

**Review Plan
U.S. Army Corps of Engineers
SAD Division
SAW District**

**Eagle Island Confined Disposal Facility
Toe Berms and Erosion Protection
Brunswick County, North Carolina**

Implementation Documents

MSC Approval Date: 05-07-2021

Last Revision Date: *None*

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1. Purpose and Requirements

a. Purpose

This Review Plan defines the scope and level of review activities for preparing implementation documents for the Eagle Island Confined Disposal Facility Toe Berms and Erosion Protection and will ensure that a quality engineering project is developed by the Corps of Engineers in accordance with EC 1165-2-217, "Review Policy for Civil Works." As discussed below, the review activities consist of a District Quality Control (DQC) effort, Policy and Legal Review, and a Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) Review. Also discussed below, an Agency Technical Review (ATR) and an Independent External Peer Review (IEPR) are not recommended. The project is in the construction phase. The implementation documents to be reviewed are the Design Documentation Report (DDR) and Plans and Specifications (P&S). Upon approval, this Review Plan will be included in the Wilmington Harbor Project Management Plan as an appendix to the Quality Management Plan.

b. Guidance and Policy References

- EC 1165-2-217, Review Policy for Civil Works, 20 Feb 2018;
- ER 1110-1-12, Quality Management, 30 Sep 2006
- ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 Aug 1999
- ER 415-1-11, Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) Review, 1 Jan 2013
- EM 1110-1-1804, Geotechnical Investigations, 1 Jan 2001
- EM 1110-1-1904, Settlement Analysis, 30 Sep 1990
- EM 1110-2-1902, Slope Stability, 31 Oct 2003
- EM 1110-2-1906, Laboratory Soils Testing 20 Aug 1986
- EM 1110-2-1913, Design and Construction of Levees, 30 Apr 2000
- EM 1110-2-5025, Dredging and Dredged Material Management, 31 Jul 2015
- Wilmington Harbor Project Quality Management Plan
- Wilmington Harbor Project Management Plan
- Wilmington District (SAW) QMS 100 Quality Management (QM) Standard Operating Procedure (SoP)
- Wilmington District (SAW) QMS 101.1 Quality Management System for Civil Works Products

c. Requirements

This Review Plan was developed in accordance with EC 1165-2-217, 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 provides the procedures for ensuring the quality and credibility of U.S. Army Corps of Engineers (USACE) decision, implementation, and operations and maintenance documents and other work products. The EC outlines the various levels of review that can be implemented: District Quality Control (DQC), Agency Technical Review (ATR), Independent External Peer Review (IEPR), Policy and Legal Review, and a Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) Review. This Review Plan identifies the most important skill sets needed in the reviews, the objective of the review, and the specific advice sought, thus setting the appropriate scale and scope of review for this individual project. This Review Plan should be provided to the PDT, and the DQC Team.

d. Review Management Organization

The South Atlantic Division (SAD), the Major Subordinate Command (MSC), is the Review Management Organization (RMO) for this project. Contents of this Review Plan have been coordinated with the SAD. In-Progress Review (IPR) team meetings with SAD and Wilmington District (SAW) will be scheduled on an “as needed” basis to discuss programmatic, policy, and technical matters.

2. Project Description and Information

a. Project Description

Wilmington Harbor is located at Wilmington on the southern coast of North Carolina in New Hanover and Brunswick Counties. The Wilmington Harbor project consists of two separable elements, the portion for annual maintenance dredging of the harbor and the portion for constructing and raising the dikes on Eagle Island Confined Disposal Facility (CDF) to contain the dredged material.

Since the early 1900s, the upper portion of Wilmington Harbor has been dredged using a hydraulic cutterhead pipeline dredge with disposal of the dredged material in disposal areas located adjacent to the channel. The Eagle Island CDF, located on the peninsula between the Cape Fear and Brunswick Rivers south of Highway 17, has been the primary disposal site for dredged material from the upper portion of Wilmington Harbor for decades. The Eagle Island CDF is located on a 1,473-acre tract owned by the U.S. Army Corps of Engineers. Eagle Island dikes were constructed in the late 1970s and now encompass approximately 740 acres of diked uplands. The existing Eagle Island CDF currently consists of three cells: Cell 1, Cell 2, and Cell 3 with diked areas of approximately 220, 260 and 260 acres, respectively. Cells are utilized for disposal on a rotating basis and dikes are raised as needed.

