



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

CENAD-PD-P (1105-2-10c)

5 Dec 2022

MEMORANDUM FOR Commander, U.S. Army Corps of Engineers, Baltimore District, 2 Hopkins Plaza Baltimore, MD 21201

SUBJECT: Request for Approval of the Baltimore Coastal Storm Risk Management Feasibility Study Review Plan

1. Reference Memorandum, CENAB-PLP, dated 3 November 2022, 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 Delivery Business Process. Subsequent revisions to this Review Plan or its execution require new written approval from NAD.
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

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REINHARD W. KOENIG, PE, SES
Programs Director
North Atlantic Division



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, BALTIMORE DISTRICT
2 HOPKINS PLAZA
BALTIMORE, MD 21201

CENAB-PLP (1200A)

MEMORANDUM FOR COMMANDER U.S. Army Engineer Division, North Atlantic
(CENAD-PD-C/Tolson), 302 John Warren Avenue, Fort Hamilton Military Community,
Brooklyn, NY 11252-6700

SUBJECT: Review Plan (RP) update for the Baltimore Coastal Storm Risk Management
(CSRM) Feasibility Study (P2 Number 404561).

1. References:
 - a. Engineer Circular 1165-2-217, 20 February 2018, Review Policy for Civil Works
 - b. Memorandum, CENAD-PD-P (1105-2-10c), 24 August 2022, subject: Baltimore, MD Coastal Storm Risk Management Feasibility Study.
2. Please find the final updated RP attached for the subject study as required by reference 1a. The subject feasibility study requires a project RP update that follows the new RP template. The National Planning Center of Expertise for Coastal Storm Risk Management reviewed and endorsed the subject review plan per reference 1b.
3. The Baltimore District (CENAB) requests review and endorsement of the updated project RP and posting on CENAD's project review plan website.
4. 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.

Enclosures

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ESTHER S. PINCHASIN
Colonel, U.S. Army
Commander and District Engineer



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

CENAD-PD-P (1105-2-10c)

24 Aug 2022

MEMORANDUM FOR Commander, U.S. Army Corps of Engineers, Baltimore District, 2 Hopkins Plaza Baltimore, MD 21201

SUBJECT: Baltimore, MD Coastal Storm Risk Management Feasibility Study

1. The National Planning Center of Expertise 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 ER 1165-2-217, entitled "Civil Works Review Policy".
2. The review was performed by Mr. Donald Cresitello, PCX-CSRМ and me.
3. PCX-CSRМ has no objection to RP approval by the Director, Programs Directorate, 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 PDT. For further information, please contact me at 347-370-4571.

A handwritten signature in black ink, reading "Larry Cocchieri", is positioned above the printed name.

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

PLANNING DECISION DOCUMENT REVIEW PLAN

October 2022

OVERVIEW

Project Name: BALTIMORE COASTAL STORM RISK MANAGEMENT FEASIBILITY STUDY

P2 Number: 404561

Decision Document Type: Feasibility Report

Project Business Line: Coastal Storm Risk Management

District: North Atlantic Baltimore (NAB)

District Contact: Planner/Biologist, (410) 962-6704

Major Subordinate Command (MSC): North Atlantic Division (NAD)

MSC Contact: PCX-CSRMD Deputy Director (347) 370-4550

Review Management Organization (RMO): The National Planning Center of Expertise for Coastal Storm Risk Management (PCX-CSRMD)

RMO Contact: PCX-CSRMD Deputy Director, (347) 370-4550

Key Review Plan Dates

Date of RMO Endorsement of Review Plan: 04 Oct 2019

Date of MSC Approval of Review Plan: 02 Dec 2019

Date of IEPR Exclusion Approval: N/A

Has the Review Plan changed since RMO Endorsement? Yes (transferred to new template)

Date of Last Review Plan Revision: 24 Aug 2022

Date of Review Plan Web Posting: TBD

Date of Congressional Notifications: N/A

Milestones and Other Key Dates

	<u>Scheduled</u>	<u>Actual</u>	<u>Complete</u>
FCSA Execution:	05 Aug 2019	05 Aug 2019	Yes
Alternatives Milestone:	18 Nov 2019	18 Nov 2019	Yes
Tentatively Selected Plan:	07 Apr 2022	02 May 2022	Yes
Release Draft Report to Public:	01 Jul 2022	01 Jul 2022	Yes
Agency Decision Milestone:	07 Nov 2022	-	No
Final Report Transmittal:	15 Sep 2023	-	No
Chief's Report:	27 Mar 2024	-	No

Project Fact Sheet

Sept 2022

Project Name: Baltimore Metropolitan Coastal Storm Risk Management Feasibility Study

Location: Baltimore Harbor Watershed, Maryland

Authority: Baltimore Metropolitan Water Resources – Patapsco Urban River Restoration Initiative authority. Committee on Public Works and Transportation of the United States House of Representatives adopted a House resolution on April 30, 1992:

