorology (hurricanes and storm surge) research and modeling.
Affiliation: University of Miami, Miami, Florida

Dr. Chen is a Professor of Meteorology and Physical Oceanography at the Rosenthal School of Marine and Atmospheric Science (RSMAS) of the University of Miami. Dr. Chen is a widely published author whose research interests include mesoscale and tropical meteorology, coastal meteorology, air-sea interactions, high-resolution coupled atmosphere-wave-ocean modeling of tropical cyclones, and numerical weather prediction. Dr. Chen leads a research group at RSMAS/UM that has developed a high-resolution, fully coupled atmosphere-wave-ocean, vortex-following, nested-grids model for hurricane research and prediction. She is currently the principal investigator/chief scientist for the National Science Foundation funded Hurricane Rainbands and Intensity Change Experiment (RAINEX) using three Doppler radar aircraft collected unprecedented in-situ data in Hurricanes Katrina, Rita, and Ophelia during the 2005 Hurricane Season. She also served as principal investigator for the Coupled Boundary Layer Air-Sea Transfer (CBLAST)-Hurricane modeling team sponsored by the Office of Naval Research. In 2006, Dr. Chen was awarded the NASA Group Achievement Award. Most recently, Dr. Chen was the invited speaker on a panel of experts for the Congressional Briefing on the National Hurricane Initiative at the U.S. House and Senate in July 2007, and testified as a witness at the Joint Hearing on: *The State of Hurricane Research and the National Hurricane Research Initiative Act of 2007*, before the Subcommittee on Energy and Environment and the Subcommittee on Research and Science Education, Committee on Science and Technology of United States House of Representatives in June 2008. She served as an Editor for *Weather and Forecasting* Journal of the American Meteorological Society. Dr. Chen holds a Ph.D. in Meteorology from the Pennsylvania State University.

Peter Goodwin, Ph.D., P.E.
Role: This reviewer was chosen primarily for his expertise in the areas of wetland ecology, ecohydraulics, civil engineering, and modeling. He also has expertise in floodplain management.
Affiliation: University of Idaho, Boise, Idaho

Dr. Goodwin is the DeVlieg Presidential Professor of Ecohydraulics and Professor in the Department of Civil Engineering at the University of Idaho. He serves as the Director of the Center for Ecohydraulics Research, an interdisciplinary program researching the linkages between ecological response to management actions or changes in physical processes of rivers, lakes, estuaries and wetlands. His expertise also includes modeling physical processes in natural

and disturbed systems and quantifying benefits of restoration activities. He has co-authored numerous books, refereed journal publications, and conference proceedings related to flood management, restoration ecology, wetland management, and hydraulic and environmental modeling of coastal, estuarine and river waters. He has been invited to speak both nationally and abroad on topics such as ecohydraulics, habitat restoration, flood management, and ecology, and serves on several national and international committees. Most recently, he was elected Vice President, International Association for Hydraulic Research and Engineering since 2007, and serves on the Science Board, Louisiana Coastal Action Plan (rebuilding the ecosystem and wetlands of coastal Louisiana post- Hurricane Katrina) since 2006. Dr. Goodwin holds a Ph.D. in Hydraulic Engineering from the University of California, Berkeley. He is a Registered Engineer, States of California and Idaho and a Chartered Engineer, United Kingdom.

Scott Hagen, Ph.D., P.E.
Role: This reviewer was chosen primarily for his expertise in the areas of modeling, hydrology, civil engineering, coastal environmental science. He also has some expertise in water quality.
Affiliation: University of Central Florida, Orlando, Florida

Dr. Hagen is an Associate Professor in the Civil and Environmental Engineering Department at the University of Central Florida. He is also the Director of the Coastal Hydroscience Analysis, Modeling & Predictive Simulations (CHAMPS) Laboratory, a nationally- and internationally-recognized laboratory whose primary research goal is to use computer modeling and simulation to better analyze and understand coastal hydroscience. Dr. Hagen's current research includes astronomic and meteorologic tidal modeling, including hurricane storm surge simulations and tidal flow analyses. He was the principal investigator of a simulation of tidal hydrodynamics on the continental shelf and within the multiple inlet/barrier island coastline of northeast Florida as well as model simulations of tidal boundary conditions for coastal water models. He has co-authored numerous refereed journal articles, conference publications, and technical reports focusing on oceanic and coastal tidal models. He has been invited to speak both nationally and abroad on the topic of modeling. Dr. Hagen serves on several committees and was recently named the Chair of Tidal Hydraulics, a national committee for the American Society of Civil Engineers (ASCE) Coasts, Oceans, Ports and Rivers Institute. Dr. Hagen holds a Ph.D. in Civil Engineering from the University of Notre Dame. He is a registered Professional Engineer, State of Florida.

Jamie Brown Kruse, Ph.D.
Role: This reviewer was chosen primarily for her expertise in the areas of real estate, risk assessment, economics, modeling, and non-structural flood damage reduction alternatives.
Affiliation: East Carolina University, Greenville, North Carolina

Dr. Kruse is a Professor in the Department of Economics at East Carolina University. She also is the Director for the Center for Natural Hazards Research. Her research interests include economics, risk, health, wind hazard economics, disaster management, and response to hazards. She has co-authored numerous journal articles, conference publications, and technical reports on areas such as hurricanes and economic research and real estate responses to flood hazards. She was the Guest Editor, Hurricane Katrina Symposium, Southern Economic Journal in October

2007. She has been invited to speak both nationally and abroad. She is a member of the American Economic Association, Economic Science Association, Southern Economic Association, Society for Risk Analysis, Society of Behavioral Economics, and American Association for Wind Engineering and is on the Advisory Panel, National Science Foundation, Decision, Risk and Management Sciences Program, 2007-2009. Dr. Kruse holds a Ph.D. in Economics from the University of Arizona.

Douglass Shaw, Ph.D.
Role: This reviewer was chosen primarily for his expertise in economics and risk assessment.
Affiliation: Texas A&M University, College Station, Texas

Dr. Shaw is a Professor in the Department of Agricultural Economics at Texas A&M University, with a joint appointment in the Department of Recreation, Parks and Tourism Sciences. He is also a research fellow at the Hazards Reduction and Recovery Center, an internationally known disaster research group, and is a participating member of the Graduate Program in Water Management and Hydrologic Science at A&M. His research specialties are environmental and water resource economics, with emphasis on valuing environmental amenities and changes in health risks associated with contamination and degradation of resources. He has published over seventy peer-reviewed articles, book chapters, or books. His current research focuses most on the connections between the role of perceived risks in environmental economics and non-market valuation under uncertainty. He has also written about climate change, the risks from consuming contaminated fish, the risks of nuclear waste transport, risks of drinking water contaminated with arsenic, risks of damage from hurricanes, and air pollution's affect on asthma patients. Dr. Shaw has given over 30 papers or talks at professional conferences, university and college seminars, and at government workshops. He has frequently presented work at annual meetings of the American Agricultural Economics Association, the Association of Environmental and Resource Economics, and the American Economic Association, and he has presented papers both nationally and internationally. He has served as Associate Editor for the journals *Water Resources Research* and the *Journal of Leisure Research* and as a member of the editorial council for the Journal of Agricultural and Resource Economics. Dr. Shaw holds a Ph.D. in Economics from the University of Colorado.

