



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
SOUTH PACIFIC DIVISION
450 GOLDEN GATE AVENUE
SAN FRANCISCO CA 94102-3661

CESPD-PDC (1110-2-1150a5)

MEMORANDUM FOR San Francisco District, ATTN: CESPN-PMI Mr. Hedgecock, 450 Golden Gate Avenue, San Francisco, California 94102

SUBJECT: Approval of Review Plan for the South San Francisco Bay Shoreline, Sunnyvale, California.

1. References:

- a. Engineering Regulation (ER) 1165-2-217 (Civil Works Review Policy).
- b. CENAD-PD-P (PCX-CSRМ) memorandum (South San Francisco Bay Shoreline Phase III Feasibility Study (Sunnyvale), 09 September 2024).
- c. CESPD-PDP Memorandum (Delegation of Signature Authority for Review Plans), 22 January 2019

2. The San Francisco District developed the Review Plan (RP) for the South San Francisco Bay Shoreline, Sunnyvale, California feasibility study in accordance with Reference 1.a. and it includes a decision that Independent External Peer Review will be conducted.

3. The Coastal Storm Risk Management Center of Expertise (CSRМ PCX), serving as the Review Management Organization, collaborated with the San Francisco District on the review plan, and has endorsed it, including the IEPR decision (Reference 1.b). The South Pacific Division District Support Team has also reviewed and resolved all comments in the review plan dated March 2025.

4. I hereby approve this RP consistent with the delegation contained in reference. 1.c.. The RP is a living document and subject to change as circumstances require, consistent with work product development under the Project Delivery Business Process. Significant changes to this RP or its execution due to significant changes in the study/scope or level of review will require new written approval from this office.

5. The point of contact for this memorandum is Mr. Jay Kinberger at (415) 503-6556 and jay.kinberger@usace.army.mil.

Encl

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JOSEPH M. SAVAGE, P.E. SES
Programs Director

Review Plan

South San Francisco Bay Shoreline (Sunnyvale) Feasibility Study
Santa Clara County, California
San Francisco District



Last Revision: March 2025

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1. Project Summary

Project Name: South San Francisco Bay Shoreline (Sunnyvale), CA Feasibility Study

Location: Sunnyvale and Mountain View, Santa Clara County, California

P2 Number: 488467

Decision and Environmental Compliance Document Type: Integrated Feasibility Report and Environmental Assessment (EA)

Congressional Authorization Required: Yes

Project Purpose(s): Coastal Storm Risk Management, Aquatic Ecosystem Restoration, and Recreation

Non-Federal Sponsors: Santa Clara Valley Water District and the California State Coastal Conservancy

Points of Public Contact for Questions/Comments on Review Plan:

District: San Francisco District

District Contacts: Project Manager or Planner

Major Subordinate Command (MSC): South Pacific Division

MSC Contact: Quality Assurance Lead

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

RMO Contact: PCX-CSRМ Director

Table 1. Key Review Plan Dates

Date of RMO Endorsement of Review Plan	09SEP24
Date of MSC Approval of Review Plan	Pending
Date of IEPR Exclusion Approval	N/A
Has the Review Plan changed since RMO Endorsement?	No
Date of Last Review Plan Revision	Pending
Date of Review Plan Web Posting	Pending

Table 2. Milestone Schedule

	Scheduled*	Actual
FCSA Execution	August 2023	28 August 2023
Alternatives Milestone	June 2024	07 October 2024
Tentatively Selected Plan	Dec 2027	Pending
Release Draft Report to Public	May 2028	Pending
Agency Decision Milestone	January 2029	Pending
Final Report Transmittal	March 2031	Pending
Chief’s Report or Director’s Report	September 2031	Pending

*This schedule incorporates planning and review contingency and is pending approval.

2. References

Engineer Regulation 1165-2-217 – Water Resources Policies and Authorities – Civil Works Review Policy, 2 Sep 2024.

Engineer Circular 1105-2-412 – Planning – Assuring Quality of Planning Models, 31 March 2011.

Planning Bulletin 2013-02, Subject: Assuring Quality of Planning Models (EC 1105-2-412), 31 March 2013.