Resolved by the Committee on Public Works and Transportation of the United States House of Representatives, That the Board of Engineers for Rivers and Harbors, is requested to review the report of the Chief of Engineers on the Baltimore Metropolitan Area, Maryland, published as House Document 589, Eighty-seventh Congress, Second Session, and the reports of the Chief of Engineers on Baltimore Harbor and Channels, Maryland, and Virginia, published as House Document 181, Ninety-fourth Congress, First Session, and House Document 86, Eighty-fifth Congress, First Session, and other pertinent reports, to determine whether modifications of the recommendations contained therein are advisable at the present time, in the interest of flood control, hurricane protection, navigation, erosion, sedimentation, fish and wildlife, water quality, environmental restoration, recreation, and other related purposes.

Sponsor: Maryland Department of Transportation (MDOT)

Type of Study: Feasibility

SMART Planning Status: A 3 x 3 Exemption Package was approved by HQ on June 10, 2022 and was approved by ASA on July 11, 2022, providing a time extension until April 5, 2024.

Project Area: The study area encompasses Baltimore City along rivers and other waterways that are subject to flooding, storm surge, and coastal storm damages. The study area also includes Martin State Airport, located in Baltimore County.

Problem Statement: The study area encompasses the portion of the City of Baltimore and surrounding metropolitan areas in eastern Baltimore County and northern Anne Arundel County to approximately the Francis Scott Key Bridge and along the tidally influenced areas that were subject to flooding, storm surge, and damages as a result of Hurricane Sandy and other recent storms (Figure 1). The impacts of Hurricane Sandy in the study area were relatively minimal compared to the large-scale damage experienced from Hurricane Isabel in 2003 and other past storm events of record. The problem in the study area is economic damages caused by coastal storms, which cause direct damages through wave action and cause flooding in low lying areas. There are opportunities to reduce coastal storm risk to property and there may be opportunities for concomitant environmental restoration while reducing coastal storm risk. There may also be opportunities for improvement to community resilience and recreation.