L. Donelson Wright, Ph.D.
Role: This reviewer was chosen primarily for his expertise in the areas of coastal environmental science and geomorphology.
Affiliation: School of Marine Science, Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, Virginia

Dr. Wright is a Chancellor Professor Emeritus of Marine Science, College of William and Mary Fellow for Coastal Research, Southeastern University Research Association. His research is largely focused on bottom boundary layer and sediment transport processes operating in the coastal ocean and adjoining estuaries, the cross-shelf flux of particles, the morphodynamics of the inner continental shelf, river-mouth and estuarine processes including the roles of positive and negative buoyancy, and on the complex interrelationships among numerous physical and biological processes near the sea floor. His research is interdisciplinary and involves elements of physical, geological, and biological oceanography and has direct engineering and environmental applications. Field investigations have been conducted in the coastal waters of the Atlantic,

Pacific, Arctic and Indian Oceans, Gulf of Mexico, Chesapeake Bay, Baltic Sea, Timor Sea, and Yellow Sea. He is currently coordinating a multi-institutional effort to establish a comprehensive coastal ocean-observing program in the southeastern region of the U.S. Dr. Wright has authored dozens of journal publications, books, and conference proceedings and given papers or talks at professional conferences, university and college seminars, and at government workshops, both nationally and abroad. Dr. Wright holds a Ph.D. through the Coastal Studies Institute, Louisiana State University (Coastal and alluvial morphology and nearshore dynamics specializations).

4. RESULTS – SUMMARY OF PEER REVIEW COMMENTS

As a result of the consensus discussion process, the IEPR panel identified 14 final comments, segmented into rankings of high, medium, and low significance. In total, as shown in Table 3, four were identified as having high significance, eight were identified as having medium significance (including one, comment 12, that was designated as "High/Medium"), and two were identified as having a low level of significance.

As indicated in Table 3, the majority of the comments focused on areas viewed by the reviewers as needing improvement or additional discussion, or that were omitted. The final IEPR comments in their entirety are included in Appendix A.

Overall, the IEPR panel agreed that the MsCIP Comprehensive Plan is an impressive body of work that is wide-ranging in the scope of research used to inform plan recommendations. However, they felt that the plan could be improved by inclusion of a concise statement of the project's long-term vision for the future coastal landscape and a figure illustrating the project in the Executive Summary. The panel also acknowledged that there has been extensive outreach and community engagement in the scoping process. The panel encouraged continued USACE collaboration with the public, local and federal governments, and the inclusion of universities and research institutions to help steer this plan towards a successful outcome. Support of local communities and States should be fostered as it is also a critical component to project success.

Because the MsCIP Comprehensive plan is a large scale and long-term project, it will take a long time to implement, and it will be an incremental process that will involve adjustments along the way. Thus, the panel emphasized that on-going monitoring to calibrate assumptions against observable evidence coupled with adaptive management that adjusts to new information is absolutely essential. Further, as identified in panel comments, they recommended that for a number of analyses the assumptions should be re-examined, the models should be refined, and a new series of simulations conducted before the USACE proceeds to the design and build phases of this project. Most importantly, the panel recommended that recent evidence of accelerated relative sea level rise should be considered in the final design, and how that relative sea level rise is incorporated must be reconsidered.

Table 3. Overview of 14 Final Comments Identified by the MsCIP Comprehensive Plan IEPR Panel.

Significance – High	
1	More refined analysis is recommended in certain areas before design and build can be conducted.
2	The preliminary evaluations of the Hurricane Storm Damage Reduction, erosion control, and ecosystem restoration need more explanation. For example it is unclear if dynamic habitat models and geomorphic evolution are considered.
3	The redevelopment scenarios should include a range of possible outcomes for the economy.
4	Adaptive management processes should be a more integral part of the Comprehensive Plan and must include a strong monitoring and feedback mechanism.
Significance – Medium	
5	The extent of inclusion of recommendations from the public and agency engagement process into the plan, and whether major controversies regarding the program plan exist, is unclear.
6	There needs to be a more in-depth discussion of the municipal and industrial waste and the future impact to the treatment facilities.
7	Human adaptation, as it relates to economic activities, needs more detail.
8	The effects of relative sea level rise need to be explained more explicitly, taking into account local effects in addition to global effects and incorporating recent studies.
9	It is unclear how relative sea level rise (RSL) is incorporated.
10	All of the physics-based models used need a better explanation, including inputs, outputs and assumptions.
11	The decision factors involved in using the models selected needs to be described. In some cases, updated modeling tools should be used.
12	Need to explain the rationale for selecting the oyster as a surrogate for other species.
Significance – Low	
13	The stated goal of the project to reduce loss of life by 100% is unrealistic.
14	The process for weighting metrics is unclear.

Appendix A

Final IEPR Comments on the MsCIP Comprehensive Plan

Comment 1:

More refined analysis is recommended in certain areas before design and build can be conducted.

Basis for Comment:

Missing or incomplete analyses supporting the comprehensive plan were identified in a number of areas. Intertwined with this issue is a general uncertainty among the reviewers as to what the USACE plans to do from this point forward. Specifically, it is not clear whether the USACE considers that it is ready to proceed directly to the levee design stage, or if the study to date is considered as a starting point and the USACE intends to do more extensive analyses.
Areas considered by the panel to be in need of more refined analysis include the following:

- No explicit levee height is recommended, so clearly more work is needed regarding this critical design issue.
- Rainfall and runoff should be considered in the analysis. While storm surge is recognized as the primary focus of this project, rainfall and flooding preceding, during, and after a storm surge could have a combined disastrous effect and should be considered as an important factor affecting the results of the analysis.
- The justification for selecting a 50-year planning horizon is unclear. This issue affects critical aspects of the project such as sustainability of measures, and State and Federal funding. Examples of other aspects of the study that can be affected by the selection of the planning horizon include subsidence, sea level rise, and storm intensity related to climate change.
- Maps of inundation and frequency of exceedance for present conditions and projections of future scenarios would assist in better evaluating mitigation strategies.
- The physical process effects are not fully addressed in the Comprehensive Plan and the physical alterations to the Mississippi coastal environment need to be more fully described. Certain physical parameters used in the analysis do not appear in the report. In addition, certain physical processes (e.g., regional scale influence including landscape and coastline alternations on the local analysis in the Comprehensive Plan) were not reflected in the report; these processes involve a chain of physical processes affecting flows, salinity, vegetation, and erosion.
- The storm surge and transport models should include the effects of all lines of defense (LODs).
- No analysis is provided supporting the feasibility of the proposed surge gates closing off the bays; since the effectiveness of LODs 3 and 4 rely on blocking off the bays with surge gates, the feasibility of this component of the plan should be firmly established.

Significance – High:

Issues relating to any of the issues listed above could significantly change the outcome of the analyses, thereby potentially affect the recommended course of action or the justification for the project.

Comment Cross-referencing:

Also see related comments:

(4) Adaptive management processes should be a more integral part of the Comprehensive Plan and must include a strong monitoring and feedback mechanism.
(8) The effects of relative sea level rise (RSL) need to be explained more explicitly, taking into account local effects in addition to global effects.
(9) It is unclear how relative sea level rise (RSL) is incorporated.
(10) All of the physics-based models used need a better explanation, including inputs, outputs and assumptions.

Recommendations for Resolution:

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

- A specific recommended levee height.
- Inclusion of rainfall and runoff in the analysis.
- A justification for a 50-year planning horizon and what is expected to occur after the 50 years.
- Inclusion of inundation maps for present conditions and for projections of future scenarios.
- Include all data on physical parameters used in the analyses and ensure that the physical models simulate all relevant physical processes on both regional and local scales.
- The storm surge and transport models should include the effects of all lines of defense (LODs).
- Provide an analysis of the proposed surge gates closing off the bays to more fully demonstrate their feasibility.

