

REVIEW PLAN

March 2019

Project Name: Charleston Peninsula Coastal Flood Risk Management Study, Charleston, South Carolina

P2 Number: 474899

Decision Document Type: Feasibility Report; the decision document will require Congressional authorization and appropriation before the recommended project may be implemented.

Project Type: Single-Purpose Coastal Storm Risk Management

District: Charleston District

District Contact: Project Manager, (843) 329-8054

Major Subordinate Command (MSC): South Atlantic Division

MSC Contact: Senior Plan Formulator, 404 562-5226

Review Management Organization (RMO): Coastal Storm Risk Management PCX

RMO Contact: Planning Program Manager, (347) 370-4571

Key Review Plan Dates

Date of RMO Endorsement of Review Plan: 27 Feb 2019

Date of MSC Approval of Review Plan: Pending

Date of IEPR Exclusion Approval: Not applicable

Has the Review Plan changed since PCX Endorsement? No

Date of Last Review Plan Revision: None

Date of Review Plan Web Posting: None

Date of Congressional Notifications: None

Milestone Schedule

	<u>Scheduled</u>	<u>Actual</u>	<u>Complete</u>
<u>FCSA Signature:</u>	Oct 2018	10 Oct 2018	Yes
<u>Alternatives Milestone:</u>	Jan 2019	18 Dec 2018	Yes
<u>Tentatively Selected Plan:</u>	Jan 2020	<i>(enter date)</i>	No
<u>Release Draft Report to Public:</u>	Mar 2020	<i>(enter date)</i>	No
<u>Agency Decision Milestone:</u>	Oct 2020	<i>(enter date)</i>	No
<u>Final Report Transmittal:</u>	Jun 2021	<i>(enter date)</i>	No
<u>Senior Leaders Briefing:</u>	Aug 2021	<i>(enter date)</i>	No
<u>Chief's Report or Director's Report:</u>	Oct 2021	<i>(enter date)</i>	No

Project Fact Sheet
March 2019

Project Name: Charleston Peninsula Coastal Flood Risk Management Study, Charleston, South Carolina

Location: City of Charleston, Charleston County, South Carolina

Authority:

1. Rivers and Harbors Act of 1962, P.L. 87- 874, Section 110
2. Resolution adopted on April 22, 1988, by the Committee on Environment and Public Works of the United States Senate
3. The Bipartisan Budget Act of 2018 (Public Law 115-123), Division B, Subdivision 1, Title IV

Sponsor: City of Charleston

Type of Study: Feasibility Study

SMART Planning Status: 3x3x3 compliant

Project Area: The Charleston Peninsula is approximately 8 square miles, located between the Ashley and Cooper Rivers. The two rivers join off the Battery in Charleston to form Charleston Harbor before discharging into the Atlantic Ocean. The Charleston Harbor is a natural tidal estuary sheltered by barrier islands. The Charleston Peninsula is the historic core and urban center of the City of Charleston and is home to 38,000 people. The shoreline of the peninsula has undergone dramatic changes, predominantly by landfilling of the intertidal zone.

Problem Statement: The Charleston Peninsula experiences coastal storm surge inundation that adversely affects the economic sustainability of Charleston, places populations at risk, and limits or completely restricts access to critical facilities, emergency services, and evacuation routes.

Federal Interest: Preliminary economic analysis indicates that structures in the 100-year floodplain are appraised at \$3.5 billion and structures in the 500-year floodplain are appraised at \$5.4 billion. Replacement values and solution cost estimates will be developed over the course of the study.

Alternative 1, the barrier only alternative, is roughly estimated at \$350 - \$500 million. Alternative 2, the combination alternative, is roughly estimated at \$1.2 billion - \$1.3 billion. Alternative 3, the combination plus breakwater alternative, is roughly estimated at \$1.3 - \$ 1.5 billion. The alternatives and their associated cost estimates will be further refined over the course of the study.

Risk Identification: The problems identified for the study include effects resulting from coastal storm surge inundation, posing a damage risk to structures and contents and a risk to human health and safety. Based on historical storm events, there is a minimal risk to loss of life.

