DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
SOUTH ATLANTIC DIVISION
60 FORSYTH ST, SW, ROOM 10M15
ATLANTA, GEORGIA 30303-3490

REPLY TO
ATTENTION OF:

CESAD-PDP

MEMORANDUM FOR Commander, Wilmington District (CESAW-TS-P/Elden Gatwood)

SUBJECT: Review Plan Approval for Currituck Sound, Ecosystem Restoration, Integrated Feasibility Report and Environmental Impact Statement

1. References:
   a. Memorandum, CESAW-TS-P, 2 February 2012
   b. Memorandum, CEMVD-PD-N, 11 August 2011
   c. EC 1165-2-209, Civil Works Review Policy, 31 January 2010

2. The attached Review Plan for Currituck Sound, Ecosystem Restoration, Integrated Feasibility Report and Environmental Impact Statement (enclosure) has been prepared in accordance with EC 1165-2-209.

3. The Review Plan has been coordinated with the National Ecosystem Planning Center of Expertise (ECO-PCX) of the Mississippi Valley Division (MVD), which is the lead office to execute this plan. For further information, please contact the ECO-PCX at (309) 794-5448. The Review Plan includes independent external peer review.

4. I hereby approve this Review Plan, which is subject to change as circumstances require, consistent with study development under the Project Management Business Process. Subsequent revisions to this Review Plan or its execution will require new written approval from this office.

5. The District should take steps to post the approved Review Plan and a copy of this approval memorandum to the SAW District public internet website and provide a link to the ECO-PCX for their use. Before posting to the website, the names of Corps/Army employees should be removed.

6. The SAD point of contact for this action is Ms. Karen Dove-Jackson, CESAD-PDP, (404) 562-5225.

Encl

WILBERT V. PAYNES
Chief, Planning and Policy Community
Of Practice

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
69 DARLINGTON AVENUE
WILMINGTON, NORTH CAROLINA 28403-1343

REPLY TO
ATTENTION OF:

CESAW-TS-P

2 February 2012

MEMORANDUM FOR Commander, South Atlantic Division (CESAD-PDS-P ATTN: Wilbert Paynes)

SUBJECT: Revised of Review Plan for Currituck Sound, Ecosystem Restoration, Integrated Feasibility Report and Environmental Impact Statement

1. References.

a. EC 1165-2-209, Civil Works Review Policy, 31 Jan 2010
b. Decision Document Review Plan Template 15 June 2011

2. I hereby request approval of the enclosed Review Plan for Currituck Sound, Ecosystem Restoration, Integrated Feasibility Report and Environmental Impact Statement. The Review Plan complies with applicable policy and includes our DQC and ATR plans for this project.

3. A risk informed decision was made by CESAW not to request an exclusion from IEPR at this time.

4. The National Planning Center of Expertise for Ecosystem Restoration (ECO-PCX) has reviewed the review plan and has no objections. A memo from the ECO-PCX, endorsing the Review Plan, was sent to CESAD on 8/19/2011. A copy of that memo is enclosed.

5. The District has responded to SAD comments and modified the Review Plan accordingly.

6. The District will post the CESAD approved Review Plan to its website and provide a link to the CESAD for its use. Names of Corps employees are withheld from the posted version, in accordance with guidance.

FOR THE COMMANDER:

Elden Gatwood

Encl

Elden Gatwood
Chief, Planning and Environmental Branch

DEPARTMENT OF THE ARMY
MISSISSIPPI VALLEY DIVISION, CORPS OF ENGINEERS
P.O. BOX 80
VICKSBURG, MISSISSIPPI 39181-0080

REPLY TO
ATTENTION OF:

CEMVD-PD-N

19 August 2011

MEMORANDUM FOR Commander, South Atlantic Division
ATTN: (Wilbert Paynes, SAD-PDS-P)

SUBJECT: Currituck Sound, NC Restoration Project Integrated Feasibility Report and Environmental Impact Statement, Wilmington District, Ecosystem Planning Center of Expertise Recommendation for Review Plan Approval

1. References:
   a. Engineering Circular (EC) 1165-2-209, Water Resources Policies and Authorities, CIVIL WORKS REVIEW POLICY, 31 Jan 2010
   b. EC 1105-2-412, Assuring Quality of Planning Models, 31 March 2011
   c. Engineering Regulation (ER) 1110-2-12, Quality Management, 30 Sep 2006

2. The enclosed Review Plan (RP) complies with all applicable policy and provides an adequate agency technical review of the plan formulation, engineering, and environmental analyses, and other aspects of plan development. The Ecosystem Restoration Planning Center of Expertise (ECO-PCX) has reviewed the RP and documentation of the review is enclosed.

3. A Type I Independent External Peer Review (IEPR) would be required on this study because it meets two of the mandatory criteria: the estimated total cost of the project is greater than $45 million and the study includes an Environmental Impact Statement. The RP outlines the Type I IEPR Plan.

4. The Modified EPA Wildlife Habitat Value of Salt Marsh model proposed for use in this study needs to be reviewed by the ECO-PCX for consideration of recommendation for single-use application. The model review plan for this effort has been approved and the review is in progress. The Specific HSI Models white ibis, and great egret, least tern and alewife/blueback herring models proposed for use in this study are approved for use by HQ Memorandum Policy Guidance on Certification of Ecosystem Output Models (Aug 2008).

5. The ECO-PCX concurs with the attached RP. Upon approval by the MSC Commander, please provide the approved RP, the MSC Commander's approval memorandum, and the link to the District posting of the RP to Jodi Staebell. When substantive revisions are made to the RP, changes in project scope, or Corps policy, a revised RP should be provided to the ECO-PCX for review. Non-substantive changes do not require further PCX review.