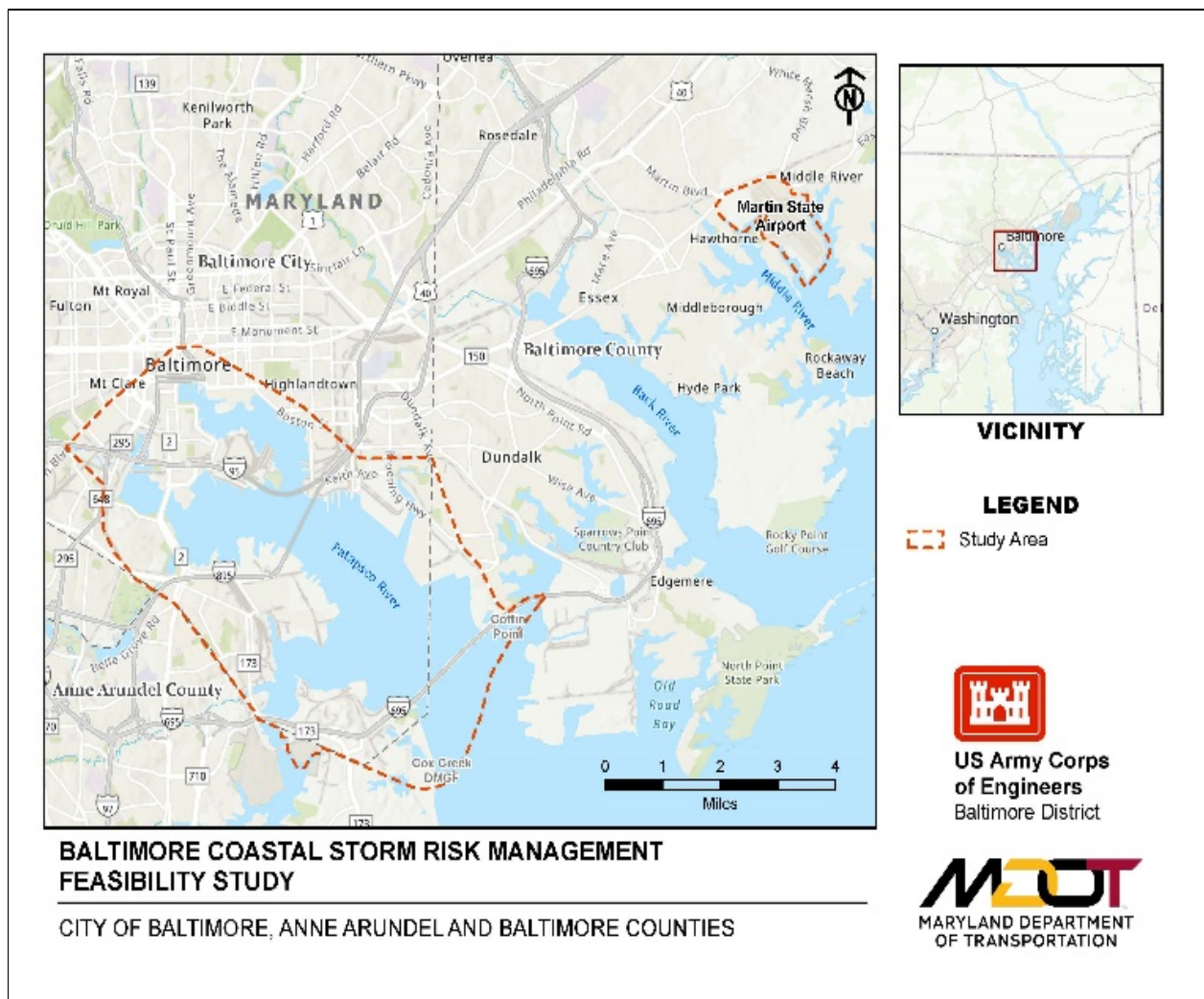


Figure 1. Study Area

Federal Interest: Opportunities exist in the study area for federal participation in multiple purpose projects that reduce economic impacts from coastal storm damage. Coastal storm risk management is needed to reduce property and life safety risk in the study area from flooding, waves, and erosion caused by coastal storms. Possible measures to reduce coastal storm risk include storm surge barriers, stormwater system improvements, berms/levees, acquisition/buyouts and relocation of properties and/or critical infrastructure, elevating structures, building codes and zoning modifications, coastal zone management, wetlands, maritime forests, and vegetated dunes and beaches. The total cost of the project is to be determined and depends on the alternative and measures selected.

Goals and Objectives: The goal of this study is to reduce coastal flood risk to vulnerable populations, properties, infrastructure, and environmental and cultural resources considering future climate and sea level change scenarios to support resilient communities in Baltimore. This study aims to reduce risks include risks to human health and safety and economic damages from coastal flooding to residential, commercial, industrial, and government buildings. This study also aims to

reduce disruption to critical infrastructure assets and improve the resiliency of critical infrastructure in the study area during coastal storm events.

Inventory and Forecast: The project base year has been identified as 2031. If no federal action is taken, more than 1,200 structures will be subject to coastal storm inundation with present sea level conditions during a storm with a 1 percent chance of occurrence.

Infrastructure and cargo would be damaged at the Port of Baltimore. Of particular concern are vehicles parked waiting for import/export on exposed parking lots at the Dundalk, South Locust Point, and Fairfield terminals. At any given time, these terminals have thousands of vehicles that are vulnerable to damage from coastal flooding.

Maryland State Highway Administration assets are vulnerable to damage from coastal flooding. Of particular concern are the Interstate 95 and 895 tunnels (Ft. McHenry and Harbor Tunnels respectively) and their supporting infrastructure. Flood waters may enter the tunnels and, in addition to severe transportation disruption, cause damage to systems in the tunnels, and structures on land housing ventilation and other equipment would be damaged in a coastal flood event.

The southern portion of the Martin State Airport runway will be inundated in a coastal storm and is susceptible to damage. Strawberry Point at the southern end of the airport houses the Maryland State Police aviation unit's hangers, which would be damaged and for which operations would need to be relocated in the event of storm damage. The airport's fuel farm would be inundated. Wilson Point Road would be inundated, cutting off access to the residential community of Wilson Point. Facilities of the Maryland Air National Guard, a tenant of the airport, would be damaged, including munitions storage, and the primary access road to the base would be inundated. Finally, coastal flooding would damage mitigation systems in place for the remediation of groundwater contamination at Martin State Airport.

Sea level is projected to rise, based on the sea level gauge at Fort McHenry. Using the intermediate sea level rise curve, more than 1,400 structures are expected to be subject to coastal storm inundation in 2080, fifty years from the project base year. The future without project conditions for year 2080 include 1 percent annual exceedance probability for USACE Intermediate and High sea level rise projections.

There are numerous development projects, both proposed and under construction, within the study area. They are all expected to be built to Baltimore City code with a first-floor elevation 2 feet above base flood elevation. No damages are forecast from these developments.

Baltimore Gas and Electric (BGE) will be replacing underwater high voltage transmission cables at the Key Bridge with an overhead crossing of the Patapsco River in 2022. When the transmission line is replaced, the existing Sollers Point terminal station will be deactivated. This terminal station is at risk of flooding from coastal storms. A new project ("Reimagine Middle Branch") is being undertaken by the South Baltimore Gateway Partnership using federal funds from FEMA to enhance coastal resilience in the Middle Branch area, including the BGE Spring Gardens natural gas storage and distribution facility.