Comment 2:

The preliminary evaluations of the Hurricane Storm Damage Reduction, erosion control, and ecosystem restoration need more explanation. For example it is unclear if dynamic habitat models and geomorphic evolution are considered.

Basis for Comment:

The evaluation of storm damage reduction, erosion control and ecosystem restoration over a 50-year period must be made in the context of a dynamic and changing system, not on the assumption of static conditions. Following initial implementations, it is to be expected that progressive changes in coastal energy regime and sea level will lead to corresponding evolution of coastal configuration and nearshore/inner shelf profiles. The coastal ecosystem will also likely undergo changes which may further contribute to morphologic changes. These changes will modify storm surges, currents and waves. The altered energy regime will then feed back into the continued evolution of habitat and coastal shape. The morphologic and habitat changes, combined with sea level rise, would probably be accompanied by changes in inundation frequency and height. Because of these changes, maps of inundation vulnerability projected some decades into the future may be very different from those of the present day. It is not clear if model runs designed to predict these changes and their consequences have been carried out. If they have, then the results need to be more explicitly described. If they have not, then the need for such runs should be acknowledged and a plan for carrying out the necessary analyses and modeling in the future as part of the adaptive management plan needs to be laid out.

Significance – High:

Failure to take account of dynamic feedbacks, such as morphology-induced storm surge amplification or attenuation, could lead to first order errors in evaluating the efficacy of the long-range program. For that reason, the panel ranks the significance of this concern as high.

Comment Cross-referencing:

Also see related comments:
(1) More refined analysis is recommended in certain areas before design and build can be conducted.
(4) Adaptive management processes should be a more integral part of the Comprehensive Plan and must include a strong monitoring and feedback mechanism.
(8) The effects of relative sea level rise need to be explained more explicitly, taking into account local effects in addition to global effects and incorporating recent studies.
(9) It is unclear how relative sea level rise (RSL) is incorporated.

Recommendations for Resolution:

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

- If the possible effects of morphological and ecologic change over time have been considered by USACE, then this needs to be explicitly pointed out in the plan.
- If the effects listed above have not been considered and plans are underpinned by assumptions of a static coastal regime, then the possible consequences of coastal evolution over time need to be clearly acknowledged but not necessarily addressed prior to initial implementation provided that the condition below is met.

- A more explicit description of how sediment and freshwater diversion actions interact between the Mississippi and Louisiana programs. Will actions in one state preclude options in another?
- An Adaptive Management Plan that includes routine monitoring and modeling of temporal changes in coastal habitat and configuration along with accompanying observed and predicted changes in storm surge and erosive waves should be articulated in detail.

Comment 3:

The redevelopment scenarios should include a range of possible outcomes for the economy.

Basis for Comment:

There are two redevelopment assumptions used to develop future scenarios for the without project conditions: a) Simple replacement of "like-kind" structures that were destroyed by Hurricane Katrina and b) Replacement of structures with condos and casinos on the water front (planning units 1 and 2). These two possibilities seem to have been selected with no real justification. There is no discussion of reasoning behind selecting these two scenarios.

Full replacement of all like-kind structures (a) is unlikely and probably impossible given that Katrina eroded a portion of the previously available land parcels. While erosion of parcels is a distinct possibility under assumption (b) as well, a single change in the redevelopment pattern is considered. There is no economic forecast or explanation for this choice of redevelopment pattern.

The panel realizes that the initial phases of redevelopment in the region might favor a pattern similar to (b) but we do not find any solid justification for either of the redevelopment scenarios that was assumed. Further current volatility in the financial and energy sectors will certainly influence the redevelopment pattern for the region. The report does not offer the two scenarios as either the minimum or maximum within a range of potential outcomes and does not provide justification for either scenario as a prediction based on a probability distribution. Whereas the method used to address uncertainty was explained in other parts of the analysis, no such attempt was made here.

Tables 7 and 8 of Appendix B provide a projected inventory of structures. There are a couple of questions that arise. Under what assumption does planning unit 2 reverse from residential to manufactured homes under redevelopment scenario (b)? The panel also noted that the parcel count is exactly the same under the two scenarios. Is there actually a 1 for 1 replacement of a single family home with a condo or casino?

The matrix of six future scenarios is created by integrating or crossing the two redevelopment scenarios (a and b) with three possibilities for relative sea level rise (RSL), none, a max of 2.4 feet RSL over 100 years, and a max of 3.4 feet of RSL over 100 years. Would the inventory of structures <u>really</u> be the same under these three possibilities for RSL? An owner of a parcel will adapt to different levels of flooding/storm surge risk when he/she chooses whether to rebuild. As discussed in Comment #7 individuals will optimally substitute/adapt to relevant conditions. They will not rebuild a structure identical to what existed before the storm, rather, they will choose different mitigation measures in the rebuilt structure or retrofit it based on observable evidence of RSL. In fact they could conceivably choose a "disposable structure" meant to provide benefits for only 5 or 10 years, fully expecting that it will be condemned due to encroachment by the sea.

In summary, the six scenarios have been created as if individuals and businesses will reflexively

replace what was lost with no thought given to the fact that some parcels are not rebuildable and that there is greater future risk, given mounting evidence on sea level rise. This is not a justifiable assumption.
Significance – High:
Given that the numbers generated here influence cost effectiveness analysis and ultimately project selection, significance is high.
Comment Cross-referencing:
Also see related comments: (7) Human adaptation, as it relates to economic activities, needs more detail.
Recommendations for Resolution:
To resolve these concerns, the report would need to be expanded to include: ▪ Add rebuilding scenarios that describe a broader range of outcomes and are based on rational behavior or provide better justification for the two rebuilding scenarios that were chosen. ▪ Explain the assumptions behind the stock of structures in Tables 7 and 8 of Appendix B. ▪ Use assumptions on economic growth that include a recession scenario.

Comment 4:

Adaptive management processes should be a more integral part of the Comprehensive Plan and must include a strong monitoring and feedback mechanism.

Basis for Comment:

Monitoring and performance criteria are often underfunded and it is difficult to assess whether the intended outcomes are achieved. Adaptive management is a defensible, scientifically-based approach for ensuring that the goals of the project are achieved and is frequently used in large-scale complex projects such as MsCIP.

It is recommended that a strong on-going monitoring and feedback mechanism feeds into an adaptive management process. Adaptive management receives a cursory mention in Section 5.5, but there are some very significant uncertainties in the proposed plan and the implementation process would benefit from a continuous assessment and feedback between field data and management decisions. This requires adequate funding, formal assessment and review and decisions made periodically about whether the desired outcomes expressed by the vision are being achieved. A description of an adaptive management approach with performance measures is surprisingly absent.

Considerable expertise has been generated within the USACE in the past decade with adaptive management, particularly at ERDC. There are many examples of similar plans include:

- Louisiana Coastal Action Plan,
- Chesapeake Bay,
- Everglades (http://www.evergladesplan.org/pm/landing_program.aspx),
- CALFED (http://198.31.87.66/monitoring/monitoring_framework.shtml),
- Columbia River (www.icbemp.gov/html/icbstrat.pdf).

Significance – High/Medium:

This management approach is the best way to ensure that the project objectives are achieved and helps minimize risks and uncertainties associated with the design process. If, however the USACE includes an Adaptive Management Plan (AMP) before the design and build this comment would be rated medium.

Comment Cross-referencing:

Also see related comments:
(1) More refined analysis is recommended in certain areas before design and build can be conducted.

