REVIEW PLAN

South San Francisco Bay Shoreline II Feasibility Study
San Francisco, California
General Investigations Program
Integrated Feasibility Report and NEPA Document
P2# 402882

US Army
Corps of Engineers
San Francisco District

Santa Clara Valley Water District

1 July 2020

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1 PROJECT DETAILS

Project Name: South San Francisco Bay Shoreline Phase II Study

P2 Number: 402882

Decision Document Type: Integrated Feasibility Report and NEPA Document

Project Type: Coastal Storm Risk Management and Ecosystem Restoration

District: San Francisco

District Contact: Project Manager (415·503·6731)

Major Subordinate Command (MSC): South Pacific Division

MSC Contact: (415·503·6556)

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

RMO Contact: Planning Program Manager (347·370·4571)

<u>Key Review Plan Dates</u>

Date of RMO Endorsement of Review Plan: Pending

Date of MSC Approval of Review Plan: Pending

Date of IEPR Exclusion Approval: Not Applicable

Has the Review Plan changed since PCX Endorsement?

Date of Last Review Plan Revision: None

Date of Review Plan Web Posting: Pending

Date of Congressional Notifications: Pending (date the RIT notified Congress of IEPR decisions)

Milestone Schedule

	Scheduled	Actual	Complete
Feasibility Cost Share Agreement	26 September 2019	26-Sep-19	Yes
Alternatives Milestone (AMM)	23 January 2020	23-Jan-20	Yes
In Progress Review (IPR), Post-AMM	13 February 2020	13-Feb-20	Yes
Vertical Team Meeting on H&H Model	31 March 2020	31-Mar-20	Yes
Vertical Team Meeting on Ecological Model IPR	21 May 2020	21 May 2020	Yes
Vertical Team Meeting on Plan Formulation Strategy IPR	18 June 2020	18 June 2020	Yes, futher discussions forthcoming
Tentatively Selected Plan	21 April 2021	TBD	No
Release Draft Report to Public	22 June 2021	TBD	No
Agency Decision Milestone	15 Oct 2021	TBD	No
Final Report Transmittal	8 Mar 2022	TBD	No
Briefing of PL Chief	9 Apr 2022	TBD	No
Chief's Report	30 Sep 2022	TBD	No

Project Name: South San Francisco Bay Shoreline Phase II Coastal Storm Risk Management and Ecosystem Restoration Study

Location: San Francisco, California

Project Area: The study area extends from Palo Alto shoreline east to Mountain View, California. The entire project shoreline is located south of the Dumbarton Bridge at the far southern end of San Francisco Bay. The study encompasses approximately 2.5 miles of the bay shoreline in Santa Clara County, which is divided into 11 Economic Impact Areas (EIAs). The specific area for the present Phase II study is between EIA 1 and EIA 4 and is bounded on the west by San Francisquito Creek in Palo Alto and on the east by Mountain View/ Charleston Slough (Figure 1). The locally preferred plan for Economic Impact Area 11 was recommended in December 2015 in a signed Chief's Report, congressionally authorized in WRDA 2016, and is undergoing construction. The EIAs are comprised primarily of various creeks, sloughs and drainage channels, the Palo Alto Municipal Airport, one flood basin, one water quality control plant, one recycling processes station and a number of salt ponds that were previously used for salt production by Cargill, Inc. Urban developments within these EIAs include commercial buildings, private dwellings and public infrastructures.

Based upon future conditions (2080) under the high sea level change scenario, there are nearly 4,000 residential parcels with over 4,800 housing units within the 0.2% annual exceedance probability (AEP) floodplain. This corresponds with a population at risk of over 12,200 for those residing in the floodplain. In addition, there are approximately 368 non-residential parcels in the floodplain, most of which are large office and industrial buildings which employ many workers who would also be at risk from flooding. Public buildings include approximately 13 schools and 12 churches. Finally, Highway (101) bisects the floodplain, and there are many local streets which would also be inundated. Motorists would also be among the population at risk.