Identified study risks include the use of existing information, assumptions regarding subsurface conditions, locations of underground utilities, and future improvements to the Port of Charleston. All study risks are considered low risk and typical of feasibility studies at the beginning of the study. These risks have been identified and analyzed on the IWR-Assistance for Planning Teams risk register,

including consequences, likelihood and uncertainty ratings, and risk management options. The risk register will be updated as the study evolves and new information is made available.



Figure 1. Study Area.

1. FACTORS AFFECTING THE LEVELS OF REVIEW

Scope of Review. Issues driving the scope of review include distinguishing between coastal storm surge inundation and interior flooding (rainfall and high tides). Although the peninsula is bounded by two rivers, riverine flooding from interior watersheds is not a driver of the flooding problem. Existing coastal and storm wave models will be used to analyze coastal flooding issues.

- Will the study likely be challenging? Yes, because the problem is complex and requires multiple models to delineate.
- Provide a preliminary assessment of where the project risks are likely to occur and assess the magnitude of those risks. Assumptions will be made about subsurface conditions which can vary greatly, especially in areas where fill has been placed for development. Inaccurate assumptions could result in cost increases when implementing the recommended plan. The tentatively selected plan will be evaluated using three sea level rise scenarios per ER 1100-2-8162, but there is no single projection of relative sea level rise that can be used to guarantee a coastal storm risk management project will remain effective throughout the entire 50 year period of analysis.
- Is the project likely to be justified by life safety or is the study or project likely to involve significant life safety issues? It is unlikely that the project will be justified by life safety, but life safety issues will be part of the study, i.e., the medical district is susceptible to catastrophic flooding and evacuation routes are subject to flooding and closure during hurricane or tropical storm events.
- Has the Governor of an affected state requested a peer review by independent experts? No.
- Will the study likely involve significant public dispute as to the project's size, nature, or effects? No. There will be public interest, but not necessarily significant public dispute.
- Is the project/study likely to involve significant public dispute as to the economic or environmental cost or benefit of the project? Unlikely.
- 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? Unknown at this time, however likelihood is low.
- Does the project design require redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design/construction schedule? Unknown at this time.
- Is the estimated total cost of the project greater than \$200 million? Unknown at this time, however the likelihood is high.
- Will an Environmental Impact Statement be prepared as part of the study? No. At this time the recommendation is to prepare an Environmental Assessment.

- Is the project expected to have more than negligible adverse impacts on scarce or unique tribal, cultural, or historic resources? Unknown, but possible. The project area includes a National Historic Landmark District and potentially two additional Historic Districts.
- 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.
- 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? No.

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 (including data, analyses, environmental compliance documents, etc.) undergo DQC. This internal review process covers basic study work products. It fulfills the project quality requirements of the Project Management Plan.

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

Independent External Peer Review. Type I IEPR may be required for decision documents under certain circumstances. 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. A risk-informed decision is made as to whether Type I IEPR is appropriate.

Cost Engineering Review. All decision documents shall be coordinated with the Cost Engineering Mandatory Center of Expertise (MCX). The MCX will assist 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 typically 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 provides 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. These reviews are not further detailed in this section of the Review Plan.

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

Table 1: Levels of Review

Product(s) to undergo Review	Review Level	Start Date	End Date	Cost	Complete
Draft Feasibility Report and EA	District Quality Control	Feb 2020	Feb 2020	<u>\$10K</u>	No
Draft Feasibility Report and EA	Agency Technical Review	Mar 2020	Mar 2020	<u>\$25k</u>	No
Draft Feasibility Report and EA	Policy and Legal Review	Mar 2020	Mar 2020	n/a	No
Draft Feasibility Report and EA	Independent External Peer Review	Mar 2020	May 2020	\$75K	No
Final Feasibility Report and EA	District Quality Control	Apr 2021	Apr 2021	<u>\$10k</u>	No
Final Feasibility Report and EA	Agency Technical Review	May 2021	May 2021	<u>\$25k</u>	No
Final Feasibility Report and EA	Policy and Legal Review	June 2021	June 2021	n/a	No

a. DISTRICT QUALITY CONTROL

The home district shall manage DQC and will appoint a DQC Lead to manage the local review (see EC 1165-2-217, section 8.a.1). The DQC Lead should prepare a DQC Plan and provide it to the RMO and MSC prior to starting DQC reviews. Table 2 identifies the required expertise for the DQC team.