Recommendations for Resolution:

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

- A separate Adaptive Management Plan (AMP) that describes how adaptive management is integrated with the design, implementation, and post-implementation management.
- The AMP should include details of the performance measures, monitoring program, statistical design of sampling protocols where appropriate, and duration of monitoring program.

- Details of how the monitoring data will be assimilated into the computer models and analysis procedures.
- Details of data archiving, periodic updating of models and future expansion of new model capabilities should be considered an integrated part of AMP.
- Details of how information related to adaptive management will be made available to local communities and other agencies. This will build on the strong outreach and engagement process already initiated by the State of Mississippi and the USACE.
- Information regarding contingency plans, thresholds that may initiate alternative management actions and a general description of what these revised actions may entail.

Comment 5:

The extent of inclusion of recommendations from the public and agency engagement process into the plan, and whether major controversies regarding the program plan exist, is unclear.

Basis for Comment:

The prevailing opinion amongst the reviewers was that a significant effort was clearly made to involve the public and numerous agencies. The panel recognizes that this component of the project must have been very difficult to manage within the very tight time schedule set by Congress. Having stated this, the panel raised the following issues regarding the public engagement component of the project:

- The Comprehensive Plan does not fully quantify the number of public participants, who they were, and it is not entirely clear as to the quality of the public feedback.
- The Comprehensive Plan is unclear as to the degree of actual public "buy-in" to the project.
- With regard to input from other government agencies, the report does not fully explain the role of the other agencies (e.g., NOAA).
- One passage of the Comprehensive Plan raises a question as to whether all affected parties were engaged in the process. In particular, in the first public meeting it was noted that people in areas not affected attended, but it was difficult for people directly affected to participate.
- The extent to which public input was incorporated into the program plan is unclear. For example, a comment in the report states that large structural measures did not garner much local support, but the proposed LODs 3 and 4 involve some relatively large-scale structural measures.
- Some statements regarding public preferences should be better documented. For example, the Real Estate Appendix states that the public prefers a "natural" looking beach. The comment noted in the bullet item above describing lack of local support for structural measures is another example. As these public preferences can affect design decisions, their sources should be well documented.

Significance – Medium:

The comments above largely pertain to documenting the public involvement efforts and demonstrating that public preferences were considered in the decision making process; this affects the completeness of the report and is therefore considered to be medium significance.

Comment Cross-referencing:

Also see related comments:
(14) The process of weighting metrics is unclear.

Recommendations for Resolution:

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

- Include specific data on the number of public participants, who they were, and be specific as to the quality of the public feedback.
- Address the issue of public acceptance for the project.
- Better explain the role of the other governmental agencies in the public engagement process.
- Verify that affected parties were adequately represented in the public engagement process.
- Provide a clearer description regarding the extent to which public input was incorporated into the program plan.
- Document any mention of public preferences made throughout the report.

Comment 6:

There needs to be a more in-depth discussion of the municipal and industrial waste and the future impact to the treatment facilities.

Basis for Comment:

The release of contaminants from municipal and industrial waste facilities during a storm surge is a potentially serious issue. The facilities are described, but the MsCIP Comprehensive Plan does not indicate whether or not they are protected and gives no mention of the impact of Hurricane Katrina on these facilities. If the facilities have not been protected, the Comprehensive Plan needs to address how to prevent municipal and industrial wastes from being carried with the storm surge. Major issues that should be addressed in the MsCIP Comprehensive Plan include: (1) how did the storm water management infrastructure perform after the storm surge of Hurricane Katrina receded, (2) are there major needs to enable the storm water management infrastructure to perform better in the future, and (3) will the proposed measures prevent municipal and industrial waste from being carried with the storm surge?

In addition to the above focus on the three-county region of Mississippi, the report should address this problem from a comprehensive perspective with respect to "fallout" from Louisiana, where the municipal and industrial contamination of the surge waters was extensive. The Comprehensive Plan should address the possibility of contaminants transported out of the New Orleans area impacting the Mississippi Gulf coast. The MsCIP and LACPR (Louisiana Coastal Protection and Restoration) plans should therefore be considered comprehensively with respect to wastewater and industrial contamination.

Significance – Medium:

This issue will not likely affect the overall recommendations and justification for the project. However, the issue of release of contaminants into the environment during a storm surge is a serious concern, so addressing this issue is considered important from the standpoint of completeness of the report.

Comment Cross-referencing:

Also see related comments:
(1) More refined analysis is recommended in certain areas before design and build can be conducted.

Recommendations for Resolution:

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

- A description of the existing measures for protecting against release of contaminants from municipal and industrial waste facilities during a storm surge.
- A description of the performance of these facilities during Hurricane Katrina.
- Demonstrate that the proposed measures will prevent municipal and industrial wastes from being carried with the storm surge.
- Consideration of the MsCIP and LACPR comprehensively with respect to wastewater and industrial contamination.

Comment 7:

Human adaptation, as it relates to economic activities, needs more detail.

Basis for Comment:

When prices, quantities, and qualities of goods that people consume change, economic theory predicts that people will change behavior in response. People can switch (substitute) goods or activities when conditions are worse, but there is nothing that requires them to do so. For example, if the price of gasoline increases, people are made worse off and might switch temporarily or permanently to a different form of transportation, but they may not. Similarly, if the quality of a particular beach deteriorates, a person may take fewer recreational trips to that beach, preferring to go to a different beach, or they may reduce or stop taking beach trips altogether.

Adaptive behavior is also important in considering housing and labor market changes. Of high importance here is the adaptation to risk associated with living and working in a given region. An adaptive response by people and businesses to higher storm surge/flooding risk could be to leave or choose not to locate new businesses in the area. Evaluation that assumes no adjustment will introduce bias. If hurricanes damage one's home, it is possible that the occupants consider moving elsewhere, or essentially rebuild the same house at the same location, or rebuild a very different structure at the same location.

All economic analysis depends therefore on the assumptions made with regard to adaptation or, in the economic jargon, substitution. In general, in cases where there are many close substitutes and adaptation is relatively easy, the benefits from a program to reduce negative conditions will be smaller. In contrast, in situations where impacted resources or goods have few substitutes, the benefits from preventing or reducing negative aspects will be larger.

The report uses existing models to develop the economic analyses, such as the Hydrologic Engineering Center's Flood Damage Analysis (HEC-FDA) software package, for which these assumptions are not provided. The report states that these models are consistent with the guidelines provided in 1983 by the U.S. Water Resources Council. However, some of the principles and guidelines in this document have been questioned in the leading environmental economics journal, and thus may be outdated. For example, see Morey, Edward R. 1994. "What is consumer's surplus per day of use, when is it a constant, independent of the number of days of use, and what does it tell us about consumer's surplus?" *J. of Environmental Economics and Management* 27: 257-70. This paper argues that the often used "value per day" is not appropriate for use in benefits calculations, in many situations.

Significance – Medium:

The assumptions about what people do in response to changes in conjunction with the project are fundamental in predicting the likely benefits and costs of the project.

Comment Cross-referencing:
Also see related comments: (3) The redevelopment scenarios should include a range of possible outcomes for the economy.
Recommendations for Resolution:
To resolve this concern, the report authors could do the following: ▪ Add supporting information about adaptation assumptions for each of the key economic models used in the analyses. State in simple terms what is being assumed about how people will respond to future changes in conjunction with the project. ▪ Provide a technical appendix on the economic models that provides a knowledgeable economist with the details needed to clarify these assumptions.

Comment 8:

The effects of relative sea level rise need to be explained more explicitly, taking into account local effects in addition to global effects and incorporating recent studies.

