



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NORTH ATLANTIC DIVISION
FORT HAMILTON MILITARY COMMUNITY
302 GENERAL LEE AVENUE
BROOKLYN NY 11252-6700

CENAD-PD-P

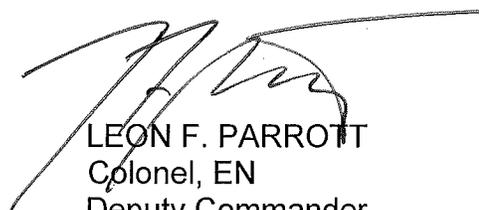
DEC 20 2017

MEMORANDUM FOR Commander, U.S. Army Corps of Engineers, Baltimore District,
10 South Howard Street Baltimore, MD 21201

SUBJECT: Request for Approval of the Metropolitan Washington, District of Columbia
(DC, MD, and VA) Coastal Storm Risk Management Feasibility Study Review Plan

1. Reference Memorandum, CENAB-PL-P, dated 8 Dec 2017, subject as above.
2. The Coastal Storm Risk Management Planning Center of Expertise of the North Atlantic Division (NAD) is the lead office to execute the referenced Review Plan. The Review Plan includes Independent External Peer Review.
3. The enclosed Review Plan is approved for execution and is subject to change as study circumstances require, consistent with study development under the Project Management Business Process. Subsequent revisions to this Review Plan or its execution require new written approval from the NAD Commander.
4. The point of contact is Mr. Larry Cocchieri, NAD Planning Program Manager at 347-370-4571 or Lawrence.J.Cocchieri@usace.army.mil.

Encl


LEON F. PARROTT
Colonel, EN
Deputy Commander



DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
10 S. HOWARD STREET
BALTIMORE, MD 21201

CENAB-PL-P

8 Dec 2017

MEMORANDUM FOR COMMANDER, U.S. Army Engineer Division North Atlantic, (CENAD-PD-X/Mr. Cocchieri), Fort Hamilton Military Community, 302 General Lee Avenue, Brooklyn, NY 11252-6700

SUBJECT: Submission of the Metropolitan Washington, District of Columbia (DC, MD, and VA) Coastal Storm Risk Management Feasibility Study (P2 No. 404563) Project Review Plan

1. References:

- a. EC 1165-2-214, Civil Works Review, 15 DEC 2012.
- b. ECB 2016-9, Civil Works Review, 4 MAR 2016.
- c. Memorandum, CEPCX-CSR, 14 Nov 2017, subject: Metropolitan Washington, District of Columbia (DC, MD, and VA) Coastal Storm Risk Management Feasibility Study.

2. The subject feasibility study requires a project review plan (reference 1a and 1b).

3. In collaboration with the Flood Risk Management Planning Center of Expertise, the National Planning Center for Coastal Storm Risk Management reviewed and endorsed the subject review plan (reference 1c).

4. CENAB requests review and approval of the project review plan, and posting on CENAD's project review plan website.

5. If you have any questions regarding the project review plan, please contact Mr. Daniel Bierly, Chief, Civil Project Development Branch, at Daniel.M.Bierly@usace.army.mil or (410) 962-6139.

Encls

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EDWARD P. CHAMBERLAYNE, P.E.
COL, EN
Commanding

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CF:
CPD Branch Reading File
PL Division Reading File

DWR ROBBINS/0685/CENAB-PL-P

BIERLY/6139/CENAB-PL-P

CHALECKI/4900/CENAB-PL

GUISE/4900/CENAB-PL

NOLTA/3358/CENAB-PP-C

MORROW/7960/CENAB-PP

HANSON/4568/CENAB-EX

CHAMBERLAYNE/4545/CENAB-EX



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U.S. ARMY CORPS OF ENGINEERS, NORTH ATLANTIC DIVISION
FORT HAMILTON MILITARY COMMUNITY
302 GENERAL LEE AVENUE
BROOKLYN NY 11252-6700

CEPCX-CSRМ

14 Nov 2017

MEMORANDUM FOR: Commander, U.S. Army Corps of Engineers, Baltimore District (CENAB-PL-P/ Dave Robbins), City Crescent Building 10 South Howard Street Baltimore MD 21201

SUBJECT: Metropolitan Washington, District of Columbia (DC, MD, and VA) Coastal Storm Risk Management Feasibility Study

1. The National Planning Center for Coastal Storm Risk Management (PCX-CSRМ) has reviewed the Review Plan (RP) for the subject study and concurs that the RP complies with current peer review policy requirements contained in EC 1165-2-214, entitled "Civil Works Review." The Review Plan includes Independent External Peer Review.
2. The review was performed by Mr. Larry Cocchieri, PCX-CSRМ.
3. PCX-CSRМ has no objection to RP approval by the Commander, North Atlantic Division.
4. Thank you for the opportunity to assist in the preparation of the RP. PCX-CSRМ is prepared to lead the Agency Technical Review for the subject study and will continue to coordinate with the project delivery team. For further information, please contact me at 347-370-4571.

A handwritten signature in black ink, appearing to read "Larry Cocchieri".