The operating plan for the Eagle Island CDF has been to pump dredged material into one of the three disposal cells each year during the annual Wilmington Harbor Anchorage Basin maintenance dredging while the other two disposal cells are being prepared for dike raising. The other two cells are dewatered and ditched to dry out material on the interior of the disposal cells to provide a source of borrow to raise the dikes. The top of dike elevations are increased in increments of approximately three to six feet for each dike raise event. The existing approximate top of dike elevation is 42' NAVD88 for Cells 2 and 3 and 40' NAVD88 for Cell 1. There are two to three spillway systems in each cell. The spillway systems include a box weir with timber stop logs for adjusting the water level during disposal operations. The spillway box weirs are raised and relocated as needed for dike raising.

The project was authorized by the Water Resources Development Acts of 1986 (PL 99-662) and 1996 (PL 104-303) and the Energy and Water Development Appropriations Act of 1998.

b. Work Description

The Toe Berms and Erosion Protection project will construct exterior toe berms around Cell 3 and erosion protection along the east side of Cell 2.

The toe berm work around Cell 3 consists of removal of trees, clearing and grubbing the toe berm footprint, and placement of fill material. The exterior toe berms will be constructed along the west and north sides of the embankment dike for Cell 3. The exterior toe berms will serve as a buttressing-type of support to the dike allowing additional dike raise increments. Material required for construction will come from the interior of the Cell 2 diked area. Control and diversion of water along with pumping and dewatering will be required in Cell 2 for borrow material.

The erosion protection work along Cell 2 consists of general grading of the existing dike and toe berm and placement of bedding and riprap materials. The erosion protection will be placed on the Cape Fear River (east) side and will be approximately 1,000 feet in length.

Additionally, the Contractor will be responsible for sediment and erosion control for both areas.



Figure 1. Extent of Exterior Toe Berms around Cell 3.