Basis for Comment:

Sea level changes are crucial to planning for future inundation scenarios. The relative changes in sea level taking account of local, regional and global contributions are the most important aspect to consider. For example in neighboring Louisiana, rapid subsidence is a major contributor to relative sea level rise there. While this is less of an issue in coastal Mississippi, subsidence and related effects such as compaction under the weight of new engineering works cannot be ignored. (The argument made as to why the RSL for the Mississippi coast is dramatically less than that of Louisiana is very weak. The values for Mississippi RSL rise are 1/3 to 1/5 of those for Louisiana. This is an area where a comprehensive approach for MsCIP and LACPR appears to be lacking.) Estimates of these effects are probably available in long-term tide gauge records. If they have been incorporated, this needs to be clearly stated. If not, then the omission must be corrected or justified.

With respect to global changes, Section 1.6.2.3 cites climate change and rates of sea level rise from NRC (1987) and IPCC (2001). Since this is such a critical parameter in the design process, recognition should be given to more recent findings. The authors state that the 2007 4th IPCC Assessment was not used as it arrived too late for this process. Since this 2007 IPCC report, evidence has been mounting that the changes are occurring at a much faster rate than originally anticipated.

Significance – Medium:

Because the report does not ignore the issue of sea level rise and allows for a rise of as much as 0.5 meter over a 50-year period, the panel does not view the shortcomings as a fatal flaw of high significance. However, they feel that estimates need to be better explained and justified. Therefore, significance is medium.

Comment Cross-referencing:

Also see related comments:

(1) More refined analysis is recommended in certain areas before design and build can be conducted.

(2) The preliminary evaluations of the Hurricane Storm Damage Reduction, erosion control, and ecosystem restoration need more explanation. For example it is unclear if dynamic habitat models and geomorphic evolution are considered. [Future scenarios of geomorphic evolution and the impacts on storm surge amplification are strongly dependent on sea level change.]

(3) The redevelopment scenarios should include a range of possible outcomes for the economy.

(9) It is unclear how relative sea level rise (RSL) is incorporated.

Recommendations for Resolution:

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

- The decision to disregard the 2007 IPCC report should be revisited since several other major coastal planning programs are also using the 4th Assessment along with more current information.
- Access can be made at: http://www.ipcc.ch/ipccreports/ar4-wg1.htm. Since the release of the 2007 IPCC report, evidence has been mounting that the changes are occurring at a much faster rate than originally anticipated.
- One recent reference is: E. J. Rohling, K. Grant, Ch. Hemleben, M. Siddall, B. A. A. Hoogakker, M.Bolshaw & M. Kucera, 2008. High rates of sea-level rise during the last interglacial period. *Nature Geoscience* 1, 38-42.
- Provide a more substantive justification as to why the RSL for the Mississippi coast is dramatically less than that of Louisiana.

Comment 9:

It is unclear how relative sea level rise (RSL) is incorporated.

Basis for Comment:

On page 2-6 of the MsCIP Comprehensive Plan it states: "Project performance in this study effort was evaluated for both an extrapolation of the observed historic rate plus subsidence…" Unfortunately, there is no specification here or in the subsequent report or its appendices defining exact how the RSL was used to evaluate project performance.

Table 4-1 implies that RSL rise will simply be linearly added. One cannot take the storm surge results from no-RSL calculations and add on the RSL rise. The physics are more complicated than that. The IPET report (by the USACE) clearly demonstrated that a one-foot rise in RSL can lead to an increase in inland storm surge of more than double, possibly a factor of four increase. Certainly the change in the physics brought on by an RSL rise (an ever wider continental shelf, short waves evolving and breaking in new locations and possibly being reconstituted further inland) does not permit a linear supposition.

Significance – Medium:

The significance of how RSL is incorporated can be deemed medium provided the panel is correct in assuming that any design and build of the LODs will not be done without readdressing RSL in all surge-related simulations.

Comment Cross-referencing:

Also see related comments:
(1) More refined analysis is recommended in certain areas before design and build can be conducted.
(8) The effects of relative sea level rise need to be explained more explicitly, taking into account local effects in addition to global effects.

Recommendations for Resolution:

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

- Clarify exactly how the RSL rise was used to evaluate project performance.
- A strong recommendation to that RSL rise will be included in coupled short- and long-wave simulations before any future design and build of LODs.

Comment 10:

All of the physics-based models used need a better explanation, including inputs, outputs and assumptions.

Basis for Comment:

Good science is based in the ability to define an experiment, conduct it, and produce an outcome that can then be reproduced by other scientists. The same holds true for a thorough numerical simulation. While the authors of the MsCIP Comprehensive Plan and its appendices are to be commended for their use of Public Domain models currently available, and there is no doubt that the physics-based modeling performed was done expertly, the application of the physics-based models is not always fully explained such that another modeler could follow the lead provided. This is not to say that the Comprehensive Plan needs to provide all input/output files; rather, there simply needs to be a better explanation of what assumptions were made in the model simulations, how the input data were used, and how the outputs were diagnosed. Further, often the appendices (e.g., Engineering Appendix) are cited in the main report, when sample output and discussion would serve better if it were included in the main body of the Comprehensive Plan.

For an example of the latter, see lines 7-11 on page 3-38, which tell us that LOD-1 was modeled, but all results/discussion are relegated to the Engineering Appendix. Those results and a brief discussion belong in the main report.

Section 2.8 (Storm Surge Modeling) of Appendix E (Engineering) serves as an example for how all physics-based models need further discussion of inputs. The appendix indicates that the SL15 mesh was used for all storm surge modeling, but no information is provided as to how the mesh was modified to permit an examination of the lines of defense. A reader does not know if the elements of the mesh were reconfigured in order to describe various LODs or if topographic elevations were simply raised at the nodes. How the SL15 mesh was modified to include any of the LODs should be described. (Note that the same commentary can be made with respect to the other physics-based models.) In addition, what effect this had on how bottom friction was characterized is not revealed. There is no discussion of the wind-reduction factors and how the mesh modifications may influence a change in the factors. Again, as noted above, the authors do not need to provide all input files, but they should discuss all parameters and what was done to accommodate those parameters with the inclusion of LODs into SL15. In addition, on page 129, lines 21 & 22 it is noted that the grid (SL15) was used to ensure consistency with the LACPR study. What is not clear is if the SL15 was modified with both LACPR recommendations and MsCIP LODs to ensure that one modification did not impact the other.

When results are displayed to show the impact of LOD-3, for example, the graphics do not identify LOD-3 (see Figure 2.8-3). One can see that the output presented in Figure 2.8-2 differs from that of Figure 2.8-3; however, it is not clear from the figure what caused the varied envelope of maximum water level. And at least one set of figures like these should be included in the main report body.

Another example is that wind input to a surge model is extremely important for both waves and surges. There is a large uncertainty in the wind input used in the model simulations for MsCIP. However, there is no information and discussion given in the Comprehensive Plan, which is a major weakness in terms of application of the modeling results.

All physics-based model inputs/outputs and assumptions should be reviewed and provide further discussion using the above points as example.

Significance – Medium:

This comment is classified as medium since it is a point of clarification and no major re-work of any modeling exercise is required.

Comment Cross-referencing:

Also see related comments:
(1) More refined analysis is recommended in certain areas before design and build can be conducted.