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).
Planning	The plan formulation reviewer should have experience in coastal flood risk management studies and associated reports; familiarity with the “Planning Guidance Notebook” (ER-1105-2-100), the Water Resources Council’s Principals and Guidelines, and SMART Planning guidance.
Economics	The economics reviewer should have experience in the analysis of demographics, land use, recreation analysis, and flood damage assessments; regional economic development associated with a project; discussion of other social effects (OSE) associated with flood risk, and well as OSE benefits from reduction in flood risk; economic justification of projects in accordance with current USACE policy for urban flood damages.
Environmental Resources	The environmental reviewer should have experience in the integration of environmental evaluation and compliance requirements pursuant to the “Procedures for Implementing the National Environmental Policy Act (NEPA)” (ER 200-2-2), national environmental statutes, applicable executive orders, and other Federal planning requirements, into the planning of Civil Works projects. Experience with ESA, fishery resources, mitigation, and marsh habitat is required.
Cultural Resources	A cultural resources reviewer should be an archaeologist/historian familiar with records searches, 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 National Historic Districts.
Hydrology	The reviewer should have experience in the field of rainfall runoff models, flow-frequency analysis, hydrologic effects of flood control operations, risk and uncertainty analysis, and hydrologic analysis using computer modeling techniques such as HEC-RAS 2D.
Hydraulic Engineering	The reviewer should have experience in the field of hydraulics and have a thorough understanding of open channel dynamics; detention/retention basins; application of levees; floodplain mapping, risk and uncertainty analysis, and computer modeling techniques, such as HEC-RAS 2D.

Geotechnical Engineering	The reviewer should be a geotechnical engineer familiar with levee/embankment stability and seepage analyses, and design, floodwall (including I-walls) analyses and design, pile foundation design, bearing capacity analyses, settlement analyses, planning analysis, fragility curves, and a number of other closely associated technical subjects.
Coastal Engineering	The coastal engineering reviewer should have experience with coastal storm risk management investigations and projects. The coastal engineer should also be an expert in the field of coastal storm surge and storm wave modeling, specifically with the use of coupled ADCIRC, STWAVE, and SWAN numerical models.
Civil Engineering	The reviewer should be a civil engineer with experience in designing grading plans and levees, levee stability, and levee and bank-protection removal or modification, earthen channels, and concrete bypasses.
Cost Engineering	The reviewer should be a cost estimating specialist competent in cost estimating for construction using MCACES/MII; working knowledge of construction; capable of making professional determinations based on experience.
Real Estate	The reviewer should be a real estate specialist familiar with real estate valuation, gross appraisal, utility relocations, takings, and partial takings as needed for implementation of Civil Works projects.

Documentation of DQC. Quality Control should be performed continuously throughout the study. A specific certification of DQC completion is required at the draft and final report stages. Documentation of DQC should follow the District Quality Manual and the MSC Quality Management Plan. An example DQC Certification statement is provided in EC 1165-2-217, on page 19 (see Figure F).

Documentation of completed DQC should be provided to the MSC, RMO and ATR Team leader prior to initiating an ATR. The ATR team will examine DQC records and comment in the ATR report on the adequacy of the DQC effort. Missing or inadequate DQC documentation can result in delays to the start of other reviews (see EC 1165-2-217, section 9).

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. An RMO manages ATR. The review is 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 EC 1165-2-217, section 9(h)(1)). Table 3 identifies the disciplines and required expertise for this ATR Team.