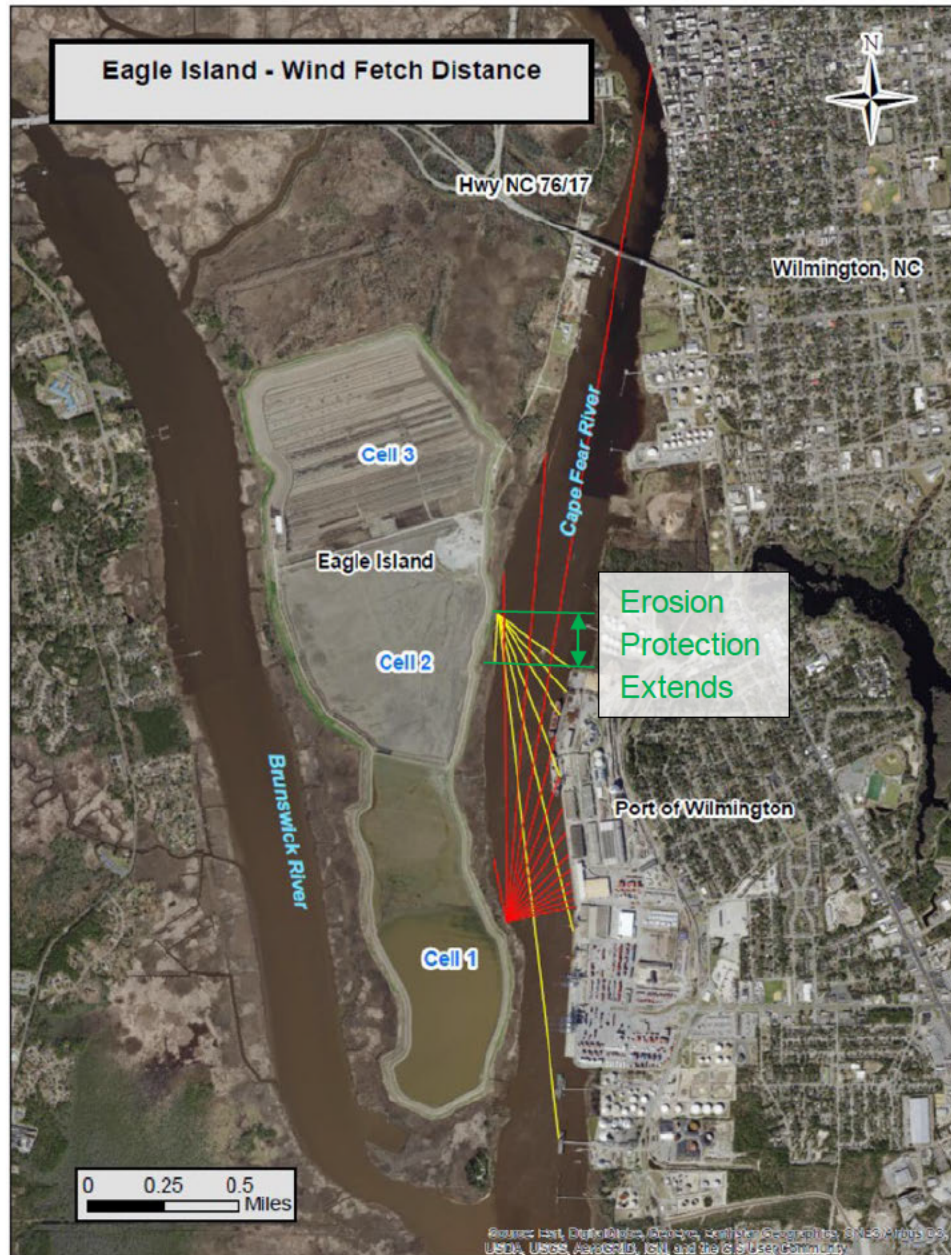


Figure 2. Location of Erosion Protection along Cell 2.

3. District Quality Control

a. Requirements

All documents (including supporting data, analyses, environmental compliance documents, etc.) shall undergo a DQC. District Quality Control (DQC) and Quality Assurance activities for the DDR and the Plans & Specifications are stipulated in ER 1110-1-12, "Quality Management." The subject DDR and P&S will be prepared by the Wilmington District using existing procedures and will undergo DQC Review. The DQC

Review will be managed by the Wilmington District and will include resources from the Wilmington District. DQC Reviews will be performed at the 65% and 95% design phases of the P&S.

All computations, drawings or sketches shall undergo a rigorous independent check as part of the standard Quality Control (QC) process. Quality checks may be performed by staff responsible for the work, such as supervisors, work leaders, team leaders, designated individuals from the senior staff, or other qualified personnel. However, they should not be performed by the same people who performed the original work, including managing/reviewing the work in the case of contracted efforts. Quality checks include a review of the schedules, budgets, means and methods of construction, and whether lessons learned have been considered. DQC is assuring the math and assumptions are correct by having a checker review all computations. The documentation of the computation review will be done by initializing each sheet of the computations. Checking is accompanied by a red check mark or similar annotation next to the item that has been checked. An alternative method of documentation will be the use of a DQC Review Checklist that indicates items checked, which are initialized by reviewer. For drawings, the checker shall either follow similar procedures as the computations and place a red check mark or similar annotation on each dimension/elevation, note or reference showing concurrence with the correctness of the information shown or use a DQC Review Checklist. Additionally, the PDT is responsible for ensuring consistency and effective coordination across all project disciplines during project design and construction management. See Attachment 1 for PDT and DQC members and disciplines.

b. Documentation

Documentation of DQC activities is required and should be in accordance with the Quality Manual of the District and the home MSC. DrChecks review software will be the official system for the continuity of the review record for DQC Reviews. DrChecks review software will be used to document DQC Review comments, responses and associated resolutions accomplished throughout the review process.

4. Agency Technical Review

There is a requirement for all implementation documents to undergo ATR; however, the work being described in this Review Plan do not need to undergo ATR because they are based on and similar to documents that have previously undergone an ATR. The layout of the Cell 3 toe berms will be completed such that overall impacts to wetlands for the entire Eagle Island project remains within the 35.5 acres that have been mitigated for and stay within the footprint that was previously established. The analyses for the toe berms around Cell 3 were previously completed in FY15 & FY16 and went

through ATR. The analysis for erosion protection was included in the FY19 Improvements design effort and DQC Reviews and ATR were completed on it. The Toe Berms and Erosion Protection project will be based on and use similar methods and requirements as the FY19 and FY20/21 construction documents that have previously gone through the ATR process.

5. Independent External Peer Review / Safety Assurance Review

a. Requirements.