Office of Management and Budget, Final Information Quality Bulletin for Peer Review, Federal Register Vol. 70, No. 10, January 14, 2005, pp 2664-267

Engineer Pamphlet 1105-2-61 – Planning – Feasibility and Post-Authorization Study Procedures and Report Processing Requirements, 1 July 2023

The online USACE Planning Community Toolbox provides more review reference information at: <https://planning.erdc.dren.mil/toolbox/current.cfm?Title=Peer%20Review&ThisPage=Peer&Side=No>.

3. Review Execution Plan

The general plan for executing all required independent reviews for the feasibility study is outlined in the following two tables.

Table 3 lists each study product to be reviewed. The table provides the schedules and costs for the anticipated reviews. Teams also determine whether a site visit will be needed to support each review. The decisions about site visits are documented in the table. As the review plan is updated the team will note each review that has been completed.

Table 4 identifies the specific expertise and role required for the members of each review team. The table identifies the technical disciplines and expertise required for members of review teams. In most cases the team members will be senior professionals in their respective fields. In general, the technical disciplines identified for a District Quality Control (DQC) team will be needed for an Agency Technical Review (ATR) team. Each ATR team member will be certified in the Corps of Engineers Reviewer Certification and Access Program (CERCAP) to conduct ATR by their community of practice. Independent External Peer Review (IEPR) panel membership will reflect disciplines representing the areas of expertise applicable to the review being conducted. The table is set up to concisely identify common types of expertise that may be applicable to one or more of the reviews needed for a study.

Table 3. Schedule and Costs of Reviews

Product to Undergo Review	Review Level	Site Visit	Start Date (FY)	End Date (FY)	Cost	Complete
Planning Model Review (if needed)	Model Review (see EC 1105-2-412)	No	TBD	TBD	\$45,000	No
Future Without-Project (FWOP) for H&H models	Targeted District Quality Control (DQC)	No	Q2 2025	Q2 2025	\$5,000	No
FWOP for H&H models	Targeted Agency Technical Review (ATR)	No	Q2 2025	Q2 2025	\$5,000	No
FWOP for economics models	Targeted District Quality Control (DQC)	No	Q3 2025	Q4 2025	\$5,000	No
FWOP for economics models	Targeted Agency Technical Review (ATR)	No	Q2 2025	Q2 2025	\$10,000	No
DQC H&H climate model	District Quality Control (DQC)	No	Q3 2025	Q4 2025	\$10,000	No
Draft Feasibility Report / EA and Appendices	District Quality Control (DQC)	No	15-Mar-28	15-May-28	\$75,000	No
	District Office of Counsel Review	No	15-Mar-28	15-May-28	N/A	No
	Public Comment under National Environmental Policy Act	No	17-May-28	7-Aug-28	N/A	No
	Agency Technical Review (ATR)	No	17-May-28	7-Aug-28	\$85,000	No
	Independent External Peer Review (IEPR)	No	17-May-28	7-Aug-28	\$200,000	No
	Policy and Legal Compliance Review	No	17-May-28	7-Aug-28	N/A	No
Final Feasibility Report / EA and Appendices	District Quality Control (DQC)	No	10-Jun-30	1-Jul-30	\$50,000	No
	Cost Certification from Cost MCX	No	2-Jul-30	30-Jul-30	\$75,000	No
	Agency Technical Review (ATR)	No	2-Jul-30	30-Jul-30	\$50,000	No
	SPN Legal Review	No	31-Jul-30	13-Aug-30	N/A	No
	Policy and Legal Compliance Review	No	14-Mar-31	21-Apr-31	N/A	No

Product to Undergo Review	Review Level	Site Visit	Start Date (FY)	End Date (FY)	Cost	Complete
	State and Agency Review and any needed National Environmental Policy Act review	No	27-May-31	11-Jun-31	N/A	No
In-kind Products from the sponsor TBD (not expected)	None anticipated	No	TBD	TBD	\$TBD	No
Review Management Organization – Coordination and Participation	Participate in most key meetings In-Progress Reviews, Issue Resolutions, and SMART Milestones	No	ONGOING	ONGOING	N/A	No

Note that the schedule includes policy and review contingency.