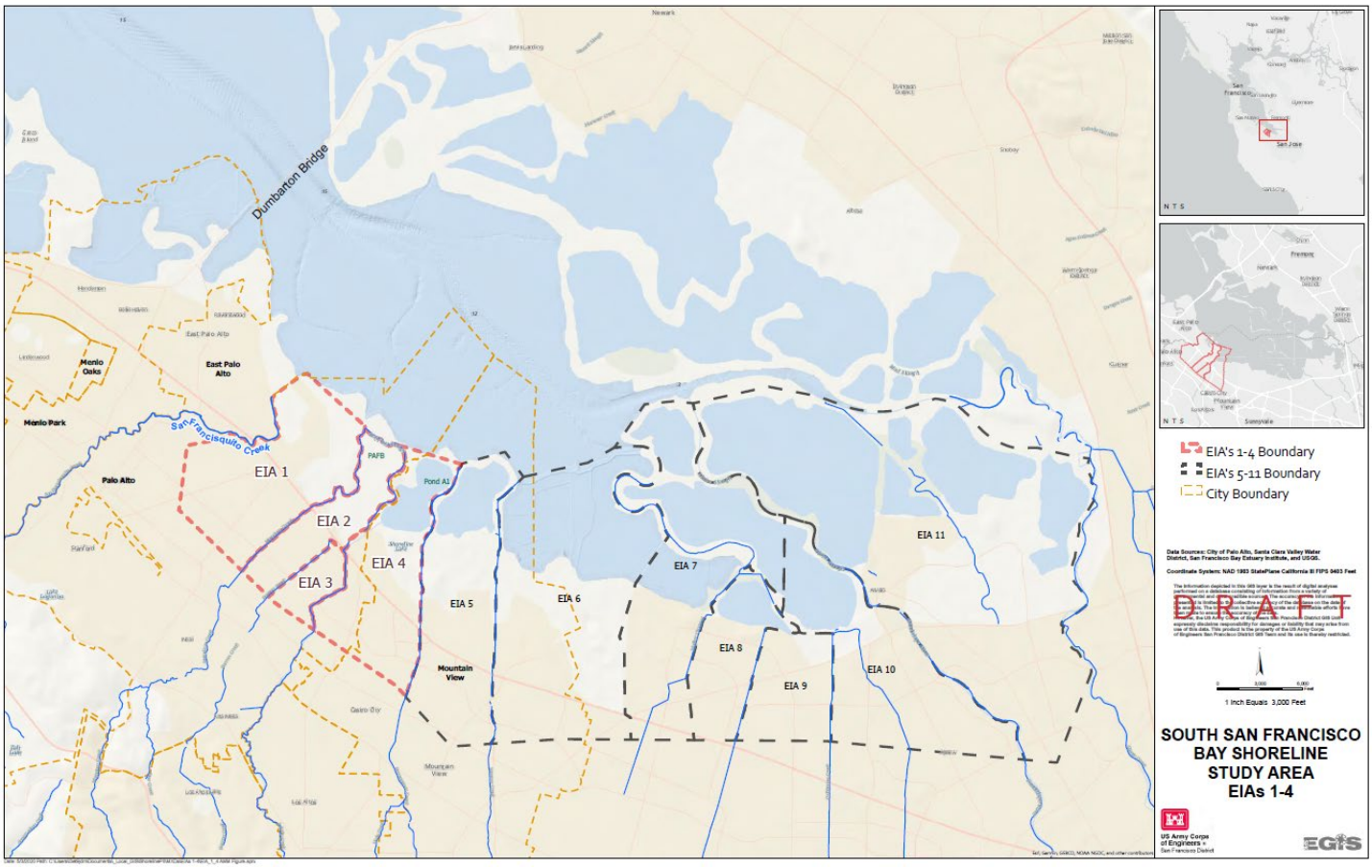

Figure 1. South San Francisco Bay Shoreline II Study Area

Problem Statement: The South San Francisco Bay Shoreline is at risk of flooding from bay water, which could cause extensive damage to public infrastructure and private property, loss of life and deterioration of public safety and health, degradation of the natural environment, and adverse changes to the social and economic character of these communities. This flood risk is expected to increase with time due to the rising sea level in the bay, and be further exacerbated as the expected sea level rise accelerates over time. Increased risk for tidal flooding is also due to having large areas of low-lying terrain protected by non-engineered dikes. In addition, the past creation of commercial salt harvesting ponds along southern San Francisco Bay has resulted in a loss of most of the tidal salt marsh habitat within the study area. These local tidal marsh losses are in addition to San Francisco estuary wide losses consisting of approximately 90 percent of all San Francisco Bay tidal wetlands. Specific problems include:

1. The risk to public safety and public health
2. The risk to public infrastructure and private property
3. Degradation and loss of tidal ecosystems

Authority: Section 110 of Rivers and Harbors Act of 1950, Section 142 WRDA 1976 as amended by Section 705 of WRDA 1986, Section 4017 of WRDA 2007, Resolution adopted by the Committee on Transportation and Infrastructure of the U.S. House of Representatives on July 24, 2002, and Section 1025 of WRDA 2014.

Rivers and Harbors Act of 1950, SEC. 110.

> The Secretary of the Army is hereby authorized and directed to cause preliminary examinations and surveys to be made at the following-named localities, the cost thereof to be paid from appropriations heretofore or hereafter made for such purposes : *Provided*, That no preliminary examination, survey, project, or estimate for new works other than those designated in this title or some prior Act or joint resolution shall be made: *Provided further*, That after the regular or formal reports made as required by law on any examination, survey, project, or work under way or proposed are submitted, no supplemental or additional report or estimate shall be made unless authorized by law: *Provided further*, That the Government shall not be deemed to have entered upon any project for the improvement of any waterway or harbor mentioned in