EC 1165-2-217 provides implementation guidance for both Sections 2034 and 2035 of the Water Resources Development Act (WRDA) of 2007 (Public Law (P.L.) 110-114). The EC addresses review procedures for both the Planning and the Design and Construction Phases (also referred to in USACE guidance as the Feasibility and the Pre-construction, Engineering and Design Phases, respectively). The EC defines Section 2035 Safety Assurance Review (SAR) as a Type II Independent External Peer Review (IEPR). The EC requires Type II IEPR be conducted outside USACE. Type II IEPR, or Safety Assurance Review (SAR), are managed outside the USACE and are conducted on 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.

b. Type I IEPR Determination

Type I IEPR is generally for decision documents. No decision documents or other applicable Section 2034 products are addressed by this Review Plan. Therefore, Type I IEPR is not applicable to the documents addressed by this Review Plan.

c. Type II IEPR/Safety Assurance Review (SAR) Determination

For any design and construction activities that are justified by life safety or for which the failure of the project would pose a significant threat to human life, a SAR is required. A recommendation for an exclusion from this requirement must be documented in the Review Plan with a thorough discussion of why there are no potential failure modes for the project that would pose a significant threat to human life. A project is determined to have a "significant threat to human life" if at any time during the construction or operation, failure could result in a substantial life safety concern. The consequences of failure and the population at risk are paramount for the SAR determination. Existing risk

information, including risk assessments, should be used to facilitate and inform this determination.

A risk-informed decision was made as to whether conducting a SAR is appropriate based on the below consideration factors as outlined in EC 1165-2-217, Section 12 (h) thru (i).

(1) The failure of the project would pose a significant threat to human life.

The Toe Berms and Erosion Protection project will only include toe berms and erosion protection and will be constructed in accordance with program requirements and constraints. The CDF is located on an island and any population near the CDF is located on the opposite side of the river. The river and tidal marshes between the dike and the houses would act as a buffer to reduce any effect of a failure. Therefore, failure or loss of the dike or spillways will not pose a significant threat to human life.

(2) The project involves the use of innovative materials or techniques and the engineering is based on novel methods, presents complex challenges for interpretations, contains precedent-setting methods or models, or presents conclusions that are likely to change prevailing practices.

This Toe Berms and Erosion Protection project will utilize methods and procedures used by the Corps of Engineers on other similar works and are not innovative, novel, nor precedent setting.

(3) The project design requires redundancy, resiliency, and robustness.

The Eagle Island CDF dike design is in accordance with EM 1110-2-1902, "Slope Stability," EM 1110-2-5025, "Dredging and Dredged Material Management," and EM 1110-2-1913, "Design and Construction of Levees." Following the design guidance in these manuals provides for some robustness and resiliency of the dike embankment. Multiple spillways for each cell provide redundancy to remove water. The capacity of the spillway pipes is large adding to robustness. Incorporation of best practices for drainage filter and diaphragm around the spillway pipes provide resiliency.

(4) The project has unique construction sequencing or a reduced or overlapping design construction schedule; for example, significant project features accomplished using the Design-Build or Early Contractor Involvement delivery systems.

The project design is not anticipated to require unique construction sequencing, or a reduced or overlapping design construction schedule. The construction sequence has been used successfully by the Corps of Engineers on other similar works.

Based on the discussion above, the District Chief of Engineering, as the Engineer-In-Responsible-Charge, does not recommend a Type II IEPR.

d. Products to Undergo Type II IEPR – Not Applicable

e. Required Type II IEPR Panel Expertise – Not Applicable

f. Documentation of Type II IEPR – Not Applicable

6. Policy and Legal Compliance Review

All implementation documents will be reviewed throughout the project for their compliance with law and policy. 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 augments and complements the policy review processes by addressing compliance with pertinent published Army policies.

7. Biddability, Constructability, Operability, Environmental, and Sustainability Review

The value of a BCOES review is based on minimizing problems during the construction phase through effective checks performed by knowledgeable, experienced personnel prior to advertising for a contract. Biddability, constructability, operability, environmental, and sustainability requirements must be emphasized throughout the planning and design processes for all programs and projects, including during planning and design. This will help to ensure that the government's contract requirements are clear, executable, and readily understandable by private sector bidders or proposers. It will also help ensure that the construction may be done efficiently and in an environmentally sound manner, and that the construction activities and projects are sufficiently sustainable. Effective BCOES reviews of design and contract documents will reduce risks of cost and time growth, unnecessary changes and claims, as well as support safe, efficient, sustainable operations and maintenance by the facility users and maintenance organization after construction is complete. A BCOES Review will be conducted for this project at the Final Design Phase. BCOES will be managed by the Wilmington District with team members from SAW.

8. Review Schedule and Costs

a. Schedule of Reviews

To the extent practical, reviews should not extend the design schedule but should be embedded in the design process. Reviewers shall be involved at key decision points and are encouraged to provide timely over the shoulder comments. An overall review schedule that shows timing and sequence of all reviews is provided below.