Table 4. Review Teams - Disciplines and Expertise

Discipline/Role	Expertise	DQC	ATR	IEPR
DQC Team Lead	Extensive experience preparing Civil Works decision documents and leading DQC. The lead may serve as a DQC reviewer for a specific discipline.	Yes	No	No
ATR Team Lead	Professional with extensive experience preparing Civil Works decision documents and conducting ATR. Skills to manage a virtual team through an ATR. The lead may serve on the ATR team for a specific discipline.	No	Yes	No
IEPR Manager	Planner with extensive knowledge of IEPR policy and procedures and contract management and oversight skills.	No	No	Yes
Planning	Skilled water resources planner knowledgeable in complex, multi-purpose planning investigations (expertise with primary purposes of flood risk management and aquatic ecosystem restoration required; experience with secondary purposes/benefit categories of recreation and water supply preferred), and the application of SMART principles. Needs to be ATR certified for Plan Formulation.	Yes	Yes	Yes
Economics	Experience with applying theory, methods and tools used in the economic evaluation of water resources projects. Experience with primary purposes of flood and coastal storm risk management and aquatic ecosystem restoration required.	Yes	Yes	Yes
Environmental Engineering	Team member will have a thorough understanding of issues related to sediment quality, treatment technologies, disposal methods, and beneficial use applications. Team member will be an expert in the assessment of risks associated with Hazardous, Toxic, and Radioactive Waste (HTRW). The reviewer should be a senior-level engineer (e.g. 10+ years of experience) and/or a professional engineer with active registration per ER 1110-2-1150.	Yes	Yes	Yes

Discipline/Role	Expertise	DQC	ATR	IEPR
Cultural/ Historic Resources	Experience with cultural resource survey methods, area of potential effects, National Historic Preservation Act Section 106, and state and federal laws pertaining to American Indian Tribes.	Yes	Yes	No
Environmental Resources	Experience with environmental evaluation and compliance requirements, national environmental laws and statutes, applicable Executive Orders, and other planning requirements. Experience with ESA, fishery resources, mitigation, and riparian habitat is required. The reviewer should have a solid background in the biological resources to be found in the Western United States, and understand the factors that may affect native species of plants and animals, public access, air quality, and other environmental resources. The reviewer should have expertise in mitigation planning required for Coastal Storm Risk Management (CSRM) projects. The reviewer should have experience in developing ecosystem restoration features and assessing risks to how those features will function into the future with potential climate changes such as increased sea levels, more frequent wind events, and wildfires. Needs to be ATR certified for environmental compliance.	Yes	Yes	Yes
Aquatic Ecosystem Restoration	Experience with National Ecosystem Restoration Plan formulation and evaluation to include formulation strategies, cost-effectiveness/incremental cost analysis and Separable Cost – Remaining Benefits analysis for multipurpose projects. Needs to be ATR certified for ecosystem restoration.	Yes	Yes	No
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. The reviewer should be a senior-level engineer (e.g. 10+ years of experience) and/or a professional engineer with active registration per ER 1110-2-1150. CERCAP certification for ATR is required.	Yes	Yes	Yes
Hydrology	Knowledge of the distribution and movement of water both on and below the Earth's surface, and the impact of human activity on water availability and conditions. Experience in the development of engineering solutions through management measures and alternative plans, and the preparation of integrated Civil Works Feasibility reports. A minimum of 5 years of hydrology experience is preferred. CERCAP certification for the ATR is required.	Yes	Yes	Yes
Hydraulic Engineering	Civil engineer experienced with development & setup of hydraulic models and performing model simulations. The reviewer must have experience reviewing HEC-RAS two-dimensional models with coastal boundary conditions. The reviewer should be experienced with levee systems and be knowledgeable of sediment deposition processes. The reviewer should be a senior-level engineer (e.g. 10+ years of experience) and/or a professional engineer with active registration per ER 1110-2-1150. CERCAP certification for ATR is required.	Yes	Yes	Yes