LARRY COCCHIERI
Deputy, National Planning Center of
Expertise for Coastal Storm Risk
Management

REVIEW PLAN

**METROPOLITAN WASHINGTON, DISTRICT OF COLUMBIA (DC, MD,
and VA) COASTAL STORM RISK MANAGEMENT STUDY**

Feasibility Study

**U.S. Army Corps of Engineers
Baltimore District**

**MSC Approval Date: Dec 20, 2017
Last Revision Date: N/A**



**US Army Corps
of Engineers**
Baltimore District

REVIEW PLAN

**METROPOLITAN WASHINGTON, DISTRICT OF COLUMBIA (DC, MD, and VA)
COASTAL STORM RISK MANAGEMENT FEASIBILITY STUDY**

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1. PURPOSE AND REQUIREMENTS

a. **Purpose.** This Review Plan defines the scope and level of peer review for the Metropolitan Washington, District of Columbia (DC, MD, and VA) Coastal Storm Risk Management Feasibility Study.

b. References

- (1) Planning Bulletin (PB) 2016-02, Civil Works Review, 4 Mar 2016
- (2) Engineering Circular (EC) 1165-2-214, Civil Works Review, 15 Dec 2012
- (3) EC 1105-2-412, Assuring Quality of Planning Models, 31 Mar 2011
- (4) Engineering Regulation (ER) 1110-1-12, Quality Management, 30 Sep 2006
- (5) ER 1105-2-100, Planning Guidance Notebook, Appendix H, Policy Compliance Review and Approval of Decision Documents, Amendment #1, 20 Nov 2007
- (6) Planning SMART Guide (<http://planning.usace.army.mil/toolbox/smart.cfm>)
- (7) Planning Manual Part II: Risk-Informed Planning, 2017-R-03, Jul 2017
- (8) U.S. Army Corps of Engineers, Baltimore District (USACE) Quality Management Plan

c. **Requirements.** This review plan was developed in accordance with EC 1165-2-214 (with interim guidance provided with PB 2016-02), 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 (per EC 1165-2-214) 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 peer review effort described in this Review Plan is the National Planning Center for Coastal Storm Risk Management (CSRMC-PCX), and in consultation with the National Flood Risk Management Planning Center of Expertise (FRM-PCX).

The RMO will coordinate with the Civil Works Cost Engineering and Agency Technical Review Mandatory Center of Expertise (MCX) 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 study for which this review plan has been prepared is the Metropolitan Washington, District of Columbia (DC, MD, and VA) Coastal Storm Risk Management Feasibility Study. The purpose of the report is to obtain Congressional authority for construction of the recommended plan for flood risk management within the study area. The feasibility report requires approval of the Chief of Engineers, and will require Congressional authorization for construction. The National Environmental Policy Act (NEPA)

document currently anticipated for this study will be an environmental impact statement (EIS), which could evaluate environmental impacts of one or more areas across the study area that could be included in the recommended plan.

- b. Study/Project Description.** The study area encompasses Washington, D.C. and the surrounding metropolitan area in the Commonwealth of Virginia and the State of Maryland (Figure 1). The study area is limited to those areas along rivers and other waterways that are subject to tidal flooding, coastal storm flooding, and interior drainage damages within areas of coastal flooding. The goal of the study is to support resilient communities by recommending actions to manage flood risk to vulnerable populations, properties, infrastructure, and environmental and cultural resources. The study will investigate solutions that will manage coastal flood risk considering future climate and sea level change scenarios in ways that support the long-term resilience and sustainability of the District of Columbia metropolitan region. Solutions including structural and non-structural flood risk management measures may include actions by USACE as well as other federal and non-federal entities.

The problem is defined as coastal flooding that has caused extensive property damage and disruption to critical services supporting communities, including the continuity of operations for the Federal Government (i.e., national security implications). Storms, such as Hurricane Isabel in 2003, have resulted in approximately 10 feet (mean low low water) extreme water (8 feet surge) and may occur more frequently in the future; however, less intense but more frequent events may cause similar damages in the future due to the potential impacts of sea level change (1-6 feet of forecasted change in mean sea level over 50 years). In other words, the flood waters associated with a storm event of lower magnitude could - in the future - potentially generate a flood comparable to what occurred during Hurricane Isabel.

Additionally, to address the flooding problem, FRM infrastructure has been constructed in the twentieth century. The feasibility study will evaluate the performance of existing FRM infrastructure, including the Potomac Park Levee System, Prince George's County Levee (tidally influenced near the Town of Bladensburg, MD near the confluence of the Northeast and Northwest Branches), and Four Mile Run. This analysis will consist of a top of protection evaluation based on future condition surge scenarios.

General conceptual analyses using existing information will be used to identify scenarios to forecast a range of possible future conditions, such as current water surface elevation inundation plus bathtub increases to account for sea level change impacts. The conceptual analyses will be used to evaluate which infrastructure systems would be affected by flooding damages, including electricity, water and wastewater, communications, and transportation systems. Considering the Nation's government relies on its staff commuting from across the metropolitan region, it is important to understand the resulting impacts that direct damages may have on the continuity of operations and other emergency management functions. There has been extensive work completed to date related to the vulnerability assessment of individual jurisdictions; however, we have learned that there is no comprehensive understanding in the region of how a disruption like a large scale flood event could impact the continuity of operations of federal government agencies. There are estimates of the economic impact of the government shutdown and this could be captured as part of the analysis to demonstrate to impact to the region beyond direct damages to contents and structures. This, along with traditional National Economic Development (NED) plan benefits of structural and content damages associated with residential, commercial/industrial, and governmental facilities would be evaluated to consider federal interest along with regional resilience. Initial economic analyses will be based on an assumption that 50-, 65-, and 80-percent risk

reduction would be provided by flood risk management alternatives to reduce damages (i.e., damages prevented).