The Port of Baltimore is expected to continue to attract a diverse array of vessels transporting containers, coal, vehicles, and general cargo. Maryland Port Administration and its partners are

upgrading Berth 3 at the Seagirt Marine Terminal which would allow for two berths to service large container ships of around 14,000 TEU capacity. MPA has partnered with USMARAD to provide upgrades to all berths at the Dundalk Marine Terminal, installing a “sea curb” during the upgrade process which will provide some risk reduction to coastal flooding.

Measures and Alternatives: The study is currently focusing on five alternatives, which are outlined below:

Alternative 4: Critical Infrastructure Plan

Structural components around critical infrastructure including tunnel entrances for Interstate I-895 and I-95 and associated infrastructure. Nonstructural measures at Patapsco Wastewater Treatment Plant, Martin State Airport, and federal facilities at Fort McHenry.

ROM Cost: \$14,649,000

Alternative 5: Critical Infrastructure and Nonstructural Plan

All elements of Alternative 4, with the addition of focus areas for nonstructural measures at Inner Harbor, Canton, Fells Point, Riverside, Locust Point and federal facilities at the US Coast Guard Yard.

ROM Cost: \$400,649,000

Alternative 5A: Critical Infrastructure and Select Nonstructural Measures Plan

Alternative 5A is an optimization of Alternative 5, that includes the critical infrastructures components of Alternative 4 along with focus areas for floodproofing in Canton, Fells Point, Inner Harbor, Riverside and Locust Point, under three annual exceedance probability (AEP) scenarios: the 1 percent AEP, 2 percent AEP, and 5 percent AEP. **This alternative is the Tentatively Selected Plan.**

Estimated Cost: \$138,000,000

Alternative 6: Critical Infrastructure Balanced Plan

All elements of Alternative 5, with the addition of a coastal floodwall along Seagirt Terminal port facility.

ROM Cost: \$489,666,000

Alternative 7: Mid-Tier Plan

Includes all structural elements of Alternative 6, except floodwalls are proposed along the Inner Harbor, Canton, Fells Point and Locust Point, instead of nonstructural measures. Also includes elevation of perimeter roads at Martin State Airport and some limited floodproofing at Patapsco Wastewater Treatment Plant and at the Martin State Airport.

ROM Cost: \$348,635,620

Risk Identification: The study area is highly urbanized, and based on existing geography, topography, and proximity to tidally influenced areas, it is highly vulnerable to flooding and other coastal hazards such as erosion, severe winds, and severe weather events. The study area terrain makes it susceptible to coastal and flash flooding. Climate change and sea level rise contribute to increasing future vulnerability. Coastal storm damage in developed areas can pose a threat to human life or safety and infrastructure. Factors such as steady population growth, continuing near-shore development, and sea-level rise effectively increase the vulnerability of the Baltimore Metropolitan area to coastal storm surge. In addition, inundation of these coastal areas may lead to negative

environmental impacts. When wastewater treatment facilities are inundated, partially treated or untreated sewage is often released, which can impact water quality. Similarly, inundation of sites identified through the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), otherwise referred to as Superfund sites, or other hazardous waste sites will also severely impact water quality.

DOCUMENTATION OF RISKS AND ISSUES

1. FACTORS AFFECTING THE LEVELS AND SCOPES OF REVIEWS

Mandatory IEPR Triggers.

- Is the estimated total project cost, including mitigation, greater than \$200 million?
No
- Has the Governor of an affected state requested a peer review by independent experts?
No
- Has the Chief of Engineers determined the project study is controversial due to significant public dispute over the size, nature or effects of the project or the economic or environmental costs or benefits of the project (including but not limited to projects requiring an Environmental Impact Statement)?
No

Level and Scope of Review. Discuss factors affecting the risk informed decisions on the appropriate levels of review. Provide enough detail to assess the level of review and to support the RMO decision on the reviews and the review team(s) expertise. Discuss how each factor affects the level of review or if it does not affect the review.

- Will the study likely be challenging?
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.
- Provide a preliminary assessment of where the project risks are likely to occur and assess the magnitude of those risks.
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. It is expected that information gaps will be encountered that cannot be addressed within the 3x3x3 study framework. These gaps will need to be documented in the Risk Register and appropriate contingencies applied when evaluating project alternatives.
- Is the project likely to be justified by life safety or is the study or project likely to involve significant life safety issues?
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.

- Is the information in the decision document or anticipated project design likely to be based on novel methods, involve 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 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.

- Does the project design require redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design/construction schedule?

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.

- Is the project expected to have more than negligible adverse impacts on scarce or unique tribal, cultural, or historic resources?

The project is not expected to have more than negligible adverse impacts on scarce or unique tribal, cultural, or historic resources. The project will be formulated to avoid adverse impacts.

- Is the project expected to have substantial adverse impacts on fish and wildlife species and their habitat prior to the implementation of mitigation measures?

No substantial adverse impacts on fish and wildlife species and their habitat is expected.