Recommendations for Resolution:

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

- Review all physics-based model documentation and make sure that another modeler would be able to repeat the documented simulation.
- Provide an estimate of uncertainty due to the limitation of current computer model physics, model errors, and input data such as wind, waves, and currents
- Incorporate, at a minimum, sample output in the main report to emphasize why the various conclusions from the model results can be drawn.
- These are particularly important when addressing the question of effectiveness of the Barrier Island restoration in reducing storm surge along the coastline. This restoration component is a major financial investment and recent concerns have been raised over the exact reduction in storm surge height. The analyses and modeling details should be transparent and defensible.

Comment 11:

The decision factors involved in using the models selected needs to be described. In some cases, updated modeling tools should be used.

Basis for Comment:

In some instances the reviewers felt that either the USACE did not use the most up-to-date models and/or they did not provide a strong justification for the model and inputs that they used. Some specific instances are listed below:

- A more in-depth discussion should be given for the inputs into the ADCIRC (ADvanced CIRCulation) and Storm Surge Model for Oceanic, Coastal and Estuarine Waters. It is also not clear how the effects of LOD-3 and LOD-4 were input into the model. It also appears that LODs 1 and 2 were included in the model. If they were omitted, justification should be provided.
- The wind and atmospheric pressure model TC96 is a parametric model that does not represent the highly variable dynamic structure of a hurricane. It provides a simplified symmetric vortex with the maximum wind radius and relatively smooth wind field. In reality, hurricane winds are highly asymmetric around the storm center, especially near landfall. The surface wind field is rather gusty with wind speed and directions vary in much smaller scale than the vortex itself. Ocean waves and storm surge are very sensitive to the gustiness of the wind. The results of coupled wave-surge model (ADCIRC-STWAVE) using TC96 forcing may not be adequate for assessments used in MsCIP. In the past, TC96 provided a good proxy to a realistic storm forcing. However, that has changed over the last 5 years or so. High-resolution models are running at ~1 km resolution, which can provide a much more accurate forcing for surge model. These high-resolution models (e.g., Weather Research and Forecast (WRF) model and MM5) are available in the public domain.
- Regarding Appendix B of the economic analysis (ES-2, line 26) – the report should justify why SLoSH was used for this portion of the study when ADCIRC was used elsewhere.
- Much of the analysis in the Economics Appendix relies on the HEC-FDA model. Little documentation is provided on this in this Appendix, so it is impossible to tell whether the models are adequate because all models depend on their underlying assumptions. If the reader could see the detailed assumptions about substitution for business and residential and recreation substitution, it would alleviate possible concerns about the calculations.
- Newer physical models (e.g., wind surge) are operational and available as open source and are being used by other agencies like NOAA.
- Issues raised with regard to the Risk Informed Decision Framework (RIDF) model: (1) there were no measures of intensity of the preference for the metric, and (2) the MAX and MIN functions are not defined.

The panel recognizes that the USACE may have deemed it preferable to use open source or existing operational models rather than more recent models in a research mode. The panel does not consider this unreasonable. However, it is important that the MsCIP Comprehensive Plan state the limitations of any models used in the study as well as recognize the potential need for more up-to-date models in the final design and adaptive management stages.

Significance – Medium:

The general sense among the reviewers was that, while the USACE selection of models was reasonable, the understanding and completeness of the report would be greatly enhanced by more complete descriptions of the models used and the input parameters selected.

Comment Cross-referencing:

Also see related comments:
(1) More refined analysis is recommended in certain areas before design and build can be conducted.
(10) All of the physics-based models used need a better explanation, including inputs, outputs and assumptions.

Recommendations for Resolution:

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

- Provide more complete descriptions of the models used in the study, particularly with regard to the fundamental assumptions on which the model is based.
- More thoroughly describe and justify the input parameters used in the models and reference associated calibration and uncertainty analyses.
- In cases where a more up to date model could have been used, the USACE should demonstrate that a more refined analysis would not affect the current decision making or, as appropriate, identify future studies using more refined models to be used in the final design. This strategy may include running one or more models in parallel in some stages of the plan implementation.

Comment 12:

Need to explain the rationale for selecting the oyster as a surrogate for other species.

Basis for Comment:

Oysters are of importance to the State of Mississippi and local communities as evidenced by the Mississippi Department of Marine Resources (MDMR) emphasis on oyster bed restoration where feasible. (Environmental Appendix, Section ES 3.1.10, Section 3.1.9). The system-wide objectives of the study include seasonal salinities within the Western Mississippi Sound. A target of 15ppt is selected on the basis of optimal growth of oysters with the oyster selected as a surrogate for other aquatic resources Section 3.3. Oysters may also be useful as an indicator of salinities for zones within the general ecosystem, although the Comprehensive Plan lacks any scientific justification for the selection of the Oyster and 15ppt (p3.20 Main Report). For example, there could be a conflict between oysters and other species (i.e., shrimp or intertidal wetland vegetation).

The report continuously emphasizes the importance of a systems approach from both the physical processes and biological perspective. This is a very positive aspect of the report and reflects recent management approaches by the USACE (NRC: 'River Basins and Coastal Systems planning within the U.S. Army Corps of Engineers' (2004)). These are linked in parts of the report (for example through the Wetland restoration DSS and the water quality model (Environmental Appendix, Section 4.1 and Section 4.2 respectively). The Environmental Appendix also provides a detailed qualitative description of Threatened and Endangered Species and their preferred habitats which is followed by a detailed spatial description of potential sites for restoration or environmental enhancement.

However, a detailed description of the landscape ecology and the cumulative benefits/impacts that might transpire from the plan implementation is lacking. It is suggested that some discussion is presented about the importance of a mosaic of habitats to ensure the overall health of the regional ecosystem. What are the limiting biological factors for the key endangered species, particularly related to minimum areas or habitat, water quality and resilience of physical habitat? Ecosystems evolve over centuries and care to avoid the collapse of certain habitats/species at the end of the 50 year horizon should be considered. ERDC has extensive experience in these issues and it is suggested that a preliminary analysis/description of a conceptual model of key species (including oysters) is prepared for this report. Of course, this is an immensely complex problem, but identification of key indicators (in addition to oysters) and processes could be identified. This information could then be used to shape the performance measures and monitoring described in Comment 4. Further, the water quality model was developed in a short-time frame with limited functionality. As described in the report, the model is useful for comparing different options and ascertaining trends, but the recommended integrated modeling and monitoring (Comment 4) will allow improved, more reliable and more defensible results. This modeling will then allow the mosaic of habitats and their trends to be assessed throughout the project implementation and beyond.

Significance – Medium:

There has been extensive interaction between NGOs, state and federal agencies to develop the priorities of habitats. This recommendation will provide a preliminary description of how the proposed project would relate to the ecosystem dynamics.

Comment Cross-referencing:

Also see related comments:
(3) Adaptive management processes should be a more integral part of the Comprehensive Plan and must include a strong monitoring and feedback mechanism.

Recommendations for Resolution:

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

- A description of the ecosystem dynamics and how the landscape is expect to change. This description will include a range of key indicators, a description of why they are important and what they are representative of and how they may change as a result of the project, climate change and sea-level rise. Are there any scenarios that could result in a catastrophic collapse of part of the ecosystem and what factors can be include to improve the resilience?

Comment 13:

The stated goal of the project to reduce loss of life by 100% is unrealistic.

Basis for Comment:

The 100% goal is of concern here. Although life safety is of supreme importance, no project can completely eliminate the future loss of life related to hurricanes in the region, which is what this 100% goal implies. Also, the level of investment required to achieve the stated goal ignores the opportunity cost in terms of other life saving public investments. Realistically, there is no amount of planning that can eliminate accidents from happening, or prevent people from choosing to ignore all warnings and staying when an event happens, as some Galveston residents did when Hurricane Ike hit in September.