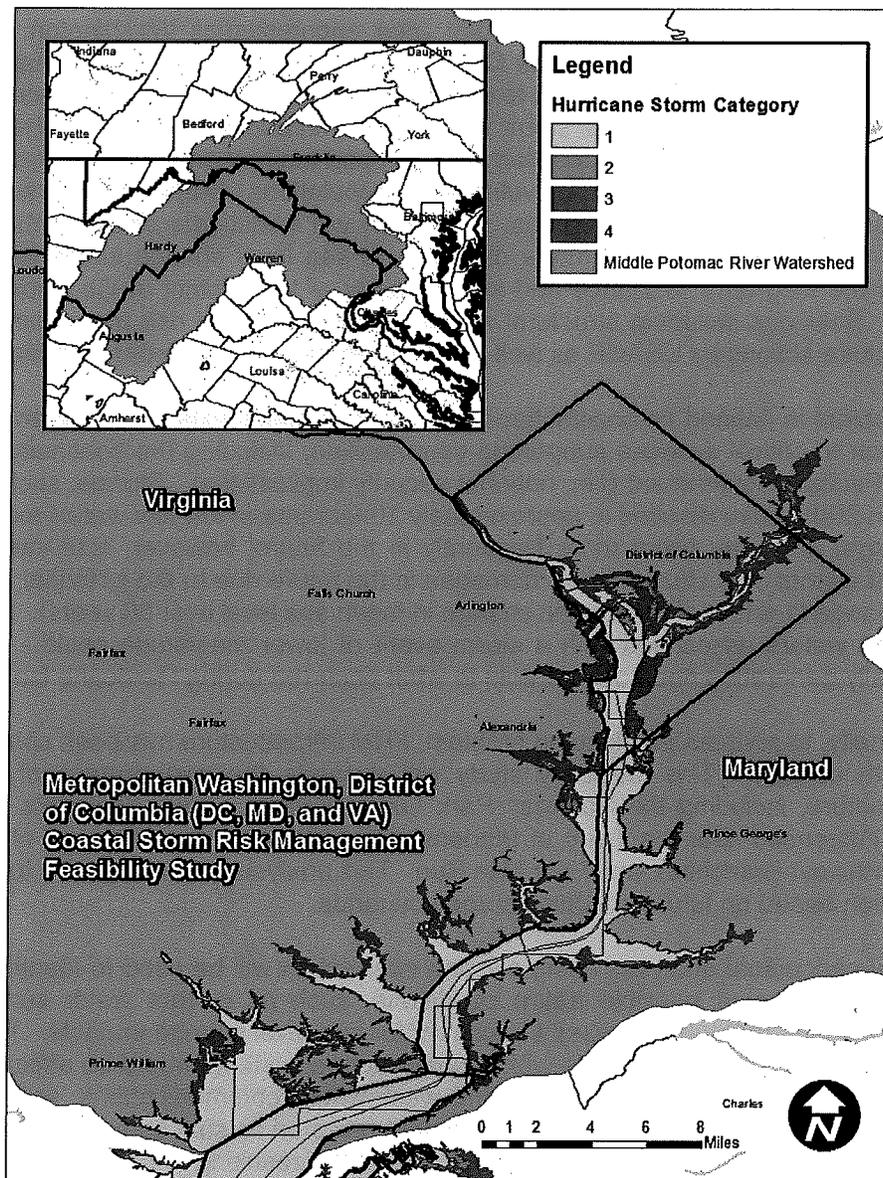


Figure 1: Study Area Map

Following from the initial problem identification, the focused array of alternatives consisting of the combination for structural, non-structural, and/or natural and nature-based features flood risk management measures will be evaluated and compared. The universe of management measures from large regional storm surge barriers to more localized structural or non-structural solutions like levees, floodwalls, floodproofing, and elevation would be evaluated and compared. Economic damages will be approximated using GIS analyses, though certified

planning models will be required for the final report presentation of cost-benefit analyses. Additionally, parametric cost estimates will be completed and used to complete benefit to cost ratio computations leading to a tentatively selected plan. NACCS information will be used to the furthest extent practicable, supplemented with local or regional information.

Information generated from the alternatives evaluation would be incorporated in the feasibility study report and corresponding floodplain management plan. Using existing recommendations from local jurisdictions, information derived from the feasibility study analyses and further collaboration with stakeholders, the floodplain management plan is intended to identify actions of stakeholders to complement the USACE tentatively selected plan to address the shared responsibility to manage flood risk within the DC metropolitan region.

The study is authorized by a resolution of the Committee on Environment and Public Works in the United States Senate, dated May 23, 2001:

That the Secretary of the Army is requested to review the Report of the chief of Engineers on the Potomac River and Tributaries in Maryland, Virginia, and Pennsylvania published in House Document 343, 91st Congress, Second Session, and other pertinent reports, with a view to conducting a study, in cooperation with the States of Maryland and West Virginia, the Commonwealths of Pennsylvania and Virginia, and the District of Columbia, their political subdivisions and agencies and instrumentalities thereof, other Federal agencies and entities, for improvements in the interest of the ecosystem restoration and protection, flood plain management, and other allied purposes for the middle Potomac River watershed.

The non-federal sponsor is the Metropolitan Washington Council of Governments (MWCOC). USACE, Baltimore District and MWCOC entered into a feasibility cost-sharing agreement on July 18, 2017.