this title until the project for the proposed work shall have been adopted by law: *Provided further*, That reports of surveys on beach erosion and shore protection shall include an estimate of the public interests involved, and such plan of improvement as is found justified, together with the equitable distribution of costs in each case: *And provided further*, That this section shall not be construed to interfere with the performance of any duties vested in the Federal Power Commission under existing law: …San Francisco Bay, including San Pablo Bay, Suisun Bay, and other adjacent bays, and tributaries thereto, California.

Water Resources Development Act of 1976, Section 142:

> SEC. 142. The Secretary of the Army, acting through the Chief of Engineers, is authorized and directed to investigate the flood and related problems to those lands lying below the plane of mean higher high water along the San Francisco Bay shoreline of San Mateo, Santa Clara, Alameda, Napa, Sonoma and Solano Counties to the confluence of the Sacramento and San Joaquin Rivers with a view toward determining the feasibility of and the Federal interest in providing protection against tidal and fluvial flooding. The investigation shall evaluate the effects of any proposed improvements on wildlife preservation, agriculture, municipal and urban interests in coordination with Federal, State, regional, and local agencies with particular reference to preservation of existing marshland in the San Francisco Bay region.

Water Resources Development Act of 1986, Section 705:

SEC. 705. SAN FRANCISCO BAY AREA FLOOD CONTROL STUDY.

> Section 142 of the Water Resources Development Act of 1976 (Public Law 94-587) is amended by inserting immediately after "Napa," the following: "San Francisco, Marin…

Resolution adopted by the Committee on Transportation and Infrastructure of the U.S. House of Representatives on July 24, 2002: The resolution requested that the Secretary of the Army "review the Final Letter Report for the San Francisco Bay Shoreline Study, California, dated July 1992, and all related interims and other pertinent reports to determine whether modifications to the recommendations contained therein are advisable at the present time in the interest of tidal and fluvial flood damage reduction, environmental restoration and protection and related purposes along the South San Francisco Bay shoreline for the counties of San Mateo, Santa Clara and Alameda, California."