- Is the project expected to have, before mitigation measures, more than a negligible adverse impact on an endangered or threatened species or their designated critical habitat?

The project is not expected to have more than a negligible adverse impact on an endangered or threatened species or their designated critical habitat, before mitigation measures.

Assessment of the District Chief of Engineering. The District Chief of Engineering has evaluated risks and determined there is a significant threat to human life associated with the study.

2. REVIEW EXECUTION PLAN

This section describes each level of review to be conducted. Based upon the factors discussed in Section 1, this study will undergo the following types of reviews:

District Quality Control. All decision documents and accompanying components (including including data, analyses, environmental compliance documents, etc.) will undergo DQC. This internal review process covers basic science and engineering work products. It fulfils the project quality requirements of the Project Management Plan.

Agency Technical Review. ATR will be performed by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. These teams will be comprised of certified USACE personnel. The ATR team lead will be from outside the home MSC. Significant life safety issues are involved in the study and a safety assurance review will be conducted during ATR.

Independent External Peer Review. IEPR is required for this decision document. This is the most independent level of review and is applied in cases that meet criteria where the risk and magnitude of the project are such that a critical examination by a qualified team outside of USACE is warranted. Certain criteria dictate mandatory performance of IEPR and other considerations may lead to a discretionary decision to perform IEPR. For this study, a risk-informed decision has been made that IEPR is appropriate. The information in Section 1 – Factors Affecting the Scope of Review – informed the decision to conduct IEPR.

Cost Engineering Review. All decision documents will be coordinated with the Cost Engineering Mandatory of Expertise (MCX). The MCX assisted in determining the expertise needed on the ATR and IEPR teams. The MCX will provide the Cost Engineering certification. The RMO is responsible for coordinating with the MCX for the reviews. These reviews occur as part of ATR.

Model Review and Approval/Certification. EC 1105-2-412 mandates the use of certified or approved models for all planning work to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions.

Policy and Legal Review. All decision documents will be reviewed for compliance with law and policy. ER 1105-2-100, Appendix H, and Director's Policy Memorandum 2019-01, both provide guidance on policy and legal compliance reviews. These reviews culminate in determinations that report recommendations 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.

Public Review. The district will post the Review Plan and approval memo on the district internet site. Public comment on the adequacy of the Review Plans will be accepted and considered. Additional public review will occur when the report and environmental compliance document(s) are released for public and agency comment.

Table 1 provides the schedules and costs for reviews. The specific expertise required for the teams are identified in later subsections of this plan covering each review. These subsections also identify requirements, special reporting provisions, and sources of more information.

Table 1: Schedule and Costs of Reviews

Product(s) to undergo Review	Review Level	Site Visit	Start Date	End Date	Cost	Complete
Draft Feasibility Report and EA	District Quality Control	No	05/17/22	06/01/22	\$27,500	Yes
Draft Feasibility Report and EA	Agency Technical Review	No	07/01/22	10/01/22	\$35,000	Yes
Draft Feasibility Report and EA	IEPR	No	07/01/22	10/01/22	\$200,000	Yes
Draft Feasibility Report and EA	Policy and Legal Review	No	07/01/22	10/01/22	n/a	Yes
Final Feasibility Report and EA	District Quality Control	No	02/28/23	03/27/23	\$27,500	No
Final Feasibility Report and EA	Agency Technical Review	No	03/28/23	04/17/23	\$35,000	No
Final Feasibility Report and EA	Policy and Legal Review	No	09/19/23	10/17/23	n/a	No

a. DISTRICT QUALITY CONTROL

The home district will manage DQC and will appoint a DQC Lead to manage the local review (see ER 1165-2-217, Chapter 4). Table 2 identifies the required expertise for the DQC team. The DQC Team members should not be involved in the production of any of the products reviewed.

Table 2: Required DQC Expertise

DQC Team Disciplines	Expertise Required
DQC Lead	A senior professional with extensive experience preparing Civil Works decision documents and conducting DQC. The lead may also serve as a reviewer for a specific discipline (such as planning, economics, environmental resources, etc).
Plan Formulation	A senior water resources planner with experience in the plan formulation process and experience in general planning policy and guidance.
Economics	The reviewer should be familiar with the processes used in evaluation of CSRM projects and have recent experience in preparing economic analysis plans for CSRM feasibility studies, including structure inventory, economic damage computation, and benefit-cost analyses. The team member should have knowledge of the applicable models and software used, such as G2CRM and GIS, that will be used in the economic analyses presented in the draft feasibility report documentation.
Environmental Resources	A senior environmental resources specialist with experience with environmental evaluation and compliance requirements pursuant to the “Procedures for Implementing NEPA” (ER 200-2-2), national environmental laws and statutes, and other federal planning requirements for Civil Works projects. Specialist should have familiarity with contaminants and environmental justice issues.
Cultural Resources	A senior cultural resource specialist with experience with cultural resource survey methodology, area of potential effects,