- c. **Factors Affecting the Scope and Level of Review.** The Metropolitan Washington, District of Columbia (DC, MD, and VA) Coastal Storm Risk Management Feasibility Study will include coastal storm surge modeling and economics analyses to evaluate and compare flood risk management alternatives. Associated with these analyses would be climate and sea level change assumptions and projections to forecast a range of possible future conditions, engineering design and cost estimates, and impacts to environmental and cultural resources.
- There is a moderate level of uncertainty associated with the study related to forecasted future projections of flood risk within the study area. A range of possible future conditions would result in a range of solutions appropriate to address the flooding problem.
 - Implementation of a flood risk management project could potentially reduce flood-related risk to human life/safety. Conversely, life safety is a concern associated with failure of the design for flood risk management infrastructure. Design considerations would consider depth and velocities and how impacts from failure of a recommended plan could affect the study area and those people residing therein.
 - The study would consider structural and nonstructural alternatives. Non-performance or design exceedance of these measures could result in an increased risk to life safety. Residual flood risk communication will be required for those areas that currently include flood risk management projects.

- A peer review by independent experts has not been requested by the Mayor of the District of Columbia, nor the governors of the Commonwealth of Virginia and the State of Maryland.
 - The study is likely not to involve significant public dispute as to the size, nature, or effects of the project as flood risk management is an important consideration in the flood prone region.
 - The study is not likely to involve significant public dispute as to the economic or environmental costs or benefits of the study. Communication of the USACE planning policy evaluation of net economic benefits leading to the National Economic Development plan or a locally preferred plan may require specific public involvement activities. However, aesthetic features associated with any structural recommendation may be required to be incorporated into project designs. The National Capital Planning Commission, the regional permitting board in the National Capital Region, has noted that structural features within its jurisdiction, especially in the Monument Core area in the District of Columbia, face stringent permitting requirements associated with potential aesthetic impacts for any recommended structures.
 - The information contained in the study or any anticipated project design is not likely to be based on novel methods, 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.
 - At this stage of the investigation, it is unknown to what degree a proposed project design would require redundancy, resiliency, and/or robustness, unique construction, sequencing, or a reduced or overlapping design construction schedule. However, consideration of redundancy, resilience, and robustness of management measures and alternative plans would be considered as part of the feasibility study.
- d. **In-Kind Contributions.** Products and analyses provided by non-Federal sponsors as in-kind services are subject to DQC, ATR, and IEPR. It is anticipated that the non-Federal sponsor will not contribute technical analyses or other in-kind products as part of the study partnership agreement between USACE and MWWCOG.

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 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.

- a. **Documentation of DQC.** DQC will be documented via a memorandum signed by USACE, Baltimore District division or branch chiefs for various organizational branches/sections involved in preparation of the decision document or supporting analyses. This document will certify that DQC has been accomplished and will serve as the Quality Control Review Report. This memorandum and DQC comments and responses will be provided to the ATR Lead prior to the start of ATR.
- b. **Products to Undergo DQC.** The draft and final feasibility reports, which include the integrated EIS, will undergo DQC. Additionally, DQC will occur on technical and interim products, milestone documentation submitted to the North Atlantic Division, and other in-

progress review documentation submissions. Technical and interim products that would undergo DQC include hydrology and hydraulics, mapping, economics, environmental and cultural resources compliance requirements, designs, and cost estimates.

- c. **Required DQC Expertise.** DQC will be conducted by senior level USACE, Baltimore District staff and supervisors of the respective functional organizations. Comments and responses will be formally documented for both the project delivery team and the DQC review. A DQC lead will be identified for each product that undergoes DQC.

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 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 to Undergo ATR.** The draft and final feasibility reports, including the integrated draft and final EIS, will undergo ATR. Additional ATR of technical and interim products may be required and coordinated between the study manager and the ATR Lead, in consultation with Baltimore District and North Atlantic Division staff as appropriate. ATR team members may also review information prior to meetings with Baltimore District staff and the vertical team primarily for the team members' preparation to participate during vertical team in-progress reviews or milestone meetings. Based on further communications with the CSR-M-PCX and FRM-PCX, as well as coordination with the North Atlantic Division and HQUSACE during milestone meetings and in-progress reviews as the study progresses, Baltimore District staff will determine whether separate interim products would require review by the ATR team.
- b. **Required ATR Team Expertise.** The expertise represented by the ATR team reflects the significant expertise involved in the work effort and generally mirrors the expertise on the project delivery team. The following table presents the ATR Team disciplines and a description of the requisite expertise required to participate on the review team:

ATR Team Members/Disciplines	Expertise Required
ATR Lead	The ATR lead should be a senior professional with extensive experience in preparing Civil Works decision documents and conducting ATR. The lead should also have the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead may also serve as a reviewer for a specific discipline (such as planning, economics, environmental resources, etc.).
Plan Formulation	The Plan Formulation reviewer should be a senior water resources planner with experience in flood risk management plan formulation for both coastal and riverine flood risk management feasibility studies. The Planner