Water Resources Development Act of 2007, Section 4027:

The reports are also authorized by Section 4027 of the Water Resources Development Act (WRDA) of 2007, which directs the Secretary of the Army to conduct a study of the feasibility of carrying out a project for: flood damage reduction along the South San Francisco Bay shoreline; environmental restoration of the South San Francisco Bay salt ponds; and other purposes the Secretary determines to be appropriate. Preconstruction engineering and design activities for this project will be continued under these authorities.

Water Resources Reform and Development Act of 2014, Section 1025:

SEC. 1025. WATER RESOURCES PROJECTS ON FEDERAL LAND

> Section 1025 of the Water Resources Reform and Development Act of 2014 provides discretionary authority to the Secretary to carry out authorized water-resource-development projects on other Federal lands under certain conditions: Sec. 1025. WATER RESOURCES PROJECTS ON FEDERAL LAND
>
> (a) IN GENERAL.—Subject to subsection (b), the Secretary may carry out an authorized water resources development project on Federal land that is under the administrative jurisdiction of another Federal agency where the cost of the acquisition of such Federal land has been paid for by the non-Federal interest for the project.
>
> (b) MOU REQUIRED.—The Secretary may carry out a project pursuant to subsection (a) only after the non-Federal interest has entered into a memorandum of understanding with the Federal agency that includes such terms and conditions as the Secretary determines to be necessary.
>
> (c) APPLICABILITY.-—Nothing in this section alters any non-Federal cost sharing requirements for the project.

Sponsor: Santa Clara Valley Water District and California State Coastal Conservancy

Type of Study: General Investigation Feasibility Study

SMART Planning Status: The initial assumption is the study will be 3x3 compliant. Currently, there are no plans to seek a schedule or budget exemption.

Federal Interest:

Within the floodplain areas analyzed for phase I of the Shoreline Study (i.e., EIAs 1 – 11), there are approximately 3,000 residential, commercial, industrial, and public structures with an estimated depreciated replacement value of $2.7 billion, including structures and their contents within the first floor (USACE 2015). Phase II (EIAs 1-4) estimated depreciated replacement value is approximately $1.5 billion dollars in structures and contents and includes high-tech, pharmacy, and biotechnical corporations, the Palo Alto water quality control plant and municipal airport. Phase III (EIAs 5-10)estimated depreciated replacement value is approximately $1billion dollars in structures and contents and includes NASA Ames, Moffet Field and the Sunnyvale Water Pollution Control Plant. Rough order magnitude for construction costs of a project for Phase II range between 250 million to 800 million dollars.

Risk Identification:

- Public outreach and stakeholder engagement: Because of its location, potential size, short and long-term impacts, and the number of people, agencies, and businesses affected, determining the Tentatively Selected Plan will require a high level of public engagement and communication.

- Costs associated with existing levees: Sufficient understanding of the geotechnical properties of levees in the study area is necessary to inform the costs of alternatives that require improvements. Existing levees and berms are not engineered and could pose a risk of flooding and salt water intrusion if not maintained.

- Understanding water levels: Changes in water elevations during planning/alternative formulation may be different than during construction. Thorough understanding of water elevations and how they affect the recommended plan must be in alignment with planned construction in Preconstruction Engineering & Design (PED).

- Sea level rise uncertainty.

- Need for resiliency to manage for life safety threats.

- Unknown characteristics of soils: If contaminated soils are discovered during PED a risk in the feasibility of the recommended plan could occur. Additionally, the uncertainty of fill quantities and pricing could result in an unconstructable project.

- Incorrect determination of federal interest: Any of the following hazards could lead to an incorrect federal interest: cost estimate, levee specifications, constructability designs (hauling/staging), unknown endangered species or cultural artifacts.

- Regulatory and environmental compliance, particularly in relation to the in-water alternatives: Strict state and federal regulatory requirements for activities in San Francisco Bay could limit the scope of alternatives.