6. Thank you for the opportunity to assist in the preparation of the Review Plan. We look forward to working with you on Model Review and IEPR.

Enclosures (1)

Jodi Staebell
Operational Director,
National Ecosystem Planning
Center of Expertise

CF:
CEMVD-PD-N (Wilbanks, Smith, Staebell)
CESAD-PDS (Stratton)
CESAW-TSD-PL (Barnes)
CESAW-PM-C (Castens)
CEMVR-PD-F (Knollenberg)

REVIEW PLAN

Currituck Sound Ecosystem Restoration Project, Currituck, North Carolina
Integrated Feasibility Report and Environmental Impact Statement

Wilmington District

SAD Approval Date: March 2012

Last Revision Date: March 2012

Previous Review Plan Approval Date: November 2007

US Army Corps of Engineers ®

REVIEW PLAN

Currituck Sound Ecosystem Restoration Project, Currituck, North Carolina
Integrated Feasibility Report and Environmental Impact Statement

TABLE OF CONTENTS

1. PURPOSE AND REQUIREMENTS

a. Purpose. This Review Plan defines the scope and level of peer review for the Currituck Sound, NC Restoration Project Integrated Feasibility Report and Environmental Impact Statement.

b. References

(1) Engineering Circular (EC) 1165-2-209, Review of Decision Documents, 31 Dec 2009

(2) EC 1105-2-412, Assuring Quality of Planning Models, 31 Mar 2011, expires 31 March 13

(3) Engineering Regulation (ER) 1110-2-12, Quality Management, 30 Sep 2006

(4) ER 1105-2-100, Planning Guidance Notebook, Appendix H, Policy Compliance Review and Approval of Decision Documents, Amendment #1, 20 Nov 2007

(5) Project Management Plan, Currituck Sound, NC Restoration Project, October 2006

(6) Enterprise Standard (ES)- 08101 Software Validation for Hydrology, Hydraulics, and Coastal Community of Practice 1 June 2011

(7) CESAD Civil Works Planning and Policy Division Quality Management Sub-plan. CESAD R 110-1-8, App C. 28 Feb 2003.

c. Requirements. This review plan was developed in accordance with EC 1165-2-209, which establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products by providing a seamless process for review of all Civil Works projects from initial planning through design, construction, and operation, maintenance, repair, replacement and rehabilitation (OMRR&R). The EC outlines four general levels of review: District Quality Control/Quality Assurance (DQC), Agency Technical Review (ATR), Independent External Peer Review (IEPR), and Policy and Legal Compliance Review. In addition to these levels of review, decision documents are subject to cost engineering review and certification by the Cost Planning Center of Expertise (PCX) (per EC 1165-2-209) and planning model certification/approval (per EC 1105-2-412).

2. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION

The RMO is responsible for managing the overall peer review effort described in this Review Plan. The RMO for decision documents is typically either a Planning Center of Expertise (PCX) or the Risk Management Center (RMC), depending on the primary purpose of the decision document. The RMO for the review effort described in this Review Plan is the Ecosystem Planning Center of Expertise (ECOPCX).

RMO will coordinate with the Cost Engineering Directory of Expertise (DX) to ensure the appropriate expertise is included on the review teams to assess the adequacy of cost estimates, construction schedules and contingencies.

3. STUDY INFORMATION

a. Decision Document. The *Currituck Sound Ecosystem Restoration Project, Currituck, NC Integrated Feasibility Report and Environmental Impact Statement* is the decision document.

Approval will be made by HQUSACE and Congressional authorization will be required. The Currituck Sound Restoration Study is being pursued under the Corps of Engineers' General Investigation (GI) Program. The Integrated Feasibility Report and Environmental Impact Statement (EIS) are being generated in response to a resolution adopted March 11, 1998:

> *"Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, That the Secretary of the Army is requested to review the report of the Division Engineer dated June 25, 1991, on Eastern North Carolina above Cape Lookout, North Carolina, and other pertinent reports, to determine whether modifications to the recommendations contained therein are advisable at the present time in the interest of water quality, environmental restoration and protection, and related purposes in Currituck Sound".*

The report of the House Committee on Appropriations accompanying the Energy and Water Development Appropriations Bill, 2001, recommended funds in the amount of $100,000 for the reconnaissance phase of the Currituck Sound, North Carolina, environmental restoration and protection project.