ATR Team Members/Disciplines	Expertise Required
	should have experience associated with existing flood risk management infrastructure re-evaluation related to incremental damages prevented. In addition, the planner should have general experience with water resource planning utilizing GIS and geospatial analyses and ESRI ArcInfo software products used for initial problems, needs, and opportunities screening analyses.
Economics	The reviewer should be familiar with the processes used in evaluation of FRM projects and have recent experience in preparing economic analysis plans for FRM feasibility studies, including structure inventory, economic damage computation, and benefit-cost analyses. HEC-FDA will be used for economics analyses for the final feasibility report documentation. GIS analyses will be used to estimate economic damages to be presented in the draft feasibility report documentation.
Environmental Resources	The environmental resources reviewer should be a senior water resources planner or biologist with extensive experience associated with environmental impact assessment, and NEPA environmental impact statements and environmental assessment preparation.
Cultural Resources	The Cultural Resources reviewer should be a senior archaeologist with extensive experience associated with cultural resources impact assessment and compliance with Section 106 of the National Historic Preservation Act of 1966, as amended.
Hydrology and Hydraulic Engineering (Riverine)	The reviewer should be a senior hydrologic and hydraulic engineering specialist with extensive experience associated with riverine H&H modeling. The reviewer should have experience with HEC-HMS and HEC-RAS.
Hydrology and Hydraulic Engineering (Coastal)	The reviewer should be a senior hydrologic and hydraulic engineering specialist with extensive experience associated with coastal H&H modeling. The reviewer should have experience with coastal hydrodynamic models including STWAVE and ADCIRC.
Civil Engineering	The civil engineering reviewer should be a senior civil engineer with a professional engineer license and have extensive experience associated with the design of structural and nonstructural riverine flood risk management measures. The reviewer should also be familiar with designs associated with existing flood risk management measure modifications. Additionally, the reviewer should have some experience associated with the design of coastal storm risk management measures and alternatives.
Geotechnical Engineering	The geotechnical engineering reviewer should be a senior geotechnical engineer with a professional engineer license and have extensive experience associated with geotechnical requirements of structural and nonstructural

ATR Team Members/Disciplines	Expertise Required
	riverine flood risk management measures. The reviewer should also be familiar with foundations and geotechnical investigations associated with structural flood risk management measure modifications, such as levees and floodwall modifications.
Structural Engineering	The structural engineering reviewer should be a senior structural engineer with a professional engineer license and have extensive expertise in the field of structural engineering, especially in design and review of floodwalls and closure gates.
Cost Engineering	The cost engineering reviewer should be a senior cost engineer with extensive experience associated with cost estimating for structural and nonstructural riverine flood risk management measures. The reviewer should also be familiar with designs and quantities associated with existing flood risk management measure modifications.
Real Estate	The real estate reviewer should be a senior real estate specialist with experience in the preparation and evaluation of gross real estate appraisals, temporary easements, and rights-of-way associated with flood risk management projects.
Risk Reviewer	The risk analysis reviewer will be experienced with performing and presenting risk analyses in accordance with ER 1105-2-101 and other related guidance, including familiarity with how information from the various disciplines involved in the analysis interact and affect the results. This review discipline can be combined with either the Economics or H&H review disciplines.

c. **Documentation of ATR.** DrChecks review software 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 order to then assess whether further specific concerns may exist.

The ATR documentation in DrChecks will include the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical team coordination (the vertical team includes the district, RMO, MSC, and HQUSACE), and the agreed upon resolution. If an ATR concern cannot be satisfactorily resolved between the ATR team and the PDT, it will be elevated to the vertical team for further resolution in accordance with the policy issue resolution process described in either ER 1110-1-12 or ER 1105-2-100, Appendix H, as appropriate. Unresolved concerns can be closed in DrChecks with a notation that the concern has been elevated to the vertical team for resolution.

At the conclusion of each ATR effort, the ATR team will prepare a Review Report summarizing the review. Review Reports will be considered an integral part of the ATR documentation and shall:

- Identify the document(s) reviewed and the purpose of the review;
- 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;
- Identify and summarize each unresolved issue (if any); 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 the vertical team for resolution and the ATR documentation is complete. The ATR Lead will prepare a Statement of Technical Review certifying that the issues raised by the ATR team have been resolved (or elevated to the vertical team). A Statement of Technical Review should be completed, based on work reviewed to date, for the USRB CFRM tentatively selected plan draft report and the final draft report (following agency decision milestone approval). A sample Statement of Technical Review is included in Attachment 2.

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 1165-2-214, 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 and are conducted on project studies. 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 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 1165-2-214.

- Type II IEPR. 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.

- a. **Decision on IEPR.** It is anticipated that the study would not meet all of the Type I IEPR exclusion criteria. Because of the scope, H&H, economics analyses completed on the study, and a proposed EIS NEPA document, and based on the risk informed decision as prescribed in EC 1165-2-214, Section 11.d(1), Type I IEPR is recommended. The following table summarizes these trigger and a discussion on each point is below:

Mandatory Triggers	Yes	No	To be Determined
Significant threat to human life	X		
Exceeds \$200 million (Sect 1044 of WRDA 14)			X
Governors Request		X	
Controversial by USACE Director of Civil Works		X	

The study will be subject to Type I IEPR on the basis of potential life safety risks. The general purpose of the IEPR is to consider the adequacy, appropriateness, and acceptability of the design in assuring public health, safety, and welfare. Type II IEPR, or Safety Assurance Review (SAR), is anticipated to be required on project design and implementation documents. As such, SAR considerations, including an assessment of the analyses and documentation related robustness, redundancy, and resilience of the recommended plan's features, will be completed to the furthest extent practicable on the initial designs presented in the feasibility study documentation provided to the IEPR panel.