The project involves a finite amount of resources and future hurricane protection efforts also involve a limited amount of human resources (labor, and effective risk communication). In economic analysis, when such constraints are involved, a realistic objective is stated that recognizes these constraints. In other words, we might say that society can strive to minimize the loss of life, subject to those constraints.

Put another way, probabilistically, reducing the risk of death to zero when human activities that relate to natural hazards are involved, is infeasible. This is regularly recognized in policy and regulation in the United States, which is often set so that the acceptable mortality rate is 1 in one million, or lower.

Significance – Low:

The original "100%" statement is likely an editorial/semantic problem.

Comment Cross-referencing:

None

Recommendations for Resolution:

To resolve this concern, the report authors could do one of the following:

- Reword the goal to state that the project hopes to achieve the lowest possible loss of life in the future as is possible, given the constraints on human resources that can be devoted to protection as part of the project, and as events happen in the future.
- Reword the 100% goal as "ideal" or "desirable" in a world with no cost-constraints or constraints on resources in dealing with hurricanes. Then note that the project involves a fixed amount of resources, so the ideal cannot realistically be achieved.

Comment 14:

The process for weighting metrics is unclear.

Basis for Comment:

Evaluation metrics were created to help rank potential projects but the process by which the 15 evaluation metrics were selected and how the weights were determined are not described with sufficient detail in the Comprehensive Plan to be understandable.

By the very criteria described in Section 3.19.5 of the plan, the panel does not have enough information to determine whether the metrics are *scientifically verifiable*, *credible*, *scalable* or *relevant*. The description of use and development in the text was certainly not *transparent*.

In some places the authors refer to evaluation metrics however, they describe risk weighting workshops to determine the appropriate weights to place on the 15 criteria only three of which are referred to as Risk Metrics (#13, #14, #15 sec. 3.19.5.5). The 15 weighted evaluation criteria are supposed to be an input into the Risk Informed Decision Framework (RIDF) but the definition of risk seems very narrow. Risk is a term that has many interpretations. The reader is familiar with the notion that for a given mean outcome, greater statistical variance can be viewed as increased risk. But alternatively, the probability of exceeding design requirements as a measure of risk could be viewed. More generally, many people tend to view risk as the likelihood of an undesirable outcome of some stochastic process. The risk-related action points seem to incorporate several broader definitions than the one offered. The report should be much clearer in its use of the terms risk and uncertainty. A fairly clean definition allows that risk is used for the case where probability distributions are known or knowable and the range of outcomes is known. Uncertainty (Knightian uncertainty) describes the case where there is missing information about the probability distribution or the range of outcomes. At times the discussion goes off into areas that are more appropriately called measurement error or model specification error.

The purpose of the cluster analysis is not well articulated. The weights were constructed using the input of 45 individuals. How vulnerable is the process to strategic behavior on the part of a few participants? These 45 individuals are representative of what population? The two largest stakeholder groups, homeowners and local business owners seem not to have contributed to the weighting process. Is it possible that sample might be biased towards environmental restoration measures? Table 3-35 in the main report and also shown in the Risk Appendix is unclear on what the point allocation means. It would be interesting to see how the final ranking of projects would change if each of the five groups of metrics had simply received equal weight.

Significance – Low:

This comment was given a low significance in that the main requirement is revision for clarity.

Comment Cross-referencing:

Also see related comments:

(5) It is unclear if the recommendations from the public engagement process (i.e., public input) were included in the process or incorporated into the program plan.
Recommendations for Resolution:
To resolve these concerns, the report would need to be expanded to include: ▪ A very specific statement on the context in which the term risk is used. Stakeholder Risk Score is a misnomer. ▪ A clearer description of the weight construction process and discussion of the sensitivity of the final recommendations to the weights chosen. ▪ The 15 evaluation criteria are listed in a different order in Table 3-35 than they are in the text of the main report; a correction is needed for consistency.

Appendix B

Charge to the MsCIP Comprehensive Plan Independent External Peer Review Panel

Independent External Peer Review of the
Mississippi Coastal Improvements Program (MsCIP) Comprehensive Plan

Charge to the Independent External Peer Review Panel

September 2008

BACKGROUND

In the Third Emergency Supplemental to the Defense Appropriations Act, 2006, Congress directed the U.S. Army Corps of Engineers (USACE) to conduct an analysis and design for comprehensive improvements or modifications to existing improvements for the coastal Mississippi region. This analysis and design is required to address hurricane and storm damage reduction, prevention of saltwater intrusion, preservation of fish and wildlife, prevention of erosion, and other related water resource purposes. In addition, USACE was directed to recommend a cost-effective project(s), but perform neither an incremental cost-benefit analysis nor maximization of net economic benefits analysis as the basis to select the recommended project(s). Based on this congressional language, the Mississippi Coastal Improvements Program (MsCIP) was initiated in January 2006. More information on the MsCIP project can be found at http://mscip.usace.army.mil/downloads.asp.

An interim report (IR) with recommendations for near-term improvements was completed in August 2006. This Comprehensive Plan contains final recommendations and will be submitted to Congress upon completion of independent external peer review and pubic review. The Comprehensive Plan consists of an integrated main report/environmental impact statement (EIS) and supporting appendices. The main report/EIS summarizes the plan formulation activities undertaken during development of the Comprehensive Plan, including the incorporation of risk as a decision criterion in the overall selection of plans. The Comprehensive Plan encompasses a system-wide framework of measures, which either alone or in combination, will achieve the goals and objectives of MsCIP. The framework is an integrated system of structural, nonstructural, and environmental measures.

Because of the national importance of this project, it has been directed that an Independent External Peer Review (IEPR) be conducted. The IEPR will follow the procedures described in the Department of the Army, USACE *Peer Review of Decision Documents* (EC1105-2-410) and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review*, released December 16, 2004. Thus specific charge schedule, questions, and instructions listed below pertain only to the Comprehensive Plan.

SCHEDULE

1.	Comprehensive Plan distributed to IEPR Panel with charge for review	9/18/2008
2.	IEPR Panel reviews Comprehensive Plan document	9/24/2008-10/15/2008
3.	IEPR Panel submits technical review comments to Battelle	COB 10/15/2008
4.	Battelle merges comments, prepared draft list of key issues, and Distributed to the IEPR Panel	10/20/2008
5.	Consensus conference call	10/22/2008
6.	IEPR panel prepares and submits final consensus comments	10/30/2008
7.	Battelle delivers draft IEPR report to USACE	11/7/2008
8.	Comprehensive Plan authors provide responses to IEPR Panel comments via DrChecks	11/12/2008
9.	IEPR Panel submits any final comments or clarifications via DrChecks	11/17/2008

CHARGE FOR PEER REVIEW

Members of this peer review are asked to determine whether the technical approach and scientific rationale presented in the MsCIP Comprehensive Plan are credible and whether the conclusions are valid. The reviewers are asked to determine whether the technical work is technically adequate, competently performed, properly documented, satisfies established quality requirements, and yields scientifically credible conclusions. The peer reviewers are not being asked whether they would have conducted the work in a similar manner. In addition, the reviewers are asked to determine whether the findings are appropriate to support the USACE in its decision-making process for the project. General guidance for the peer reviewers, followed by specific questions by report section, is provided below.