	Section 106 of the National Historic Preservation Act, and state and Federal laws/executive orders pertaining to American Indian Tribes.
Hydrology and Hydraulic Engineering	The reviewer should be a senior hydrologic and hydraulic engineering specialist with extensive experience associated with coastal H&H modeling and have thorough understanding of coastal processes, and structural and non-structural solutions. The reviewer should have experience with coastal hydrodynamic models including STWAVE and ADCIRC.
Engineering-Geotechnical	A geotechnical engineer with experience with geotechnical investigations and design necessary for FRM and coastal storm risk management projects. Should have experience with remediation of contaminants in soils and sediments, as well as managing in-ground infrastructure conflicts.
Cost Engineering	A senior cost engineer with experience in SMART Planning and 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.

Documentation of DQC. Quality Control will be performed continuously. A specific certification of DQC completion will be prepared at the draft and final report stages. Documentation of DQC will follow the District Quality Manual and the MSC Quality Management Plan. Dr. Checks will be used for documentation of DQC comments. An example DQC Certification statement is provided in ER 1165-2-217, Appendix D.

Documentation of completed DQC will be provided to the MSC, RMO and ATR Team leader. Documentation available at the time of ATR will be made available to the ATR Team. The team will examine DQC records and comment in the ATR report on the adequacy of the DQC effort.

b. AGENCY TECHNICAL REVIEW

The ATR will assess whether the analyses are technically correct and comply with guidance, and that documents explain the analyses and results in a clear manner. The RMO will manage the ATR. The review will be conducted by an ATR Team whose members are certified to perform reviews. Lists of certified reviewers are maintained by the various technical Communities of Practice (see ER 1165-2-217, Chapter 5.5.3). Table 3 identifies the disciplines and required expertise for this ATR Team (also see Attachment 1 - the ATR Team roster.

Table 3: Required ATR Team Expertise

ATR Team Disciplines	Expertise Required
ATR Lead	A senior professional with extensive experience preparing Civil Works decision documents and conducting ATR. The lead should have the skills to manage a virtual team through an ATR.

	The lead may serve as a reviewer for a specific discipline (such as planning).
Plan Formulation	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 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 analysis.
Economics	The reviewer should be familiar with the processes used in evaluation of CSRM projects and have recent experience in preparing economic analysis plans for CSRM feasibility studies, including structure inventory, economic damage computation, and benefit-cost analyses. G2CRM 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. Specialist should have familiarity with urban environmental issues, including air quality, water quality, soil/sediment contaminants, infrastructure, and environmental justice.
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,Hydraulic and Coastal Engineering	The reviewer should be a senior hydrologic,hydraulic and coastal engineering specialist with extensive experience associated with coastal and interior drainage 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, and consideration of urban infrastructure conflicts.

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. Cost ATR reviewer must be certified and assigned by the Cost MCX.
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 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. Should have experience with remediation of soil/sediment contaminants.
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, and management of conflicts with existing urban infrastructure.
Climate Preparedness and Resilience CoP Reviewer	The reviewer should be a member of the Climate Preparedness and Resiliency Community of Practice, and be familiar with sea level rise analysis, impacts to coastal communities as a result of sea level rise, and climate resiliency.
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.
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 in urban settings.

Documentation of ATR. DrChecks will be used to document all ATR comments, responses, and resolutions. Comments should be limited to those needed to ensure product adequacy. All members of the ATR team will use the four part comment structure (see ER 1165-2-217, Chapter 5). If a concern cannot be resolved by the ATR team and PDT, it will be elevated to the vertical team to resolve using the issue resolution process in ER 1165-2-217, chapter 5.9. Concerns will be closed in DrChecks by noting the concern has been elevated. The ATR Lead will prepare a Statement of Technical Review (see ER 1165-2-217, chapter 5.11 and Appendix D), for the draft and final reports, certifying that review issues have been resolved or elevated. ATR will be certified when all concerns are resolved or referred to the vertical team and the ATR documentation is complete.

c. INDEPENDENT EXTERNAL PEER REVIEW

IEPR is managed outside of the USACE and conducted on studies. The IEPR panel will 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.

Decision on IEPR. An IEPR will be performed due to the scope and complexity of the project and the nature of the project requires considerations of life safety.

Products to Undergo IEPR. The full draft report will undergo IEPR.

Required IEPR Panel Expertise. Panels will consist of independent, recognized experts from outside of the USACE in disciplines representing a balance of areas of expertise suitable for the review being conducted. Table 4 lists the required panel expertise.

Table 4: Required IEPR Panel Expertise

IEPR Panel Member 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 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.
Economics	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.