- b. **Products to Undergo Type I IEPR.** Type I IEPR will be performed on the draft report and appendices. SAR will be addressed as part of the initial design presented as the tentatively selected plan.
- c. **Required Type I IEPR Panel Expertise.** Type I IEPR will be conducted for this study. The IEPR panel will include the necessary expertise to assess the planning, economics, environmental, and engineering analyses presented in the decision document. The following table presents the IEPR Panel disciplines and a description of the requisite expertise required to participate on the panel:

IEPR Panel Members/Disciplines	Expertise Required
Plan Formulation	The Panel Member should be from academia, a public agency, a non-governmental entity, or an Architect-Engineer or Consulting Firm with a minimum of 10 years demonstrated experience in public works planning with a

IEPR Panel Members/Disciplines	Expertise Required
	<p>Master's Degree in a relevant field. Direct experience working for or with USACE is highly preferred but not required. The panel member shall have a minimum of five years' experience directly dealing with the USACE six-step planning process, which is governed by ER 1105-2-100, Planning Guidance Notebook. Panel Member must be very familiar with USACE plan formulation process, procedures, and standards as it relates to hurricane and coastal storm risk management projects, as well as riverine flood risk management projects.</p>
Economics	<p>The Economics Panel Member should be from academia, a public agency, a non-governmental entity, or an Architect-Engineer or Consulting Firm. Member must have at least 10 years' experience directly related to water resource economic evaluation or review, with a minimum MS degree or higher in economics. Direct experience working for or with USACE is highly preferred but not required. Panel Member should be familiar with the USACE planning process, guidance, and economic evaluation techniques. Active participation in related professional societies is encouraged. Candidate should be familiar with the USACE flood risk management analysis and economic benefit calculations, including use of standard USACE computer programs including HEC-FDA.</p>
Biology/Ecology	<p>The panel member should be a scientist from academia, a public agency, a non-governmental entity, or an Architect-Engineer or Consulting Firm with a minimum 10 years demonstrated experience in evaluation and conducting NEPA impact assessments, including cumulative effects analyses. The panel member should also be familiar with all NEPA Environmental Assessment requirements as well as have experience with the Endangered Species Act, essential fish habitat, and the Marine Mammals Protection Act. The panel member should have particular knowledge of construction impacts on marine and terrestrial ecology of coastal regions of the mid-Atlantic coast of North America. The panel member should have a minimum of a Master's Degree or higher in an appropriate field of study. Active participation in related professional societies is encouraged.</p>
Hydrologic and Hydraulic Engineering	<p>The Hydrologic and Hydraulic Engineering Panel Member should be a registered professional engineer with a minimum of 15 years' experience in hydrologic and hydraulic engineering with an emphasis on large public works projects, with a minimum MS degree or higher in engineering. Active participation in related professional societies is encouraged. The panel member should have extensive experience associated with flood risk management projects with an emphasis on large river</p>

IEPR Panel Members/Disciplines	Expertise Required
	control structures, including levees and floodwalls. The panel member should have experience modeling large river systems and possesses a thorough understanding of the dynamics of open channel flow systems, floodplain hydraulics, and interior flood control systems. In addition, the panel member should have an understanding of coastal/tidal hydrodynamic influences on riverine hydraulics. The panel member should be familiar with USACE application of risk and uncertainty analyses in flood risk management studies. The panel member should also be familiar with standard USACE hydrologic and hydraulic computer models including HEC-1, HEC-HMS, HEC-2, HEC-RAS, ADCIRC, and STWAVE.
Civil Engineering	The Civil Engineering Panel Member should be a registered professional engineer from academia, a public agency whose mission includes flood damage prevention, or an Architect-Engineer or consulting firm, having a minimum of 10 years' experience in civil or construction engineering. The panel member should have demonstrated experience in performing civil engineering design for all phases of flood risk management related projects. The panel member should also be familiar with and have demonstrated experience related to concrete floodwall, earthen levee foundation, and pumping station design and construction. Panel member should be familiar with the construction industry. Additionally, the panel member should be capable of addressing the USACE Safety Assurance Review (SAR) aspects of all projects. Active participation in related professional engineering and scientific societies is encouraged.
Geotechnical Engineering	The Geotechnical Engineering Panel Member should be a registered professional engineer from academia, a public agency whose mission includes flood risk management, or an Architect-Engineer or consulting firm, having a minimum of 10 years' experience in civil or construction engineering. The panel member should have demonstrated experience in geotechnical engineering analyses for all phases of flood risk management related projects. Additional experience and familiarity of geotechnical practices associated with concrete floodwalls, earthen levee foundations and dams, and line of protection under seepage concerns. Additionally, this Panel Member should be capable of addressing the USACE SAR aspects of all projects. Active participation in related professional engineering and scientific societies is encouraged.

- d. **Documentation of Type I IEPR.** The IEPR panel will be selected and managed by an Outside Eligible Organization (OEO) per EC 1165-2-214, 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 4.d 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, 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 IEPR 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 IEPR Report and prepare a written response for all recommendations adopted or not adopted. The final decision document will summarize the IEPR Report and USACE response. The IEPR Report and USACE response will be made available to the public, including through electronic means on the internet.

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. CIVIL WORKS COST ENGINEERING AND AGENCY TECHNICAL REVIEW MANDATORY CENTER OF EXPERTISE (MCX) REVIEW AND CERTIFICATION

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

9. MODEL CERTIFICATION AND 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 (if required).

EC 1105-2-412 does not cover engineering models used in planning. 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. As part of the USACE Scientific and Engineering Technology (SET) Initiative, many engineering models have been identified as preferred or acceptable for use on Corps studies and these models should be used whenever appropriate. 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 (if required).