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 Formulator	A senior water resources planner certified to perform ATR with experience in coastal flood risk management studies; familiarity with the “Planning Guidance Notebook” (ER-1105-100), the Water Resources Council’s Principals and Guidelines, and SMART Planning guidance.
Economics	An economist certified to perform ATR with experience in the analysis of demographics, land use, recreation analysis, and flood damage assessments: regional economic development associated with a project; discussion of other social effects (OSE) associated with flood risk, and well as OSE benefits from reduction in flood risk; economic justification of projects in accordance with current USACE policy for urban flood damages.
Environmental Resources	A senior professional certified to perform ATR and experience in the integration of environmental evaluation and compliance requirements pursuant to the “Procedures for Implementing the National Environmental Policy Act (NEPA)” (ER 200-2-2), national environmental statutes, applicable executive orders, and other Federal planning requirements, into the planning of Civil Works projects. Experience with ESA, fishery resources, mitigation, and marine habitat is required.
Cultural Resources	A senior professional with experience with records searches, 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 Engineering	The reviewer should be an expert in the field of hydrology and have a thorough understanding and knowledge of the development of flow and stage frequency curves, open channel dynamics, enclosed channel systems, application of detention/retention basins, application of levees and flood walls, Interior drainage, nonstructural solutions involving flood warning systems and flood proofing, etc. and/or computer modeling techniques that will be used such as HEC-RAS2D.

Hydraulic Engineering	Thy reviewer should be an expert in the field of hydraulics and have a thorough understanding of open channel dynamics; detention/retention basins; application of levees; floodplain mapping, risk and uncertainty analysis, and computer modeling techniques, such as HEC-RAS 2D.
Coastal Engineering	The reviewer should be a senior engineer with experience with coastal storm risk management investigations and projects. The coastal engineer should also be an expert in the field of coastal storm surge and storm wave modeling, specifically with the use of coupled ADCIRC, STWAVE, and SWAN numerical models.
Geotechnical Engineering	The reviewer should be a geotechnical engineer familiar with levee/embankment stability and seepage analyses and design, floodwall (including I-walls) analyses and design, pile foundation design, bearing capacity analyses, settlement analyses, planning analysis, fragility curves, and a number of other closely associated technical subjects.
Cost Engineering	The Cost Engineering reviewer must be from the Civil Works Cost Engineering and Agency Technical Review Mandatory Center of Expertise with Technical Expertise (Cost MCX/TCX) in Walla Walla District, or must be on the Cost MCX/TCX approved list of delegated Cost ATR reviewers.
Civil Engineering	The reviewer should be a senior civil engineer familiar with structural and nonstructural CSRSM measures.
Real Estate	The Real Estate reviewer must have expertise in the real estate planning process for cost shared and full federal civil works projects, relocations, report preparation and acquisition of real estate interests. The reviewer should have a full working knowledge of EC 405-2-12, Real Estate Planning and Acquisition Responsibilities for Civil Works Projects, the portions of ER 405-2-12 that are currently applicable, and Public Law 91-646. The reviewer should be able to identify areas of the REP that are not in compliance with the guidance set forth in EC405-2-12 and should make recommendation for bringing the report into compliance. All estates suggested for use should be termed sufficient to allow project construction, and the real estate cost estimate should be
Climate Preparedness and Resilience CoP Reviewer	A member of the Climate Preparedness and Resiliency Community of Practice (CoP) will be identified by the CoP and participate in the ATR review.
Risk and Uncertainty	The risk analysis reviewer will be experience 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. The reviewer may also serve as a reviewer for a specific discipline.

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. If a concern cannot be resolved by the ATR team and PDT, it will be elevated to the vertical team for

resolution using the EC 1165-2-217 issue resolution process. Concerns can be closed in DrChecks by noting the concern has been elevated for resolution. The ATR Lead will prepare a Statement of Technical Review (see EC 1165-2-217, Section 9), for the draft and final reports, certifying that review issues have been resolved or elevated. ATR may be certified when all concerns are resolved or referred to the vertical team and the ATR documentation is complete.

c. INDEPENDENT EXTERNAL PEER REVIEW

(i) Type I IEPR.

Type I IEPR is managed outside of the USACE and conducted on studies. The panel members will be selected by an Outside Eligible Organization (OEO). 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.

Decision on Type I IEPR.

The decision document meets the mandatory triggers for Type I IEPR described in EC 1165-2-217, Section 11. Risks to critical infrastructure and the likely estimated total cost of the project as described in Section 1 of this RP indicate that an IEPR is appropriate.