Environmental	<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. Panel member should have familiarity with urban environmental issues, including contaminants, infrastructure, and environmental justice. The panel member should also be familiar with all NEPA Environmental Assessment requirements as well as have experience with the Clean Air Act, Endangered Species Act, and essential fish habitat. 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 tidal river control structures, including tidal flood gates, levees and floodwalls. The panel member should have experience modeling large tidal 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 have a working knowledge of water supply and wastewater infrastructure. 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.</p>

Documentation of IEPR. The OEO will submit a final Review Report no later than 60 days after the end of the draft report public comment period. USACE shall consider all recommendations in the Review Report and prepare a written response for all recommendations. The final decision document will summarize the Review Report and USACE response and will be posted on the internet.

d. SAFETY ASSURANCE REVIEW

Safety Assurance Reviews are managed outside of the USACE and are conducted on design and construction products for hurricane, storm and flood risk management projects, or other projects where existing and potential hazards pose a significant threat to human life. In some cases, significant life safety considerations may be relevant to planning decisions. These cases may warrant the development of relevant charge questions for consideration during reviews such as ATR or IEPR. In addition, if the characteristics of the recommended plan warrant a Safety Assurance Review, a panel will be convened to review the design and construction activities before construction begins, and until construction activities are completed, on a regular schedule.

Decision on Safety Assurance Review. A 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.

e. MODEL CERTIFICATION OR 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 are any models and analytical tools used 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 a planning product. The selection and application of the model and the input and output data is the responsibility of the users and is subject to DQC, ATR, and IEPR.

Table 5: Planning Models. The following models may be used to develop the decision document:

Model Name and Version	Brief Model Description and How It Will Be Used in the Study	Certification / Approval
G2CRM Version 4.564	The Generation II Coastal Risk Model (G2CRM) is a desktop computer model oriented specifically toward analysis of nonsacrificial coastal protection systems in a risk-based life cycle context. It is a desktop computer model that implements an object-oriented probabilistic life cycle analysis model using event-driven Monte Carlo simulation. The model was used to evaluate and compare the existing, future without-, and future with-project alternative plans.	Approved for one time use

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. The professional practice of documenting the application of the software and modeling results will be followed. The USACE Scientific and Engineering Technology Initiative has identified many engineering models as preferred or acceptable for use in studies. These models should be used when

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.

Table 6: Engineering Models. These models may be used to develop the decision document:

Model Name and Version	Brief Model Description and How It Will Be Used in the Study	Approval Status
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 Coastal Hazard System modeling accomplished as part of 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 CMSWave 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

f. POLICY AND LEGAL COMPLIANCE REVIEW

Policy and legal compliance reviews for draft and final planning decision documents have been delegated to the MSC (see Director's Policy Memorandum 2019-01).

(i) Policy Review.

The policy review team will be selected through the collaboration of the MSC Chief of Planning and Policy and the HQUSACE Chief of the Office of Water Project Review. The team is identified in Attachment 1 of this Review Plan. The makeup of the Policy Review team may be drawn from Headquarters (HQUSACE), the MSC, the Planning Centers of Expertise, and other review resources as needed.

- The Policy Review Team will be invited to participate in key meetings during the development of decision documents as well as SMART Planning Milestone meetings. These engagements may include In-Progress Reviews, Issue Resolution Conferences, or other vertical team meetings plus the milestone events.
- The input from the Policy Review team will be documented in a Memorandum for the Record (MFR) produced for each engagement with the team. The MFR will be distributed to all meeting participants.
- In addition, teams may choose to capture some of the policy review input in a risk register if appropriate. These items should be highlighted at future meetings until the issues are resolved. Any key decisions on how to address risk or other considerations will be documented in an MFR.

(ii) Legal Review.

Representatives from the Office of Counsel will be assigned to participate in reviews. Members may participate from the District, MSC and HQUSACE. The MSC Chief of Planning and Policy will coordinate membership and participation with the office chiefs.

- In some cases, legal review input may be captured in the MFR for the meeting or milestone. In other cases, a separate legal memorandum may be used to document the input from the Office of Counsel.
- Each participating Office of Counsel will determine how to document legal review input.

DISCLAIMER: This information is distributed solely for the purpose of pre-dissemination review under applicable information quality guidelines. It does not represent and may not be construed to represent any agency determination or policy.