- a. **Planning Models.** The following table presents the planning models that are anticipated to be used 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	Certification / Approval Status
HEC-FDA v1.4 (Flood Damage Analysis)	The Hydrologic Engineering Center's Flood Damage Reduction Analysis (HEC-FDA) program provides the capability for integrated hydrologic engineering and economic analysis for formulating and evaluating flood risk management plans using risk-based analysis methods. The program will be used to evaluate and compare the existing, future without-, and future with-project alternative plans.	Certified

- b. **Engineering Models.** The following table presents the engineering models that are anticipated to be used 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 Status
HEC-HMS 3.5 (Hydrologic Modeling System)	The Hydrologic Modeling System (HEC-HMS) is designed to simulate the precipitation-runoff processes of dendritic watershed systems. It is designed to be applicable in a wide range of geographic areas for solving the widest possible range of problems. This includes large river basin water supply and flood hydrology, and small urban or natural watershed runoff. Hydrographs produced by the program are used directly or in conjunction with other software (e.g., HEC-RAS) for studies of water availability, urban drainage, flow forecasting, future urbanization impact, reservoir spillway design, flood risk management (including interior drainage analyses), floodplain regulation, and systems operation.	HH&C CoP Preferred Model
HEC-RAS 4.0 and 4.1 (River Analysis System)	The Hydrologic Engineering Center's River Analysis System (HEC-RAS) program provides the capability to perform one-dimensional steady and unsteady flow river	HH&C CoP Preferred Model

	hydraulics calculations. The program will be used for steady flow analysis to evaluate the future without- and with-project conditions along the Wild River and its tributaries. The models will be used for both steady and unsteady flow analysis.	
ADCIRC (Advanced CIRCulation Model)	This finite element, numerical model is used to simulate depth averaged hydrodynamics of coastal water bodies. ADCIRC can be forced with astronomical tidal constituents, atmospheric wind and pressure fields, wave induced radiation stresses, and river discharge. It will be used to compute the flow fields associated with tides and storm conditions for with and without project conditions. The ADCIRC modeling effort represents the primary forcing for all subsequent modeling applications and builds off of the NACCS.	HH&C CoP Preferred Model
STWave (STeady State Spectral Wave)	This steady state wave model will be used to simulate regional wave conditions. Forced with wind fields and/or an offshore wave spectrum, the model will compute wave transmission to the project site accounting for processes like directional spreading, refraction and breaking. STWave output at selected locations are used to force higher resolution wave models such as CMS-Wave or MIKE21.	HH&C CoP Preferred Model
MII	MII is the second generation of the Micro-Computer Aided Cost Estimating System (MCASES). It provides an integrated cost estimating system (software and databases) that meets USACE requirements for preparing cost estimates.	Cost Engineering Approved
Crystal Ball	Per ECB No. 2007-17, cost risk analysis methods will be used for the development of contingency for the total project cost estimate. Crystal Ball software is approved for use to conduct the total project cost and schedule risk analysis.	Cost Engineering Approved

10. REVIEW SCHEDULES AND COSTS

- a. **ATR Schedule and Cost.** The USACE planning modernization initiative incorporates the assumption that feasibility studies will be completed within three years. In order to comply with the current guidance presented ER 1105-2-100, Planning Guidance Notebook, Appendix H, Policy Compliance Review and Approval of Decision Documents, Amendment #1, 20 Nov 2007, activity milestones, particularly the review requirements associated with EC 1165-2-214, Civil Works Review Policy, 31 Jan 2012, must be completed within predefined and accepted durations. The anticipated start for ATR of the draft feasibility report is December 2018. Approximately \$136,700 has been budgeted for the ATR team to review the draft report documentation, the draft final report documentation, and meeting participation.
- b. **Type I IEPR Schedule and Cost.** The estimated Type I IEPR cost is \$200,000 for the IEPR contract. The anticipated start for IEPR of the draft feasibility report is December 2018.

- c. **Model Certification/Approval Schedule and Cost.** This section may be updated at a later date as the study progresses; however, no models anticipated to be used as part of the study require certification at this point. If model certification/approval is required at a future date, the FRM-PCX or appropriate PCX will be notified as soon as possible. The budget estimate may need to be updated based on model certification, if necessary.

11. PUBLIC PARTICIPATION

Members of the public have opportunities to comment on the development of this study throughout the study. Public involvement including scoping meetings associated with the NEPA process will occur to solicit input into the problems, needs, and opportunities within the study area. The draft and final report will be available to the local communities and participating cooperating agencies, and will be available on the Baltimore District website. Comments, questions, and other information relevant for consideration in the study may be submitted to Baltimore District staff at MetroDCCoastalStudy@usace.army.mil.

12. REVIEW PLAN APPROVAL AND UPDATES

The USACE North Atlantic Division Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input (involving district, MSC, RMO, and HQUSACE members) as to the appropriate scope and level of review for the decision document. Like the PMP, the Review Plan is a living document and may change as the study progresses. The home district is responsible for keeping the Review Plan up to date. Minor changes to the review plan since the last MSC Commander approval are documented in Attachment 3. Significant changes to the Review Plan (such as changes to the scope and/or level of review) should be re-approved by the MSC Commander following the process used for initially approving the plan. The latest version of the Review Plan, along with the Commanders' approval memorandum, should be posted on the Home District's webpage. The latest Review Plan should also be provided to the RMO and home MSC.

13. REVIEW PLAN POINTS OF CONTACT

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

- Planning Division, Baltimore District, (410) 962-4900.
- North Atlantic Division, (347) 370-4550.
- CSR-PCX Deputy Director, (347) 370-4550.
- FRM-PCX Deputy Director, (415) 503-6852.