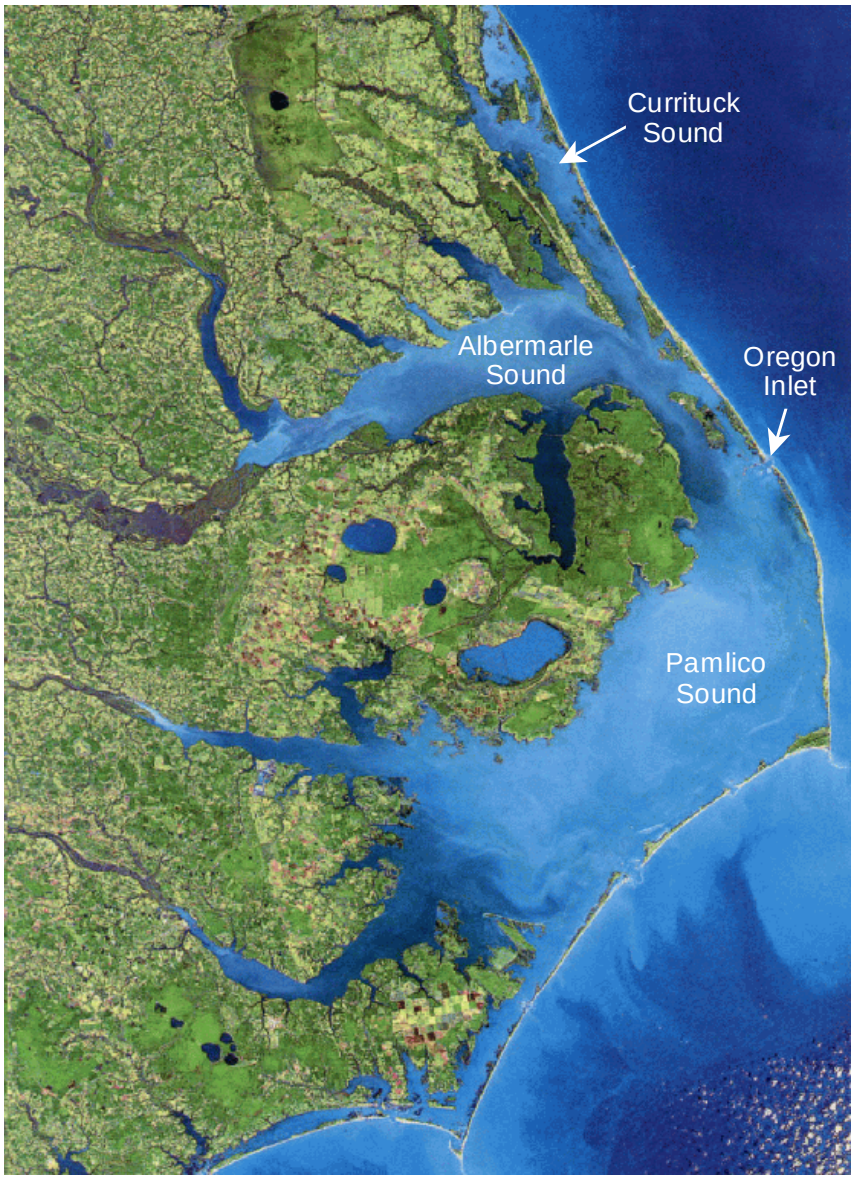
Currently data collection efforts are being conducted as part of multiple individual studies within the Currituck Sound as well as in the surrounding watersheds that impact the Sound, including Back Bay. The Currituck Sound Environmental Restoration (CSER) Study is currently formulating recommended alternatives necessary to meet the established restoration goals and objectives. A Feasibility Report and NEPA document recommending viable restoration projects and management measures will be the products of the study.

The Study focuses on understanding reasons for the decline in aquatic resources within the Sound and nearby vicinity, characterizing the present condition of the system, and developing plans for restoration and protection of this valuable resource. A critical step in this multi-phase Study is the development of a regional hydrodynamic numerical model coupled with local hydrodynamic and water quality models, which can be applied to the evaluation of the present state of Currituck Sound and used to explore possible mitigation options.

b. Study Description

Together, the US Army Corps of Engineers (USACE) and the NC Department of Environment and Natural Resources (NCDENR) are partnering to conduct a Feasibility Study to identify ways to restore Currituck Sound. This is a single-purpose study for the purpose of Ecosystem Restoration. The ongoing study is being cost shared between the USACE and NCDENR.

Currituck Sound is located on the northern portion of the North Carolina coast (Figure below). Currituck Sound is a shallow (typically < 10 ft, 3 m), non-tidal, wind influenced estuary with limited circulation. The natural opening of the Sound occurs in the south where Currituck Sound opens to Albemarle Sound at Point Harbor. Man-made connections to the Chesapeake Bay to the north and to Albemarle Sound have been constructed in the past to support navigation.



During the early history of North Carolina, Currituck Sound was a saltwater body continuously connected to the ocean by a series of inlets. A total of five known historic inlets (Old Currituck, New Currituck, Musketo, Trinity Harbor, and Caffey's) occurred alternately, but continuously, from the early 1600s through the closure of the last naturally occurring inlet in Currituck Sound, Caffey's Inlet, between 1828 and 1830. With the closing of Caffey's Inlet, over 100 square miles of lunar tidal brackish-saltwater was converted to a wind tide driven system ranging from relatively fresh (<0.5 ppt) to oligohaline (0.5-5 ppt) and previously valuable oyster beds that provided the submerged structural habitat were replaced by Submerged Aquatic Vegetation (SAV) as a keystone habitat. These habitat changes facilitated freshwater fisheries and increased waterfowl use within a few years. The flood tide deltas from the historic inlets reverted back to barrier marshes once the inlets closed and the widened areas subsequently became the beach communities of Corolla and Sanderling (Pilkey, 1998).

The establishment of an oligohaline sound following the last inlet closure created a rare and nationally significant coastal habitat. Its shallow wind driven hydrology and abundance of SAV and coastal marshes supported a thriving largemouth bass fishery and provided an ideal habitat for migratory waterfowl. This in turn supported a large sport fishing and hunting industry that was unique to Currituck County and contributed significantly to its economy.

Beginning in the early- to mid-1900's, following the myriad of natural and anthropogenic modifications to the Currituck Sound watershed associated with development pressures, construction and maintenance of navigation channels and locks, agricultural ditching, roadway construction, etc., several scientific investigations were initiated to evaluate the recognized decline in SAV and other associated aquatic resources throughout the Currituck Sound. Through these investigations, an array of reasons were suggested for this decline including: salinity fluctuations (i.e., opening of the canals and locks) and reduced light penetration associated with turbidity (i.e., dredging activities and nutrient loading).

From a comprehensive review and evaluation, particular valued ecosystems within the Currituck basin were identified which offer disproportionate need and opportunities for restoration due to either their roles as critical linkages to other ecosystems or their threatened and reduced extent. These valued ecosystems include: marsh and shallow water habitats, submerged aquatic vegetation, and estuarine islands and waterbird nesting. All of these habitats are interrelated at the ecosystem level considering common species, habitats and threats. Additionally, they are connected by way of estuarine water column or by way of the food web through consumption of aquatic resources by fish, birds and mammals. The integrity of the entire system depends upon the health of areas and individual habitat types within the system (Deaton et al. 2010). The presence of all of these habitat types in appropriate quantity and proximity would contribute to overall health of the ecosystem.