- Actions taken by others: The study area includes multiple cities and there is the potential for flood risk reduction projects to be completed prior to the base year of this study (2030). This poses a risk to identifying the future without project condition correctly.

- Threatened and Endangered (T&E) Species: Several T&E listed species are present in the study area. The recommended alternative should avoid impacts to listed species and improve ecological functions for wildlife. Quantifying National Ecosystem Restoration (NER) benefits and tradeoffs between tidal wetlands and managed ponds is difficult and will entail a high level of coordination with resource agencies and the Project Delivery Team (PDT). Additionally, the PDT is exploring utilizing/developing models to accurately capture the impacts and benefits of project actions on the ecosystem versus using existing models with a higher uncertainty of performance. This may affect the ability of the study to remain within 3x3.

- Real estate: There is mixed land use and ownership within the study area. It is likely that a non-standard estate will be recommended and land acquisition may be contentious.

None of the identified risks are expected to pose a significant threat to human life or the environment.

Scope of Review.

- Will the study likely be challenging? Determining a Tentatively Selected Plan will be challenging because the diversity of stakeholders will require much fine tuning of the preferred alternative. The consideration of levee alignment to reduce flood risks and restoration of tidal wetlands and salt ponds in the same study area poses an additional challenge to the PDT. Construction should not be challenging in that the potential alternatives are likely to be similar to construction work on-going in EIA 11.

- Provide a preliminary assessment of where the project risks are likely to occur and assess the magnitude of those risks.

  - *Public outreach and stakeholder engagement*: Because of its location, potential size, short and long-term impacts, and the number of people, agencies, and businesses affected, determining the Tentatively Selected Plan will require a high level of public engagement and communication. This factor should have a small effect on the level of review because there are ongoing efforts by the non-federal sponsors to gain support of the communities.

- *Costs associated with unknown levee geotechnical characteristics*: Sufficient understanding of the geotechnical properties of levees in the study area is necessary to inform the costs of alternatives that require levee improvements.

    - *Regulatory and environmental compliance, particularly in relation to the in-water alternatives*: Strict state and federal regulatory requirements for activities in San Francisco Bay could limit the scope of alternatives. This factor should have a small effect on the level of review because the PDT will engage with the San Francisco Bay Restoration Regulatory Integration Team (BRRIT) and other Resource Agency staff early.

- Is the project likely to be justified by life safety or is the study or project likely to involve significant life safety issues?. Coordination with experts in the life loss analysis field is underway. The project will be justified based on net national economic development benefits resulting from a reduction in expected future direct and indirect flood damages to buildings, contents, and public infrastructure and national ecosystem restoration benefits. The Chief of Engineering also believes the potential risks to life safety from any

recommended plan would be low (not significant). This is based on the following factors:

- There are numerous potential vehicular and pedestrian egress routes to nearby higher ground. Analysis of flooding under various scenarios is on-going using existing data and updated bathymetry data is currently being processed to incorporate into the flood forecast.

- 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? Not likely.

- Is the project/study likely to involve significant public dispute as to the economic or environmental cost or benefit of the project? Not likely.

- 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? Yes. The PDT is developing an ecological model which will need to be approved by the Ecosystem Planning Center of Expertise (ECO PCX).

- Does the project design require redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design/construction schedule? TBD. Resiliency is important for sea level rise.

- Is the estimated total cost of the project greater than $200 million? Yes the estimated cost of the study is between 2.5 and 6.5 million dollars.

- Will an Environmental Impact Statement be prepared as part of the study? The PDT has not determined the level of National Environmental Policy Act (NEPA) documentation. Early scoping is planned to help inform this decision. Should an EIS be deemed necessary, a notice of intent would be released.

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

- 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. Conversely, it

will have positive impacts to fish and wildlife and their habitats. This study is multipurpose, coastal storm risk management and ecosystem restoration.