ATTACHMENT 1: TEAM ROSTERS

PROJECT DELIVERY TEAM			
Name	Office	Position	Phone Number
Joe Bieberich	CENAB-PP-C	Project Manager	410-962-1749
Vanessa Campbell	CENAB-PL-P	Study Manager	410-962-9499
Andrew Roach	CENAB-PL-P	Plan Formulation	410-962-8156
Komla Jackatey	CENAB-PL-P	Lead Economist	410-962-2910
Chris Johnson	CENAB-PL-P	Biologist	410-962-2969
Ethan Bean	CENAB-PL-P	Archeologist	410-962-2173
Luis Santiago	CENAB-PL-P	Geographer	410-962-6691
Damian Lebron Gonzalez	CENAB-ENC-E	Civil Engineer	410-962-7967
Syed Qayum	CEANB-ENC-W	H&H Engineer	410-962-2950
Chun-Yi Kuo	CENAB-ENG-G	Geotech Engineer	410-962-5663
Nestor Delgado-Velez	CENAP-EC-EBI	Structural Engineer	410-962-6718
Narom Luis	CENAB-END-T	Cost Engineer	410-962-3322
CJ Ditsious	CENAB-ENE-T	Chemist	410-962-2427
Eric Lamb	CENAB-REC	Civil Realty Specialist	410-962-5101
Cynthia Mitchell	CENAB-CC	Public Affairs Specialist	410-962-9015
Eddie Lukemire	MDOT	Environmental Program Manager	
Sandy Hertz	MDOT	Assistant Director, Office of the Environment	

DISTRICT QUALITY CONTROL			
Name	Office	Position	Phone Number
Andrew Roach	CENAB-PLP	DQC Lead	410-962-8156
Amber Metallo	CENAB-PLP	Plan Formulation	410-443-5356
Charles Leasure	CENAB-PLP	Environmental Team Lead	410-962-5157
Eva Falls	CENAB-PL	Cultural Resources	410-962-4458
Erik Adamiec	CESAJ-PDD	Economics	630-589-2254
Dan Risley	CENAB-EN	H&H Engineering	410-962-5127
Andrew Orlovsky	CENAB-EN	Civil Engineering	410-962-3100
Nicole Kennedy	CENAB-EN	Geotechnical Engineering	410-962-5663
Craig Homesly	CENAB-REC	Real Estate	410-962-4944
Parris McGhee-Bey	CENAB-CDV-C	Cost Engineering	410-962-9596
Richard Kridler	CENAB-END-S	Structural Engineering	410-962-6718

AGENCY TECHNICAL REVIEW			
Name	Office	Position	Phone Number
Carrie McCabe	SWF	ATR Lead & Plan Formulation	(409) 766-3853
Idris Dobbs	SAJ	Economics	(904) 232-1053
Angela (Angie) Dunn	SAJ	Environmental Resources	(904) 232-2336
Meredith Moreno	SAJ	Cultural Resources	(904) 232-1577
Lisa Winter	NAE	Coastal Engineering	(978) 318-8954
Das Himangshu	SWG	Civil Engineering	(409) 766-6383
William (Bill) Bolte	NWW	Cost Engineering	(509) 527-7585
Steven (Steve) Potts	NAE	Geotechnical Engineering	(978) 318-8311
Denis Hoerner	MVN	Structural Engineering	(504) 862-2659
Patrick O'Brien	SPN	Climate Change	(504) 344-8752
Joe Lamb	SPL	Risk & Uncertainty	(213) 452-3819
Russell Blount	SAM	Real Estate	(251) 694-3675

POLICY REVIEW TEAM			
Name	Office	Position	Phone Number
Megan Jadrosich	CENAD-PD-PP	Review Manager/Plan Formulation Reviewer	347-370-4653
Patricia Bolton	CENAD-RB-T	Cost Engineering Reviewer	347-370-4682
Julie Alcon	CECW-PC	Senior Environmental Policy Reviewer	202-761-0523
Jason Shippy	CECC-NAD	Assistant Division Counsel	347-370-4526
Naomi Fraenkel Altschul	CENAD-PD-PP	Economics Reviewer	917-359-2819
Carlos Gonzalez	CENAD-PD-RE	Real Estate Reviewer	347-370-4529
Heidi Moritz	CENWP-ENC-HD	Climate Preparedness & Resilience	503-808-4893
Jodi McDonald	CENAD-PD-OR	Operations and Regulatory Reviewer	917-273-8582
Javier Jimenez-Vargas	CENAD-RB-E	Engineering and Construction Reviewer	347-370-4599

VERTICAL TEAM			
Name	Office	Position	Phone Number
Nate Richards	CECW-NAD	Regional Integration Team Planner	309-794-5286
Roselle Henn Stern	CENAD-PD-P	North Atlantic Coast Focus Area Study Program Manager	347-370-4562
Joseph Vietri	CENAD-PD-P	MSC Chief, Planning & Policy, PCX-CSRMS Director	347-370-4570
Hank Gruber	CENAD-PD-P	MSC Deputy Chief, Planning & Policy	347-370-4566
Lawrence Cocchieri	CENAD-PD-X	PCX-CSRMS Deputy Director	347-370-4571
Joseph Forcina	CENAD-PD-C	MSC Chief, Civil Works Integration Division	347-370-4584
Christopher Tolson	CENAD-PD-P	MSC District Support Team	347-370-4608
Donald Cresitello	CENAD-PD-P	Senior Coastal Planner/PCX-CSRMS	347-370-4591