Study Problem Statement: Alteration of the natural coastal processes in the CSER Study area has resulted in the creation of a unique wind-tide driven oligohaline back barrier ecosystem. This ecosystem, which once supported an abundance of submerged aquatic vegetation, coastal marshes, and islands and associated wildlife and fisheries, has been degraded as a result of anthropogenic activities in the Sound and surrounding watershed. Areal extent of these keystone habitats has declined, weakening their interconnectedness and altering energy regimes throughout the Sound thereby reducing their capacity for self repair. This facilitates a negative feedback that continues to destabilize the ecosystem by reinforcing change and causing continued site alteration.

c. Factors Affecting the Scope and Level of Review.

Technical Challenges: Availability of suitable and acceptable data and models for use in analysis and the ability to compare outputs in a meaningful way because of the diversity of habitat types in the study area poses challenges for the Environmental Benefits Analysis. Additionally, making a connection between possible measures across the very large watershed may also be a challenge.

Social Challenges: No Social Challenges are anticipated.

Institutional Challenges: Time and cost requirements for implementation of the Study, including the level of necessary review, pose a challenge with the local sponsor. The sponsor

suggests a more focused study approach but USACE policy and process require a watershed approach.

Risk: The PDT worked to manage risk in developing measures. It developed measures by expanding on and referencing successful similar work completed by the USACE Wilmington District and others, including the State of North Carolina. The team used the experience from previous projects to identify possible risks and decrease uncertainty in plan formulation.. Significant risk would be avoided by proper design, appropriate site selection, and correct seasonal timing of biotic applications. Unforeseen temporary perturbations during habitat establishment would be addressed by making allowances for replanting during the biotic establishment period. The dynamic and complex nature of coastal environmental processes is a principal source of uncertainty. Post-construction monitoring and adaptive management plans would be used to address 20 unplanned outcomes in all Tentatively Selected Plan components.

Threat to human life/safety: There are no anticipated threats to human life or safety.

Governor request for review: The Governor of North Carolina has not requested a peer review by independent experts.

Public Dispute: The project is not expected to involve significant public dispute as to the size, nature, or effects of the project, or to the economic or environmental cost or benefit of the project.

Project Design: The information in the decision document or anticipated project design is not based on novel methods and does not involve the use of innovative materials or techniques, present complex challenges for interpretation, contain precedent-setting methods or models, or present conclusions that are likely to change prevailing practices. The project design does not require redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design construction schedule.

d. In-Kind Contributions.

Products and analyses provided by non-Federal sponsors as in-kind services are subject to DQC, ATR, and IEPR. For the Currituck Sound Ecosystem Restoration Study, the local sponsor has provided approximately $234,000 in in-kind contributions, in the form of data collection.

4. DISTRICT QUALITY CONTROL (DQC) .

All decision documents (including supporting data, analyses, environmental compliance documents, etc.) shall undergo DQC. DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). The DQC Team will be comprised of management or staff that has not been directly involved in the day to day conduct of the study effort. The home district shall manage DQC. Documentation of DQC activities is required and should be in accordance with the Quality Manual of the District and the home MSC.

The Wilmington District is responsible for controlling quality for all work that it accomplishes. The SAW Quality Management Plan establishes district roles, responsibilities and processes consistent with the South Atlantic Division's Quality Management Plan (28 Feb 2003). The PDT is responsible for a complete reading of the report to assure the overall integrity of the

report, technical appendices, and the recommendations before approval by the District Commander.

In general, the USACE Civil Works regulations, policy letters, technical manuals, and pertinent federal laws will serve as the basis of the technical review. Checklists developed by each functional area organization on the PDT may be used during the review process.

a. Documentation of DQC. Documentation of the technical and policy review of a specific product will be sufficient to allow both planning management and QC reviewers to feel confident that a comprehensive review was conducted in accordance with principles and guidelines established. All in-progress review actions, review team meetings, and other significant technical review related actions will be documented in the form of a written memorandum prepared by the review leader

Products to Undergo DQC. All documents will be submitted for DQC prior to Agency Technical Review.

5. AGENCY TECHNICAL REVIEW (ATR).

ATR is mandatory for all decision documents (including supporting data, analyses, environmental compliance documents, etc.). The objective of ATR is to ensure consistency with established criteria, guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct and comply with published USACE guidance, and that the document explains the analyses and results in a reasonably clear manner for the public and decision makers. ATR is managed within USACE by the designated RMO (ECOPCX) and is conducted by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. ATR teams will be comprised of senior USACE personnel and may be supplemented by outside experts as appropriate. The ATR team lead will be from outside the home MSC.

a. Products for Review. ATR was conducted on Feasibility Scoping Meeting (FSM) documentation in the summer of 2009. During this ATR, compliance with established policy, principles, and procedures utilizing justified and valid assumptions were verified. This included review of

- Assumptions
- Methods, procedures, and material used in analyses
- Alternatives evaluated
- The appropriateness of data used and the level of data obtained
- Reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing USACE policy.

In addition, the Model Review package underwent ATR in August 2011. This review was performed by the USACE Environmental Research and Development Center (ERDC).