ATTACHMENT 1: TEAM ROSTERS

Name	Role	Affiliation/Office Symbol
Gayle McCowin	Project Manager	CENAB-PP-C
Amy Guise	Chief, Planning Division	CENAB-PL
Daniel Bierly	Chief, Civil Projects Development Branch	CENAB-PL-P
David Robbins	Plan Formulation, Study Manager	CENAB-PL-P
Andrew Roach	Plan Formulation and Policy Advisor; Quality Control	CENAB-PL-P
Kristina May	Biologist	CENAB-PL-P
Michele Gomez	Environmental Resources Quality Control	CENAB-PL-P
Denise Kammerer-Cody	Economics	CENAE-EPV
Komla Jackatey	Economics	CENAB-PL-P
Louis Snead	Design Management	CENAB-ENC-M
Tanveer Chowdhury	Hydrologic and Hydraulic Engineering	CENAB-ENC-W
Mary Cialone	Coastal Hydrodynamic Engineering	ERDC-CHL
Jim Ludlum	Civil Engineering	CENAB-ENC-E
Luis Santiago	Civil Engineering	CENAB-ENC-E
Nicole Kennedy	Geotechnical Engineering	CENAB-ENG-F
Luan Ngo	Cost Engineering	CENAB-END-T
Adam Oestreich	Real Estate	CENAB-REC
<i>Team Members, Review Management Organization</i>		
Larry Cocchieri	Deputy Director, CSR-M-PCX	CENAD-PL-P
Eric Thaut	Deputy Director, FRM-PCX	CESPD-PDP
Karen Miller	NAD Regional Manager, FRM-PCX	CELRH-PM-PD
<i>Team Members, ATR</i>		
TBD	ATR Lead	TBD
TBD	Planning	TBD
TBD	Economics	TBD
TBD	Environmental Resources	TBD
TBD	Cultural Resources	TBD
TBD	Hydrology and Hydraulic Engineering	TBD
TBD	Geotechnical Engineering	TBD
TBD	Civil Engineering	TBD
TBD	Structural	TBD
TBD	Cost Engineering	TBD
TBD	Real Estate	TBD

Name	Role	Affiliation/Office Symbol
TBD	Risk Reviewer	TBD
TBD	International Coastal Engineer	TBD
<i>Team Members, CENAD</i>		
Rena Weichenberg	Plan Formulation	CENAD
Valerie Cappola	Environmental Resources	CENAD
Naomi Altschul	Econnoimcs	CENAD
Donald Cresitello	Coastal Engineering	CENAD
Ralph LaMoglia	Engineering	CENAD
Young Kim	Policy Review	CENAD
Kevin Kane	Real Estate	CENAD
<i>Federal Team Members, HQUSACE</i>		
Ray Wimbrough	Regional Integration Team	HQUSACE
Fay Lachney	Plan Formulation, Office of Water Policy Review	HQUSACE
Julie Alcon	Biologist, Office of Water Policy Review	HQUSACE
Doug Gorecki	Economics, Office of Water Policy Review	HQUSACE
John Winkelman	Engineering and Construction	HQUACE

ATTACHMENT 2: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR DECISION DOCUMENTS

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the <type of product> for <project name and location>. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-214. 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 DrCheckssm.

SIGNATURE

Name

ATR Team Leader

Office Symbol/Company

Date

SIGNATURE

Name

Project Manager

Office Symbol

Date

SIGNATURE

Name

Architect Engineer Project Manager¹

Company, location

Date

SIGNATURE

Name

Review Management Office Representative

Office Symbol

Date

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

Chief, Engineering Division

Office Symbol

Date

SIGNATURE

Name

Chief, Planning Division

Office Symbol

Date

¹ Only needed if some portion of the ATR was contracted

ATTACHMENT 3: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number

ATTACHMENT 4: ACRONYMS AND ABBREVIATIONS

<u>Term</u>	<u>Definition</u>	<u>Term</u>	<u>Definition</u>
ASA(CW)	Assistant Secretary of the Army for Civil Works	NER	National Ecosystem Restoration
ATR	Agency Technical Review	NEPA	National Environmental Policy Act
CSDR	Coastal Storm Damage Reduction	O&M	Operation and maintenance
DPR	Detailed Project Report	OMB	Office and Management and Budget
DQC	District Quality Control/Quality Assurance	OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
DX	Directory of Expertise	OEO	Outside Eligible Organization
EA	Environmental Assessment	OSE	Other Social Effects
EC	Engineer Circular	PCX	Planning Center of Expertise
EIS	Environmental Impact Statement	PDT	Project Delivery Team
EO	Executive Order	PAC	Post Authorization Change
ER	Ecosystem Restoration	PMP	Project Management Plan
FDR	Flood Damage Reduction	PL	Public Law
FEMA	Federal Emergency Management Agency	QMP	Quality Management Plan
FRM	Flood Risk Management	QA	Quality Assurance
FSM	Feasibility Scoping Meeting	QC	Quality Control
GRR	General Reevaluation Report	RED	Regional Economic Development
Home District/MSD	The District or MSD responsible for the preparation of the decision document	RMC	Risk Management Center
HQUSACE	Headquarters, U.S. Army Corps of Engineers	RMO	Review Management Organization
IEPR	Independent External Peer Review	RTS	Regional Technical Specialist
ITR	Independent Technical Review	SAR	Safety Assurance Review
LRR	Limited Reevaluation Report	USACE	U.S. Army Corps of Engineers
MSC	Major Subordinate Command	WRDA	Water Resources Development Act
NED	National Economic Development		