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

Required Type I IEPR Panel Expertise. Panels will consist of independent, recognized experts from outside of 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 Type I IEPR Expertise

IEPR Panel Member Disciplines	Expertise Required
Economics	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, with a minimum MS degree or higher in economics. Familiarity with G2CRM is desired. Two years' experience in reviewing federal water resource economic documents is required. In addition, the panel member should have experience in the analysis of regional economic development associated with a project; discussion of other social effects (OSE) associated with flood risk, as well as OSE benefits from reduction in flood risk; and economic justification of projects in accordance with current USACE policy for urban flood damages.

Environmental	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 the integration of environmental evaluation and compliance requirements pursuant to the “Procedures for Implementing the National Environmental Policy Act (NEPA)” (ER 200-2-2), national environmental statutes, applicable executive orders, and other Federal planning requirements, into the planning of Civil Works projects. The panel member should have particular knowledge of impacts on marine and terrestrial ecology of coastal regions of the south-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.
Coastal Engineering	The panel member should be a registered professional engineer with a minimum of 10 years’ experience in coastal and hydraulic engineering, or a professor from academia with extensive background in coastal processes and hydraulic theory and practice, with a minimum Master’s Degree or higher in engineering. The panel member should be familiar with USACE application of risk and uncertainty analyses in hurricane and coastal storm risk management projects. The panel member should also be should also be an expert in the field of coastal storm surge and storm wave modeling, specifically with the use of coupled ADCIRC, STWAVE, and SWAN numerical models.
Civil/Structural Engineering	The panel member should be a registered professional engineer or a professor from academia with a minimum of 10 years’ experience in civil engineering and specifically the design of coastal storm risk management structures. The panel member should be familiar with USACE engineering manuals, circulars, technical letters, and regulations on design, analysis, and implementation of coastal storm risk management projects. The panel member should have demonstrated experience with floodwall and levee design.
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. The 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.

*(Outside Eligible Organization (OEO) - An organization that: (1) is described in section 501(c)(3), and exempt from Federal tax under section 501(a), of the Internal Revenue Code of 1986; (2) is independent; (3) is free from conflicts of interest; (4) does not carry out or advocate for or against Federal water resources projects; and (5) has experience in establishing and administering peer review panels.)

Documentation of Type I 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.

Type II IEPR. The second kind of IEPR is Type II IEPR. These Safety Assurance Reviews are managed outside of the USACE and are conducted on design and construction for hurricane, storm and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. A Type II IEPR Panel will be convened to review the design and construction activities before construction begins, and until construction activities are completed, and periodically thereafter on a regular schedule.

Decision on Type II IEPR. Based on the project as currently envisioned, the District Chief of Engineering, as the Engineer-In-Responsible-Charge, does not recommend a Type II IEPR Safety Assurance Review of this project at this time. A risk-informed decision concerning the timing and the appropriate level of reviews for the project implementation phase will be prepared and submitted for approval in an updated Review Plan prior to initiation of the design/implementation phase of this project.

d. 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	Brief Model Description and How It Will Be Used in the Study	Certification / Approval
IWR-Planning Suite	This software assists with the formulation and comparison of alternative plans. While IWR-PLAN was initially developed to assist with environmental restoration and watershed planning studies, the program can be useful in planning studies addressing a wide variety of problems. IWR-PLAN can assist with plan formulation by combining solutions to planning problems and calculating the additive effects of each combination, or "plan." IWR-PLAN can assist with plan comparison by conducting cost effectiveness and incremental cost analyses, identifying the plans which are the best financial investments and displaying the effects of each on a range of decision variables.	Certified

RECONS	RECONS (Regional Economic System) is a Corps corporate model specifically developed to assess the Regional Economic Development (RED) impacts of Corps civil works projects. This model will be used to support discussion of the RED benefits associated with project implementation. The RECONS model will estimate the impacts to the local economy, in terms of income, employment and tax revenues, resulting from project construction.	Certified
Generation II Coastal Risk Model (G2CRM)	Generation II Coastal Risk Model (G2CRM) was developed to support planning-level studies because it focuses on probabilistic life cycle approaches. This allows for examination of important long-term issues including the impact of climate change and avoidance of repetitive damages. Key features of the model include the ability to use readily available data from existing sources and corporate databases and integration with geographic information systems (GIS). The G2CRM generates a wide variety of outputs useful for estimating damages and costs, characterizing and communicating risk, and reporting detailed model behavior, in the without-project condition and under various plan alternatives for the with-project condition.	Approved / Certified for use on Supplemental Studies