ATR will also be conducted on Alternatives Formulation Briefing documentation, the Draft Report (including NEPA documentation and appendices), and the Final Report (including NEPA documentation and appendices.

b. Required ATR Team Expertise. The following provides a list of ATR Team disciplines and expertise required for the Neuse River Basin ATR team. The expertise represented on the ATR team reflects the significant expertise involved in the work effort, and in general, mirrors the expertise on the PDT. ATR Team members were determined by the RMO, in cooperation with the PDT, vertical team, and other centers of expertise, The names, organizations, contact information, credentials, and years of experience of the ATR members are included in Attachment 1.

ATR Team Member Expectations:

Plan Formulation: Team member will be experienced in Ecosystem Restoration Planning and familiar with applicable USACE plan formulation standards and procedures. Additionally, the team member will be experienced in Environmental Benefits Analysis modeling as it relates to the proposed measures for this study.

Hydrology & Hydraulics: Team member will be experienced in the field of hydrology & hydraulics and have a thorough understanding of specific requirements based on study objectives and proposed measures – for example, knowledge of watershed hydrology, channel dynamics, enclosed sound systems, application of measures for fetch reduction within the Sound, etc. Additionally, the team member will be experienced in computer modeling techniques that will be used, such as ADCIRC, CH3D, CE-QUAL-ICM, etc.

Environmental: Team member will be experienced in the field of estuarine, freshwater, and barrier island ecosystems as they relate to the proposed study measures. Specifically, the team member should be knowledgeable of salt marsh and SAV communities as well as be familiar with all National Environmental Policy Act (NEPA) requirements.

Economics: Team member will be experienced in in Economic analyses for Ecosystem Restoration studies and have a thorough understanding of requirements based on study objectives and proposed measures.

Cost Engineering: Team member will be experienced in Cost Engineering analyses for Ecosystem Restoration studies and have a thorough understanding of requirements based on study objectives and proposed measures.

Cultural Resources: Team member will be experienced in the field of cultural resource evaluations. Specifically, the team member should be capable of fulfilling all cultural resource requirements in accordance with National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA). Additionally, the team member shall be experienced in Native American Graves Protection and Repatriation Act (NAGPRA) requirements related to the proposed study measures.

Real Estate: The RE team member must be able to review the real estate plan and the real estate aspects of the planning documents, being familiar with and having expertise in the real estate planning process for cost shared and federal civil works projects, relocations, navigational servitude issues, report preparation and the reviewing and acquisition of real estate interests.

b. Documentation of ATR. DrChecks review software has been/will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. Comments should be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment will normally include:

(1) The review concern – identify the product's information deficiency or incorrect application of policy, guidance, or procedures;

(2) The basis for the concern – cite the appropriate law, policy, guidance, or procedure that has not be properly followed;

(3) The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability; and

(4) The probable specific action needed to resolve the concern – identify the action(s) that the reporting officers must take to resolve the concern.

In some situations, especially addressing incomplete or unclear information, comments may seek clarification in or to then assess whether further specific concerns may exist. The ATR documentation in DrChecks includes the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical coordination, and lastly the agreed upon resolution. The ATR team will prepare a Review Report which includes a summary of each unresolved issue; each unresolved issue will be raised to the vertical team for resolution. Review Reports will be considered an integral part of the ATR documentation and shall:

- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions; and
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

ATR may be certified when all ATR concerns are either resolved or referred to HQUSACE for resolution and the ATR documentation is complete. Certification of ATR should be completed, based on work reviewed to date, for the AFB, draft report, and final report. A sample certification is included in ER 1110-2-12.

6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR).

IEPR may be required for decision documents under certain circumstances. IEPR is the most independent level of review, and is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside of USACE is warranted. A risk-informed decision, as described in EC 1165-2-209, is made as to whether IEPR is appropriate. IEPR panels will consist of independent, recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of areas of expertise suitable for the review being conducted. There are two types of IEPR:

- Type I IEPR. Type I IEPR reviews are managed outside the USACE. Type I IEPR panels assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, economic analysis, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating

risk and uncertainty, models used in the evaluation of environmental impacts of proposed projects, and biological opinions of the project study. Type I IEPR will cover the entire decision document or action and will address all the underlying engineering, economics, and environmental work, not just one aspect of the study. For decision documents where a Type II IEPR (Safety Assurance Review) is anticipated during project implementation, safety assurance shall also be addressed during the Type I IEPR per EC 1165-2-209.

- Type II IEPR. Type II IEPR, or Safety Assurance Review (SAR), are managed outside the USACE and are conducted on documents concerning design and construction activities for hurricane, storm, and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. Type II IEPR panels will conduct reviews of the design and construction activities prior to initiation of physical construction and, until construction activities are completed, periodically thereafter on a regular schedule. The reviews shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health safety and welfare.

a. **Decision on IEPR..** A risk informed decision analysis has been performed and a decision has been made by the District that performance of Type I IEPR will be necessary based on criteria in EC 1165-2-209 and discussed in section 6.a.3 (below) as well as the information provided in section 3 (above). No significant threat to human life is anticipated, and current expectations are that Type II IEPR will not be required. A final determination concerning the requirement/need for a Type II IEPR will be made and documented in the Review Plan that addresses the project construction phase.

1. Implementation Guidance: The implementation guidance states that activities shall include preparation of a decision document which will contain at a minimum: Plan Formulation Analysis, an Incremental Analysis/Cost Effectiveness Analysis, the Appropriate National Environmental Policy Act Documentation, and the Results of Agency Technical Review and Independent External Peer Review to justify proceeding with the Selected Plan. All of these elements have been addressed except the Independent External Peer Review which is discussed below.

2. **Engineer Circular 1165-2-209 Requirements:** Prior to issuance of this Engineering Circular this study was given a waiver from external peer review (Neuse River Basin Restoration Feasibility Study Peer Review Plan 11 October 2007). At the time it was determined that (1) no influential scientific information will be produced by the study and (2) the risk was assessed as low. Since that time, these factors are still relevant. Factors that trigger an Independent External Peer Review described in the Engineer Circular and their relevance to this project are discussed below.