- 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? It is likely an Incidental Take Statement will be required as part of Section 7 consultation with USFWS and possibly NMFS. The project is not anticipated to have significant adverse affects on endangered or threatened species or any critical habitat.

4 REVIEW EXECUTION PLAN

This section describes each level of review to be conducted. Based upon the factors discussed in Section 3, this study will undergo the following types of reviews:

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

Agency Technical Review (ATR). 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. These teams will be comprised of certified USACE personnel. The ATR team lead will be from outside the Corps' South Pacific Division (SPD). 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 (IEPR). 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. 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 coastal storm 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.

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 Risk Management Organization (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.

Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) Review. Per ER 415-1-11, all project documents must undergo BCOES review.

Value Engineering. Per ER 11-1-321 all studies must undergo a Value Engineering review, unless a waiver is obtained.

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 (M/D/Y)	End Date (M/D/Y)	Cost	Complete
Planning Model Review	ECO PCX Approval	Mar 2020	Dec 2020	$50,000	No
Draft FWOP Conditions	District Quality Control	Jun 2020	Jun 2020	$11,000	No
Draft Coastal Modeling FWOP	Agency Technical Review	Aug 2020	Aug 2020	$20,000	No
Draft FWOP Econ Damages	Agency Technical Review	Aug 2020	Aug 2020	$20,000	No
Draft Economics Appendix	District Quality Control	Jan 2021	Jan 2021	$10,000	No
Draft Engineering Appendix	District Quality Control	Jan 2021	Jan 2021	$11,000	No
Draft Real Estate Plan	District Quality Control	Jan 2021	Jan 2021	$10,000	No
Draft Supporting NEPA Documents	District Quality Control	Jan 2021	Jan 2021	$11,000	No
Draft Integrated Report	District Quality Control	Mar 2021	Mar 2021	$16,000	No
Public Review of Draft Report	Public and Agencies	May 2021	May 2021	n/a	No
Draft Integrated Report	Agency Technical Review	May 2021	May 2021	$50,000	No
Draft Integrated Report	Type I IEPR	May 2021	July 2021	$150,000	No
Draft Integrated Report	Policy and Legal Review	May 2021	July 2021	n/a	No
Final Integrated Report	District Quality Control	Oct 2021	Oct 2021	$11,000	No
Final Integrated Report	Agency Technical Review	Nov 2021	Nov 2021	$30,000	No
Final Integrated Report	Policy and Legal Review	Dec 2021	Feb 2022	n/a	No
OMRR&R	DQC and ATR	PED			

4.1 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.

DQC Disciplines	DQC Team Members	Expertise Required
Planning		The reviewer should have recent experience in reviewing plan formulation processes for coastal storm risk management studies and be able to draw on "lessons learned" in advising the PDT of best practices.
Economics		The Economics reviewer should have extensive experience in the economic analysis for Civil Works projects. It is preferable for the economics reviewer to have familiarity with HEC-FDA.
Flood Risk Management (Coastal)		The flood risk management reviewer should be familiar with the latest guidance form the National Flood Risk Management Program and the communication of flood risk to the affected communities.
Environmental Resources		The reviewer should have a solid background in all environmental compliance requirements and USACE guidelines on their integration with the USACE feasibility study process and One Federal Decision Executive Order. The reviewer should have experience and knowledge of the coastal and estuarine systems found in the study area and understand the factors that may affect native species of plants and animals. The reviewer should also be familiar with implementing Engineering With Nature and Natural and Nature-Based Features concepts, and the dual purpose study objectives.
Cultural / Historic Resources		The reviewer should have extensive USACE experience regarding cultural and historic resources on public lands. They need to be familiar with Department of Defense as well as USACE policies and procedures as they pertain to USACE studies and projects.
Coastal Engineering		The reviewer should have experience in coastal engineering, including structural and non-structural solutions. The reviewer should also be well versed in the life safety risks associated with coastal storm risk-management projects. The reviewer should also have extensive experience with sea level change analysis and have knowledge of vertical datums in the study area.
Geotechnical Engineering		The reviewer should have recent experience in the USACE design requirements. This person should also have experience in investigating existing subsurface conditions and materials; determining their physical/mechanical and chemical properties that are relevant to the project considered, assessing risks posed by site conditions; designing earthworks and structure foundations; and monitoring site conditions, earthwork and foundation construction.
Civil Engineering		The reviewer should have recent experience in the design of and plans and specifications for various coastal storm risk management features such as sea walls and slope protection.
Cost Engineering		The reviewer should have experience preparing cost estimates for coastal storm risk management projects and the application of scientific principles and techniques to cost engineering.