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	Brief Model Description and How It Will Be Used in the Study	Approval Status
HEC-RAS 2D, Version 5.0	The software performs 1-D steady and unsteady flow river hydraulics calculations and has capability for 2- D (and combined 1-D/2-D) unsteady flow calculations. How it will be used: Apply rainfall to the terrain for inflow into the PCSWMM drainage pipe system and to determine inundation areas when drainage system capacity is exceeded.	Approved for use

ADvanced CIRculation Model 52.30 (ADCIRC)	ADCIRC was developed to predict storm surge water level and help control the impact of storm damage. ADCIRC is a hydrodynamic modeling technology that conducts short- and long-term simulations of tide and storm surge elevations and velocities in deep-ocean, continental shelves, coastal seas, and small-scale estuarine systems	Certified
Steady State Spectral Wave 6.2.28 (STWAVE)	STWAVE allows coastal project engineers to numerically model wave generation and transformation over complex bathymetry, interaction of waves with currents and structures, and propagation of waves in entrances and harbors.	Certified

e. POLICY AND LEGAL REVIEW

Policy and legal compliance reviews for draft and final planning decision documents are delegated to the MSC (see Director’s Policy Memorandum 2018-05, paragraph 9).

(i) Policy Review.

The policy review team is identified 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 will be drawn from Headquarters (HQUSACE), the MSC, 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 should be documented in a Memorandum for the Record (MFR) produced for each engagement with the team. The MFR should 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 should 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 particular 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.

ATTACHMENT 1: TEAM ROSTERS

PROJECT DELIVERY TEAM			
Name	Office	Position	Phone Number
	SAC	Project Manager	
	SAC	Planner	
	SPK	Planner	
	SAC	Biologist	
	SAM	Economist	
	SAC	Civil Engineer	
	SAW	Coastal Engineer	
	SAW	Geotechnical Engineer	
	MVK	H&H Engineer	
	SAC	Cost Engineer	
	SAC	Structural Engineer	
	SAC	Mechanical Engineer	
	SAS	Archaeologist	
	SAS	Real Estate Specialist	
	SAC	Public Affairs Officer	
	SPK	Risk Mentor	

DISTRICT QUALITY CONTROL TEAM			
Name	Office	Position	Phone Number
	SAC	DQC Lead	
	SPK	Plan Formulation	
	SAC	Environmental	
	SAJ	Economist	
	MVK	H&H Engineer	
	SAC	Cost Engineer	
	SAC	Civil Engineer	
	SAJ	Structural Engineer	
	SAC	Mechanical Engineer	
	SAW	Coastal Engineer	
	SAW	Geotechnical Engineer	
	SAC	Cultural Resources	
	SAS	Real Estate	

AGENCY TECHNICAL REVIEW TEAM			
Name	Office	Position	Phone Number
	NAP	ATR Manager	
	NAE	ATR Lead	
	NWD	Climate Change	
		Plan Formulation	
		Environmental	
		Economist	
		Hydraulic Engineer	
		Hydrologic Engineer	
		Coastal Engineer	
		Geotechnical Engineer	
		Archaeologist	
		Real Estate Specialist	
		Risk and Uncertainty	

VERTICAL TEAM			
Name	Office	Position	Phone Number
	CECW-PD	Acting Chief, USACE Planning and Policy Division	
	CECW-SAD-RIT	CESAD-RIT Planner	
	CENAD-PD	Chief, Planning and Policy, Director CSRMPX	
	CECW-PC	Acting Chief, OWPR	
	CESAD-PD-P	Acting SAD Chief of Planning and Policy Division	
	CESAD-RBT	SAD Chief of Engineering Division	
	CESAD-PD-P	Charleston DST Leader	
	CESAD PD-P	Environmental	
	CESAD-RBT	Quality Manager	

POLICY REVIEW TEAM			
Name	Office	Position	Phone Number
	SAD	Review Manager	
	NAD	Economics	
	SAD	Environmental	
	SAD	Plan Formulation	
	SAD	Engineering	
	SAD	Real Estate	
	SAJ	Climate Change	
	SAD	Office of Counsel	