General Charge Guidance

1. Please answer the scientific and technical questions listed below and conduct a broad overview of the Mississippi Coastal Improvements Program (MsCIP) Comprehensive Plan (including appendices). Please focus on your areas of expertise and technical knowledge.
2. Identify, explain, and comment on assumptions that underlie economic, engineering, or environmental analyses.
3. Evaluate the soundness of models and planning methods as applicable and relevant to your area of expertise. Comment on whether models explain past events and how models will be evaluated and validated.
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. If appropriate, you can offer opinions as to whether there are sufficient analyses upon which to base a recommendation for construction, authorization, or funding.
7. 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.

8. If desired, IEPR panel members can contact each other. However, IEPR panel members **should not** contact anyone who is or was involved in the project, preparing the subject documents or that were part of the Internal Technical Review.
9. Please contact the Battelle Assistant Project Manager (Maureen Wooton wootonm@battelle.org 614-646-4890) for requests or additional information.
10. In case of media contact, notify the Battelle project manager immediately.
11. Your name and bio will appear as one of the panelists in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form via the project Sharepoint site (see URL and instructions below) or directly to Maureen Wooton (wootonm@battelle.org) no later than October 15, 2008, 8 pm Eastern Time.

SharePoint Instructions:

- Navigate to http://websps1.battelle.org/usace-epr/home/MsCIP/default.aspx.
- Enter your individual user name and password provided by Battelle to access the site.
- Click on "New Document" to open the Comment Response Form Template.
- When you have completed the form, select "Save As " and save the file using the following convention: AuthorLastName_MsCIP_EPR_CRF.doc
- Alternatively, you can save the template to your computer and Upload the final document to the site. (Note: once a file is uploaded, its contents cannot be changed or deleted; if you need to make revisions to your form, please upload the document again.)

Specific Charge Questions

Executive Summary

(No questions)

Chapter 1. Introduction

1. Comment on the completeness and clarity of the purpose and the scope of the study.

2. Comment on whether the agency and public involvement process was inclusive and sufficient to solicit technical input from the state and Federal agencies, general public, and any other stakeholders and/or interested party.

Chapter 2. Study Area Description (Affected Environment)

3. Comment on whether you agree with the general analysis of the affected environment within the study area. Is the description of the affected environment sufficient to support

the analysis of environmental effects in Chapter 4? For your particular area of expertise, provide an in-depth review of the adequacy of the analysis. (see also Appendix A)

Chapter 3. Plan Formulation (Alternatives and Plans)

4. Is the 50 year planning horizon sufficient to meet the study objectives and goals? Why or why not?

5. Is the plan formulation process discernable and sound? Can one logically understand how the tentatively selected plans fit into the overall comprehensive plan?

6. Is the discussion of problems and opportunities complete? Comment on whether the opportunities adequately describe structural, non-structural and environmentally-focused solutions and plans.

7. Please comment on the adequacy of the planning goals, objectives and constraints. What additional information, if any, should be included?

8. Was the process used to conduct a preliminary evaluation of Hurricane Storm Damage Reduction, erosion reduction, ecosystem restoration and saltwater intrusion adequate? What additional information should be considered?

9. Are the assumptions and methodology used to develop the lines of defense concept reasonable and well justified? Why or why not?

10. Is the methodology for the development, evaluation and comparison of preliminary and final alternatives adequately described? What additional information or approaches should be considered?

11. Please comment on the criteria used for the evaluation metrics. Are the metrics developed for environmental quality, national economic development, other social effects, regional economic development, and risk adequate and weighted appropriately? Why or why not?

Chapter 4. Environmental Effects

12. Are the effects to the socio-economic, physical and biological environment adequately described for the comprehensive plan? What additional information, if any, should be included?

13. Are the effects to the physical and biological environment adequately described for the Homeowner Assistance and Relocation Program? What additional information, if any, should be included?

14. Are cumulative impacts adequately addressed for all proposed actions? What information, if any, is lacking?

15. Have the no action alternative and potential impacts been adequately described for Beach and Dune Restoration, Admirals Island, Dantzler, Turkey Creek, Bayou Cumbest, Franklin Creek, the SAV Pilot, Deer Island Restoration Moss Point Relocation, Waveland Floodproofing, and Forrest Heights levee? What additional information, if any, should be included?

Chapter 5. Description of Tentatively Selected Comprehensive Plan Components.

16. Please comment on the discussion of the projects being implemented by agencies other than the USACE. In your professional opinion, is inclusion of these projects beneficial to the overall goals and objectives of the Mississippi Coastal Improvements Program? Why or why not?

17. Are there key issues pertaining to the proposed USACE implementation projects that have not been adequately addressed? Please describe.

Chapter 6. Implementation Requirements

(No questions)

Appendices

A: Environmental Appendix

18. Is the Section 404(b)(1) Evaluation Report complete with respect to engineering and environmental considerations? Why or why not?

19. Are the restoration objectives and assumptions stated for each of the proposed restoration projects complete and adequate? Why or why not? What additional information should be included?

20. Is the conclusion that the MsCIP "will be in attainment" with Mississippi's Air Quality Standards reasonable?

21. Was the Spatial Decision Support Model used appropriately for this project? Why or why not?

B: Economic Appendix

22. Is the economic analysis based on accepted economic methodologies and is it sound and appropriate for this project? Why or why not?

23. Comment on the selection and adequacy of the models used to perform the economic analysis.

24. Comment on the adequacy and appropriateness of the method used to calculate the value of the structures and contents.

25. Are the assumptions used in the analysis reasonable? Why or why not?

26. Are the six future without project scenarios reasonable? Why or why not?

27. Are the assumptions underlying the redevelopment scenarios explicit, justified and/or realistic? Are the most likely re-development scenarios included in the analysis?

C: Real Estate Appendix

28. Does this appendix adequately address all real estate interests and requirements?

29. Are the real estate cost estimates reasonable?

D: Nonstructural Formulation Appendix

30. Provide an assessment of the overall nonstructural alternative analysis, including an assessment of its quality, completeness, and feasibility.

E: Engineering Appendix

31. Provide an assessment of the overall engineering analysis, including an assessment of its quality, completeness, and feasibility.

32. Comment on the completeness and accuracy of the General section as a basis for the engineering analysis.

33. Comment on the Lines of Defense (beginning with offshore barrier islands and progressing inland) planning concept. Are the components and options within each Line of Defense appropriate?

34. Comment on the described model applications and engineering analysis appropriate to your areas of expertise: hydrodynamic and coastal process, statistical, wind and atmospheric pressure, offshore wave, nearshore wave, storm surge, stage frequency curves, barrier islands, wetlands, regional sediment budget, flood damage analysis, and geotechnical issues?

35. Do the schedules for design and construction, and operation and maintenance requirements, seem reasonable?

F: Cost Estimating Appendix

36. Is the basis for estimate and rationale provided complete and reasonable? What additional information should be considered?.

G: Risk Appendix

37. Comment on the methodology for integrating risk and uncertainty and conducting trade-offs.

38. Is the application of the Risk Informed Decision Framework (RIDF) for evaluating the benefits and consequences of the measures appropriate?

H: Barrier Islands Appendix

Please address whether the information presented is adequate to support the recommendation of Barrier Island creation and restoration.

I: Modeling Appendix

Were the models used for the MsCIP the appropriate models? In your professional opinion, are there others that should have been considered? If so, which ones and why?

J: Internal Technical/External Peer Review

(No questions)

K: Plan Formulation Appendix

39. Is the information presented in the appendix sufficient to describe the overall planning process that was described in Chapter 3 of the Environmental Impact Statement?

40. Please comment on whether the MsCIP Planning Process is complete with respect to the Traditional Planning Process.