3. According to Engineer Circular 1165-2-209, Appendix D, any of the following factors trigger the requirement for a Type I Independent External Peer Review:

    a. Significant threat to human life. No significant threat to human life is anticipated. The project involves various ecosystem restoration measures in Currituck Sound.

    b. Total project cost greater than $45 million. It is currently anticipated that the current cost estimate will be more than $45 million. Final cost estimates will

be reviewed by the Cost Estimating Center of Expertise at Walla Walla District.

c. Request by the State Governor. There has been no request for Independent External Peer by the Governor of North Carolina.

d. Request by a State or Federal Agency. There has been no request for Independent External Peer Review by any State or Federal Agency.

e. Significant public dispute. There is no significant public dispute. Based on public scoping, the U.S. Army Corps of Engineers (Corps) determined that an Environmental Impact Statement will be necessary.

f. Methods are novel or complex. Measures currently proposed may be considered novel. Further analysis will show if these measure will be screened from further consideration.

g. Chief of Engineers determines Independent External Peer Review is necessary. To date, the Chief of Engineers has not determined that Independent External Peer Review is necessary.

a. Products for Review. The Draft Report (including NEPA documentation and appendices) is planned to undergo Type I IEPR at this time.

b. Required IEPR Panel Expertise. The Type I IEPR Panel should consist of a similar make-up to the ATR team. The following expertise should be represented:

Plan Formulation: Team member will be experienced in Ecosystem Restoration Planning and familiar with applicable USACE plan formulation standards and procedures. Additionally, the team member will be experienced in Environmental Benefits Analysis modeling as it relates to the proposed measures for this study.

Hydrology & Hydraulics: Team member will be experienced in the field of hydrology & hydraulics and have a thorough understanding of specific requirements based on study objectives and proposed measures – for example, knowledge of watershed hydrology, channel dynamics, enclosed sound systems, and application of measures for fetch reduction within the Sound, etc. Additionally, the team member will be experienced in computer modeling techniques that will be used such as ADCIRC, CH3D, CE-QUAL-ICM, etc.

Environmental: Team member will be experienced in the field of estuarine, freshwater, and barrier island ecosystems as they relate to the proposed study measures. Specifically, the team member should be knowledgeable of salt marsh and SAV communities as well as be familiar with all National Environmental Policy Act (NEPA) requirements.

Economics: Team member will be experienced in Economic analyses for Ecosystem Restoration studies and have a thorough understanding of requirements based on study objectives and proposed measures.

Cultural Resources: Team member will be experienced in the field of cultural resource evaluations. Specifically, the team member should be capable of fulfilling all cultural resource requirements in accordance with National

Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA). Additionally, the team member shall be experienced in Native American Graves Protection and Repatriation Act (NAGPRA) requirements related to the proposed study measures.

Cost Engineering: Team member will be experienced in Cost Engineering analyses for Ecosystem Restoration studies and have a thorough understanding of requirements based on study objectives and proposed measures.

Real Estate: The RE team member must be able to review the real estate plan and the real estate aspects of the planning documents, being familiar with and having expertise in the real estate planning process for cost shared and federal civil works projects, relocations, navigational servitude issues, report preparation and the reviewing and acquisition of real estate interests.

c. Documentation of IEPR. The Type I IEPR panel will be selected and managed by an Outside Eligible Organization (OEO) per EC 1165-2-209, Appendix D. Panel comments will be compiled by the OEO and should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. IEPR comments should generally include the same four key parts as described for ATR comments in Section 5.c above. The OEO will prepare a final Review Report that will accompany the publication of the final decision document and shall:

- Disclose the names of the reviewers and their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions; and
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

The final Review Report will be submitted by the OEO no later than 60 days following the close of the public comment period for the draft decision document. USACE shall consider all recommendations contained in the Review Report and prepare a written response for all recommendations adopted or not adopted. The final decision document will summarize the Review Report and USACE response. The Review Report and USACE response will be made available to the public, including through electronic means on the internet.

DrChecks review software will be used to document IEPR comments and aid in the preparation of the Review Report. Comments should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. IEPR comments should generally include the same four key parts as described for ATR comments in Section 5.c. The OEO will be responsible for compiling and entering comments into DrChecks. The IEPR team will prepare a Review Report that will accompany the publication of the final report for the project and shall:

- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions; and
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

The final Review Report will be submitted by the IEPR panel no later than 60 days following the close of the public comment period for the draft decision document. The report will be considered and documentation prepared on how issues were resolved or will be resolved by the District Commander before the district report is signed. The recommendations and responses will be presented to the CWRB by the District Commander with an IEPR panel or OEO representative participating, preferable in person.

7. POLICY AND LEGAL COMPLIANCE REVIEW.

All decision documents will be reviewed throughout the study process for their compliance with law and policy. Guidance for policy and legal compliance reviews is addressed in Appendix H, ER 1105-2-100. These reviews culminate in determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the home MSC Commander. DQC and ATR augment and complement the policy review processes by addressing compliance with pertinent published Army policies, particularly policies on analytical methods and the presentation of findings in decision documents.

8. COST ENGINEERING DIRECTORY OF EXPERTISE REVIEW AND CERTIFICATION.

All decision documents shall be coordinated with the Cost Engineering DX, located in the Walla Walla District. The Cost Engineering DX will assist in determining the expertise needed on the ATR team and Type I IEPR team and in the development of the review charge(s). The DX will also provide the Cost Engineering DX certification. The ECO PCX is responsible for coordination with the Cost Engineering DX.