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.

DQC Disciplines	DQC Team Members	Expertise Required
Real Estate		The reviewer should have experience preparing Real Estate Plans for General Investigation Studies.

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).

4.2 Agency Technical Review

The ATR will assess whether the analyses are technically correct and comply with guidance, and that reports 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. Note, some reviewers can cover more than one discipline for their ATR review, such as coastal engineering and climate preparedness, risk analysis and economics, or other possible combinations. If deemed justified, the Project Manager will request the appropriate ATR specialist to conduct ATR on a section of the report before submittal of the final report (e.g., Economics).

Table 3: Required ATR Team Expertise

ATR 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 guide a virtual team through the ATR process. The ATR lead may also serve as a reviewer for a specific discipline (e.g., planning, economics, and environmental resources).
Planning	The Planning reviewer should be a senior water resources planner with experience in coastal storm risk management, ecosystem restoration, familiarity with the "Planning Guidance Notebook" (ER-1105-100), the Water Resources Council's Principals and Guidelines, and SMART Planning guidance.
Economics	The Economics reviewer should be a senior economist with experience in flood damage analysis using HEC-FDA; recreation analysis; Cost-effectiveness/Incremental Cost Analysis (CE/ICA); use of RECONS model to address regional economic development associated with a project; discussion of other social effects (OSE) associated with coastal storm risk, as well as OSE benefits from reduction in coastal storm risk; economic justification of projects in accordance with current USACE policy for coastal storm damages.
Environmental Resources	The Environmental Resources 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, Clean Water Act (CWA), Coastal Zone Management Act (CZMA), and coastal habitat is required.
Cultural Resources	The Cultural Resources reviewer should be an archaeologist 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 American Indian Tribes.
Climate Preparedness and Resilience	A member of the Climate Preparedness and Resilience CoP will participate on the ATR team.
Coastal Engineering	The ATR team member will be a subject matter expert in the field of coastal engineering and coastal geomorphology and have a thorough understanding of both the nature of coastal storm risk in this area and coastal structures such as seawalls. They should also have experience in coastal modeling and sea level change analysis and knowledge of vertical datums in the San Francisco Bay area.
Geotechnical Engineering	The reviewer should be a geotechnical engineer familiar with sampling and laboratory testing, embankment stability and seepage analyses, planning analysis, sea walls, fragility curves, and a number of other closely associated technical subjects.
Civil Engineering	The reviewer should be a structural engineer with experience in sea walls, revetments, groins, and other coastal structures.
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 real estate specialist should be familiar with real estate valuation, gross appraisal, utility relocations, takings, and partial takings as needed for implementation of Civil Works projects.
Risk Analysis	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. The reviewer should also be familiar with failure tree statistical analysis and coastal storm risk transfer.

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.

4.3 Independent External Peer Review

4.3.1 Type I IEPR

Type I IEPR is managed outside of the USACE and conducted on 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.

Decision on Type I IEPR. Yes. While the PDT has not yet determined the level of NEPA documentation required, an EIS may be necessary and the cost of the study is expected to be above 200 Million.

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

Required Type I IEPR Panel Expertise. The Panel 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 of expertise.