PROJECT PHASE/SUBMITTAL	REVIEW START DATE	REVIEW END DATE
DQC Review of 65% Design	29 March 2021	2 April 2021
DQC Review of 95% Design	19 April 2021	23 April 2021
BCOES Review	10 May 2021	14 May 2021
Policy and Legal Review	16 June 2021	22 June 2021

*Dates subject to change

b. IEPR Schedule and Costs

A Type II IEPR will not be required for this project.

9. Public Participation of Review Plan

As required by EC 1165-2-217, the approved Review Plan will be posted on the District public website (<http://www.saw.usace.army.mil/Library/Review-Plans/>). The public will have 30 days to provide comments on the documents; after all comments have been submitted, the comments will be provided to the technical reviewers. This is not a formal comment period and there is no set timeframe for the opportunity for public comment. If comments are received, the PDT will consider them and decide if revisions to the review plan are necessary. This engagement will ensure that the peer review approach is responsive to the wide array of stakeholders and customers, both within and outside the federal government.

10. Review Plan Approval and Updates

The MSC for this is the South Atlantic Division. The SAD Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input as to the appropriate scope and level of review. The Review Plan is a living document and may change as the study progresses; the District is responsible for keeping the Review Plan up to date. Minor changes to the Review Plan since the last SAD Commander's approval will be documented in an Attachment to this plan. Significant changes to the Review Plan (such as changes to the scope and/or level of review) should be re-







approved by the SAD Commander following the process used for initially approving the plan. The latest Review Plan should be provided to the PDT and the DQC Team.

11. Engineering Model Certification and Approval

The use of certified or approved engineering models is required for all activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. The responsible use of well-known and proven USACE developed and commercial engineering software will continue and the professional practice of documenting the application of the software and modeling results will be followed. 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 and IEPR (if required). The following engineering models are anticipated to be used for this phase of the project.

MODEL	STATUS
AutoDesk AutoCAD 2019	Approved
AutoDesk Civil 3D 2019	Approved
AutoDesk Civil 3D 2020	Approved

12. Review Plan Points of Contact

NAME/TITLE	ORGANIZATION	EMAIL/PHONE
 Geotechnical Engineer, Engineer Technical Lead	CESAW-ECP-EG	
 Quality Manager	SAD	



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Attachment 1. Team Rosters

PDT Members

Title	Name	Organization	Email / Phone
Project Manager	[REDACTED]	CESAW-PM-DJ	[REDACTED]
Project Mangement Analyst	[REDACTED]	CESAW-PM-D	[REDACTED]
Engineering Technical Lead / Geotechnical Engineer	[REDACTED]	CESAW-ECP-EG	[REDACTED]
Geotechnical Engineer	[REDACTED]	CESAW-ECP-EG	[REDACTED]
Civil Engineer	[REDACTED]	CESAW-ECP-ED	[REDACTED]
Civil Engineering Technician	[REDACTED]	CESAW-ECP-ED	[REDACTED]
Biologist	[REDACTED]	CESAW-ECP-PE	[REDACTED]
Cost Engineer	[REDACTED]	CESAW-ECP-ET	[REDACTED]
GIS Specialist	[REDACTED]	CESAW-ECP-ET	[REDACTED]
CADD Coordinator	[REDACTED]	CESAW-ECP-ED	[REDACTED]
General Engineer	[REDACTED]	CESAW-ECP-ED	[REDACTED]
General Engineer	[REDACTED]	CESAW-ECP-ED	[REDACTED]
Deputy District Counsel	[REDACTED]	CESAW-OC	[REDACTED]
Contracting Specialist	[REDACTED]	CESAW-CT-D	[REDACTED]
Contracting Officer	[REDACTED]	CESAW-CT	[REDACTED]



DQC Reviewers

Discipline	Name	Organization	Email/ Phone
Civil Engineer	[REDACTED]	CESAW-ECP-ED	[REDACTED]
Cost	[REDACTED]	CESAW-ECP-ET	[REDACTED]
Environmental	[REDACTED]	CESAW-ECP-PE	[REDACTED]
Geotechnical	[REDACTED]	CESAW-ECP-EG	[REDACTED]
Geotechnical	[REDACTED]	CESAW-ECP-EG	[REDACTED]
Construction	[REDACTED]	CESAW-ECP-CA	[REDACTED]
Construction	[REDACTED]	CESAW-ECP-CA	[REDACTED]



Attachment 2. Review Plan Revisions

Revision Date	Description of Change	Page / Paragraph Number