9. MODEL CERTIFICATION/APPROVAL.

EC 1105-2-412 mandates the use of certified or approved models for all planning activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. Planning models, for the purposes of the EC, are defined as any models and analytical tools that planners use to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate potential effects of alternatives and to support decision making. The use of a certified/approved planning model does not constitute technical review of the planning product. The selection and application of the

model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR.

EC 1105-2-412 does not cover engineering models used in planning activities. The responsible use of well-known and proven USACE developed and commercial engineering software will continue and the professional practices part of the USACE Scientific and Engineering Technology (SET) Initiative, many engineering models have been identified as preferred or acceptable for use on USACE Studies. Use of engineering models is also subject to DQC, ATR, and IEPR.

Planning Models. The following planning models are anticipated to be used in the development of the decision document: A series of planning and biological models were used in this study. In accordance with EC 1105-2-412, IWR Plan was used to establish cost effective alternatives and compare the incremental cost benefits of alternatives. The planning and biological models used to quantify environmental benefits have completed ATR as recommended by the Ecosystem (ECO) PCX. The District is coordinating with the ECO PCX to determine what needs to be done to complete model approval. The information presented in this section will be presented at the Alternative Formulation Briefing for discussion and support in granting approval of these models for use in this study.

A description of each of the models and the results of technical review follow:

Model Name and Version	**Brief Description of the Model and How It Will Be Applied in the Study**	**Approval for Use Status**
Spatial Decision Support System (SDSS) model	A restoration SDSS is a flexible but also formalized and systematic GIS-based method for scaling, weighting, and combining multiple, spatially explicit variables that are in a raster (cell-based) format, for the purpose of identifying distinct areas within a larger landscape that present good opportunities for restoration of a particular resource. Every cell within the landscape matrix has a value calculated for it based on the value of its input variables. High opportunity cells identified through the SDSS can then be the focus of more detailed analysis for the purposes of calculating benefits and costs. Conceptually, a SDSS is something that has been widely used by numerous agencies and researchers for a variety of purposes and applications. Lin et al (2006) provides some additional background on the topic. Two separate spatial decision support system models were developed for this study, one for identifying marsh complex restoration areas, and one for identifying bird island nesting areas. The marsh complex model contains 7 variables, and the bird island model contains 5 variables. All variables are scaled to a 0-2 score and	Submitted to PCX approval for use – currently going through ATR process

	assigned equal weights.	
Modified US EPA model for assessing salt marshes	The EPA model represents a stand-alone assessment tool based on wildlife habitat values of coastal wetlands. The model quantifies salt marsh health and function through the valuation of marsh characteristics and the presence of habitat types. The USEPA model quantifies habitat values based on marsh characteristics and the presence of habitat types that contribute to use by terrestrial species. Model's developers identified 79 birds, 20 mammals, and 6 amphibian and reptile species that utilize New England salt marsh habitat at some life stage. Habitat requirements of these species were determined through a search of published literature, unpublished reports, anecdotal information from wetland ecologists and personal observations of the model's creators. From the available information, the developers identified common habitat types associated within salt marshes, or those that were reported as being used by at least 3 bird or mammal species. These habitat types, as well as the habitat requirements of salt marsh fauna, form the basis of the salt marsh assessment model.	Submitted to PCX approval for use – currently going through ATR process
Functional Linkage Index GIS tool (used as part of the modified EPA model)	The Functional Linkage Index is a metric for measuring connectivity among habitat patches. The Functional Linkage Index Tool is a GIS tool that can be used to calculate the metric. The FLI falls into the general category of connectivity metrics that are based on matrix permeability. It uses least-cost distances as a way of approximating functional connectivity, and also allows for more robust measurements of habitat quality. The score should be of particular use for comparing relative changes to connectivity resulting from various development or restoration scenarios within a specified study area. Because the FLI is meant to be measured in a Geographical Information System (GIS) environment, a tool for calculating the metric within ESRI's ArcGIS was also created concurrently with the development of the metric.	Submitted to PCX approval for use
USFWS HSI models	Specific HSI Models proposed for use include; white ibis, and great egret (tree nesters), least tern (sand nester) and alewife/blueback herring. Model descriptions are available at http://el.erdc.usace.army.mil/emrrp/emris/emrishelp3/list_of_habitat_suitability_index_hsi_models_pac.htm. The proposed bird and fish species were chosen because of their occurrence in the study area, affinity	US Fish and Wildlife Service HSI models are already approved for use and require no additional

	for specific habitat types proposed for restoration (wooded and sand, bird nesting islands and herring spawning canals) and the availability of existing models for these particular species. The availability of two tree nesting species models will allow for combination of species specific output into a community output.	documentation

Engineering models: The following engineering models wereused in the development of the decision document:

Model Name and Version	**Brief Description of the Model and How It Will Be Applied in the Study**	**Approval for Use Status**
CH3DWES	The CH3D model uses a horizontally boundary-fitted curvilinear grid and a vertically sigma grid, and hence is suitable for application to coastal and nearshore waters with complex shoreline and bathymetry. The non-orthogonal grid enables CH3D to more accurately represent the complex geometry than the orthogonal grid, which is used by most other ocean circulation models. The model contains a robust turbulence closure model which enables accurate simulation of stratified flows in estuaries and lakes.	Allowed for Use
ADCIRC	ADCIRC is a system of computer programs for solving time dependent, free surface circulation and transport problems in two and three dimensions. These programs utilize the finite element method in space allowing the use of highly flexible, unstructured grids. Typical ADCIRC applications have included: (i) modeling tides and wind driven circulation, (ii) analysis of hurricane storm surge and flooding, (iii) dredging feasibility and material disposal studies, (iv) larval transport studies, (v) near shore marine operations.	CoP Preferred

The CH3D-WES Model was used simulate physical processes impacting circulation and vertical mixing including tides, wind, density affects (salinity and temperature), freshwater inflows, turbulence, and the effect of the earth's rotation. This information helped provide a better understanding of the hydrodynamics of Currituck Sound and was further was used to assess problems and impacts. The ADCIRC model was used to define boundary conditions.