Table 4: Required Type I IEPR Panel Expertise

IEPR Disciplines	EXPERTISE REQUIRED
Planning	The Planning reviewer should be a senior water resources planner with experience in coastal storm risk management, familiarity with the "Planning Guidance Notebook" (ER-1105-100), the Water Resources Council's Principals and Guidelines, and SMART Planning guidance.
Economics	The Economics reviewer should be a senior economist with experience in flood damage analysis using HEC-FDA; recreation analysis; use of RECONS model to address regional economic development associated with a project; discussion of other social effects (OSE) associated with coastal storm risk, and well as OSE benefits from reduction in coastal storm risk; economic justification of projects in accordance with current USACE policy for coastal storm damages.
Environmental Resources	The Environmental Resources 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 coastal habitat is required.
Coastal Engineering	Team member will be a subject matter expert in the field of coastal engineering and coastal geomorphology and have a thorough understanding of both the nature of coastal storm risk in this area and coastal structures such as seawalls. They should also have experience in coastal modeling and sea level change analysis and knowledge of vertical datums used in the San Francisco Bay.
Geotechnical Engineering	The reviewer should be a structural engineer with experience in sea walls, revetments, groins, and other coastal structures.

Documentation of Type I IEPR. The Outside Eligible Organization (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.

4.3.2 Type II IEPR.

The second kind of IEPR is Type II IEPR. These Safety Assurance Reviews (SAR) are managed by the RMC and are conducted during the design and construction phase 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. Since this is a Coastal Storm Risk Management project a Safety Assurance Review will be required prior to construction. The San Francisco District Chief of Engineering has determined a Type II IEPR and SAR is warranted and funds should be allocated during PED to ensure redundancy, resiliency, and robustness is built into any CSRM features in order to provide a thorough public safety analysis and project design.

4.4 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 lists the proposed models for the study.

Table 5: Study Models

Model Name and Version	Model Description and How It Will Be Used in the Study	Cert/Approval
HEC-FDA 1.4.2	This program performs integrated engineering and economic analysis to support the formulation and evaluation of coastal storm risk management plans. The model applies Monte Carlo simulation to compute the value of flood damages while explicitly accounting for the uncertainty in engineering and economic inputs and provides a wide variety of outputs, including without project damages, with project damages and damages reduced, and project performance statistics.	Certified
RECON v. 2.0	This model is an economic input/output model that estimates the regional economic impacts in terms of jobs, labor income and gross regional product, including direct, indirect and induced effects that result from the introduction of expenditures in a local economy.	Certified
IWR Planning Suite II v. 2.0.9.1	This model classifies plans as cost-effective or not or as a best buy using cost-effective/incremental cost analysis methodology. The primary purpose of the model is to assist the team in selecting cost-effective plans.	Certified
Environmental Model	The PDT is working with the ECO PCX and VT to develop a model that will capture tidal marsh benefits and quantify features.	In-process of Certification

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
HEC-RAS v. 5.0.7	HEC-RAS is a computer program developed by the U.S Army Corps of Engineers that models the hydraulics of water flow through natural rivers and other channels. Version 5.0 introduced two-dimensional modeling of flow as well as sediment transfer modeling capabilities.	Approved
WARMER	The Wetland Accretion Rate Model for Ecosystem Resilience (WARMER) model is a 1-D model of marsh elevation that incorporates both biological and physical processes resulting in vertical marsh accretion. The WARMER model is datum controlled and has been applied to evaluate the habitat evolution of marshes in the San Francisco Estuary and the Sacramento-San Joaquin Delta and continues to be used by USGS' Western Ecological Research Center as they study marsh resilience to sea level rise in the San Francisco Bay.	Approved

4.5 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 (Civil Works Programs) 2018-05, paragraph 9, Director's Policy Memorandum [Operationalizing Risk-Informed Decision Making in Project Management (Planning Phase)], dated 2 July 2019, Planning Bulletin 2018-01 (Feasibility Study Milestones), and recently updated SPD QMP).

4.5.1 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, 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 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.

4.5.2 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.