10. REVIEW SCHEDULES AND COSTS

a. ATR Schedule and Cost.

REVIEW PHASE	COMPLETION DATE	COST
ATR of FSM Documentation	Fall 2009	$23,000
ATR of Models Package	Spring 2011	$10,000
ATR of AFB Documentation	Summer 2012	$25,000
ATR of Draft Feasibility Report	Winter 2012/2013	$20,000
ATR of Final Report	Winter 2013/2014	$10,000

* Estimated costs are based on the actual cost of the ATR for the FSM Documentation, as well as communication with the PCX Guild.

b. IEPR Schedule and Cost.

REVIEW PHASE	COMPLETION DATE	COST
IEPR of Draft Feasibility Report	TBD in coordination with PCX	$125,000

c. Model Certification/Approval Schedule and Cost. A planning model approval for use package was sent to the PCX in April 2011. The models themselves are currently undergoing ATR at a cost of approximately $10,000. Planning Model use and outputs, as well as Engineering model use and output, will undergo ATR as part of the AFB, Draft, and Final Reports.

11. PUBLIC PARTICIPATION

Public comments are solicited for the duration of the Study through initiatives such as the initial public scoping meeting, interagency coordination meetings, and the posting of study products and documents on the District website for public access and review. Once completed, the Currituck Sound Integrated Feasibility Report will be disseminated to resource agencies, interest groups, and the public as part of the National Environmental Policy Act (NEPA) environmental compliance review. The report will include an Environmental Impact Statement (EIS). Public entities and private individuals may also review and comment on draft document. All significant and relevant public comments will be provided as part of the review package to Peer Reviewers as they are available and may include but are not limited to: scoping letters, meeting minutes, other received letters, and emails.

12. REVIEW PLAN APPROVAL AND UPDATES

The South Atlantic Division (SAD) is responsible for approving the review plan. Approval is provided by the South Atlantic Division Commander. The commander's approval reflects vertical team input (involving Wilmington District, SAD, PCX, and HQUSACE members) as to the appropriate scope and level of review for the decision document. This Review Plan is a living document and may change as the study progresses. Minor changes to the review plan since the last SAD Commander approval will be documented in Attachment 3. Significant changes to the Review Plan (such as changes to the scope and/or level of review) will be re-

approved by the SAD Commander following the process used for initially approving the plan. The latest version of the Review Plan, along with the Commanders' approval memorandum, is posted on the Wilmington Districts webpage. The latest Review Plan is also provided to the RMO and home MSC.

13. REVIEW PLAN POINTS OF CONTACT

Questions and/or comments on this review plan can be directed to the following points of contact:

- Project Manager

  US Army Corps of Engineers – Wilmington District

  CESAW-PM-C

  69 Darlington Avenue

  Wilmington, NC 28403

- Lead Planner

  US Army Corps of Engineers – Wilmington District

  CESAW-TS-PE

  69 Darlington Avenue

  Wilmington, NC 28403

- Lead Environmental

  US Army Corps of Engineers – Wilmington District

  CESAW-TS-PE

  69 Darlington Avenue

  Wilmington, NC 28403

- MSC Point of Contact

  US Army Corps of Engineers – South Atlantic Division

  CESAD-PDS

  60 Forsyth Street, Rm. 10M15

  Atlanta, GA 30303

  Phone: (404) 562-5228

- Eco PCX SAD Account Manager

  US Army Corps of Engineers – Eco PCX

  CENAO-WR-PR

  803 Front Street

  Norfolk, VA 23510

ATTACHMENT 2: ATR CERTIFICATION TEMPLATE

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the *Combined Feasibility Report and Environmental Assessment* for *Manteo, Old House Channel, NC* located in Dare County, NC. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-209. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks[sm].

SIGNATURE

Name Date

ATR Team Leader

Office Symbol/Company

SIGNATURE

Pam Castens Date

Project Manager

PM-C

SIGNATURE

Name Date

Architect Engineer Project Manager[1]

Company, location

SIGNATURE

Name Date

Review Management Office Representative

Office Symbol

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows: *Describe the major technical concerns and their resolution.*

As noted above, all concerns resulting from the ATR of the project have been fully resolved.

SIGNATURE

Name Date

Chief, Engineering Division

Office Symbol

SIGNATURE

Name Date

Chief, Planning Division

Office Symbol

[1] Only needed if some portion of the ATR was contracted

ATTACHMENT 3: ACRONYMS AND ABBREVIATIONS

Term	Definition	Term	Definition
AFB	Alternative Formulation Briefing	NCDENR	North Carolina Department of Environment and Natural Resources
ATR	Agency Technical Review	NEPA	National Environmental Policy Act
CESAW	US Army Corps of Engineers, South Atlantic Division	OVEST	Office of the Chief of Engineers Value Engineering Study Team
CWRB	Civil Works Review Board	PDT	Project Delivery Team
DQC	District Quality Control	PMP	Project Management Plan
DX		P&S	Plans & Specifications
ECO-PCX	National Ecosystem Planning Center of Expertise	RMO	Resource Management Office
EIS	Environmental Impact Statement	SAD	South Atlantic Division
FSM	Feasibility Scoping Meeting	USACE	United States Army Corps of Engineers
GI	General Investigations	Walla Walla Dx	Walla Walla District Directorate for Civil Works Cost Engineering
HQ	Headquarters		
IEPR	Independent External Peer Review		
LOI	Letter of Intent		
MSC	Major Subordinate Command		