Expertise		DQC	ATR	IEPR
Discipline/Role	Knowledge of current agency policy, guidance, and engineering associated with the cost and schedule of resources leading to the design and construction of CSRM projects. Experience using cost estimation software and certification with the Cost Engineering Center of Expertise is required.	Yes	Yes	No
Cost 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 flood risk-management projects. The reviewer should also have extensive experience with sea level change analysis. The reviewer should be a senior-level engineer (e.g. 10+ years of experience) and/or a professional engineer with active registration per ER 1110-2-1150. CERCAP certification for ATR is required.	Yes	Yes	No
Coastal 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. The reviewer should be a senior-level engineer (e.g. 10+ years of experience) and/or a professional engineer with active registration per ER 1110-2-1150. CERCAP certification for ATR is required.	Yes	Yes	Yes
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. The reviewer should be a senior-level engineer (e.g. 10+ years of experience) and/or a professional engineer with active registration per ER 1110-2-1150. CERCAP certification for ATR is required.	Yes	Yes	Yes
Real Estate	Experience developing Real Estate Plans and experience in real estate fee/easement acquisition and residential/business relocations for Federal and/or Federally Assisted Programs for implementation of Civil Works projects.	Yes	Yes	No
Levee Safety	Expertise in levee safety analysis to ensure consistent and appropriate analysis and identification of associated risks and project performance analysis.	Yes	Yes	Yes
Climate Preparedness and Resilience	A member of the Climate Preparedness and Resiliency Community of Practice knowledgeable of coastal hydrology climate change assessment policy and practice.	Yes	Yes	No
Risk and Uncertainty	For decision documents involving hydrologic, hydraulic, and/or coastal related risk management measures, include on the ATR team an expert on multi-discipline flood risk analysis to ensure consistent and appropriate identification, analysis, and written communication of risk and uncertainty.	Yes	Yes	No
HTRW	Experience in HTRW with a focus on past industrial waste. *ATR not necessary because study will not propose HTRW remediation.	Yes	No*	No
Operations	Experience in operation of existing and proposed features within the study area. * ATR for this discipline is not necessary in the feasibility stage since designs are conceptual and subject to minor changes based upon final engineering designs during PED.	Yes	No*	No
Construction	Experience in construction of existing and proposed features within the study area.	Yes	No*	No

Discipline/Role	Expertise			
	<p>* ATR for this discipline is not necessary in the feasibility stage since designs are conceptual and subject to minor changes based upon final engineering designs during PED.</p>			
Office of Counsel	<p>Experienced legal professional with experience in providing legal reviews and advice for Civil Works decision documents. Must have expertise in federal environmental and administrative law, including NEPA, ESA, and the Clean Water Act. Should have experience in regulatory compliance, permitting processes, and risk assessments. Active California bar membership of 10+ years required.</p>			
	Yes	No	IEPR	

4. Documentation of Reviews

Documentation of DQC. District Quality Control will be performed continuously. A specific certification of DQC completion will be prepared at the base conditions (existing and future), draft and final report stages. Documentation of DQC will follow the District Quality Manual and the MSC Quality Management Plan. DrChecks will be used for documentation of DQC comments. Documentation of completed DQC, to include the DQC checklist, will be provided to the MSC, RMO and the ATR Team leader. The ATR team will examine DQC records and comment in the ATR report on the adequacy of the DQC effort.

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, Section 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, Section 5.9. Unresolved concerns will be closed in DrChecks by noting the concern has been elevated. ATR documentation will include an assessment by the ATR team of the effectiveness of DQC. The ATR Lead will prepare a Statement of Technical Review (see ER 1165-2-217, Section 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.

Documentation of IEPR. The Outside Eligible Organization 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 final 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.

Documentation of Model Review. Planning models require compliance with EC 1105-2-412. Models developed by the Corps of Engineers are certified and models developed by others are approved. Certifications or approvals may be specific to a single study, a regional application or for nationwide application. Completion of a model review is documented in a memorandum from the Director of a Planning Center of Expertise and should accompany reporting packages for study decisions.

5. Supporting Information

Study or Project Background

Study Authority

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.

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.”

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.

Study or Project Area

The Shoreline Sunnyvale study area extends approximately six miles from Permanente Creek to the Guadalupe River along the shore of the San Francisco Bay in northern California (Figure 1). It includes the cities of Mountain View, Sunnyvale, and Santa Clara as well National Aeronautics and Space Administration (NASA) and United States Fish and Wildlife Service (USFWS) lands. The USFWS operates the Don Edwards Wildlife Refuge on the former salt production ponds within the bay.

Study or Project Area Map

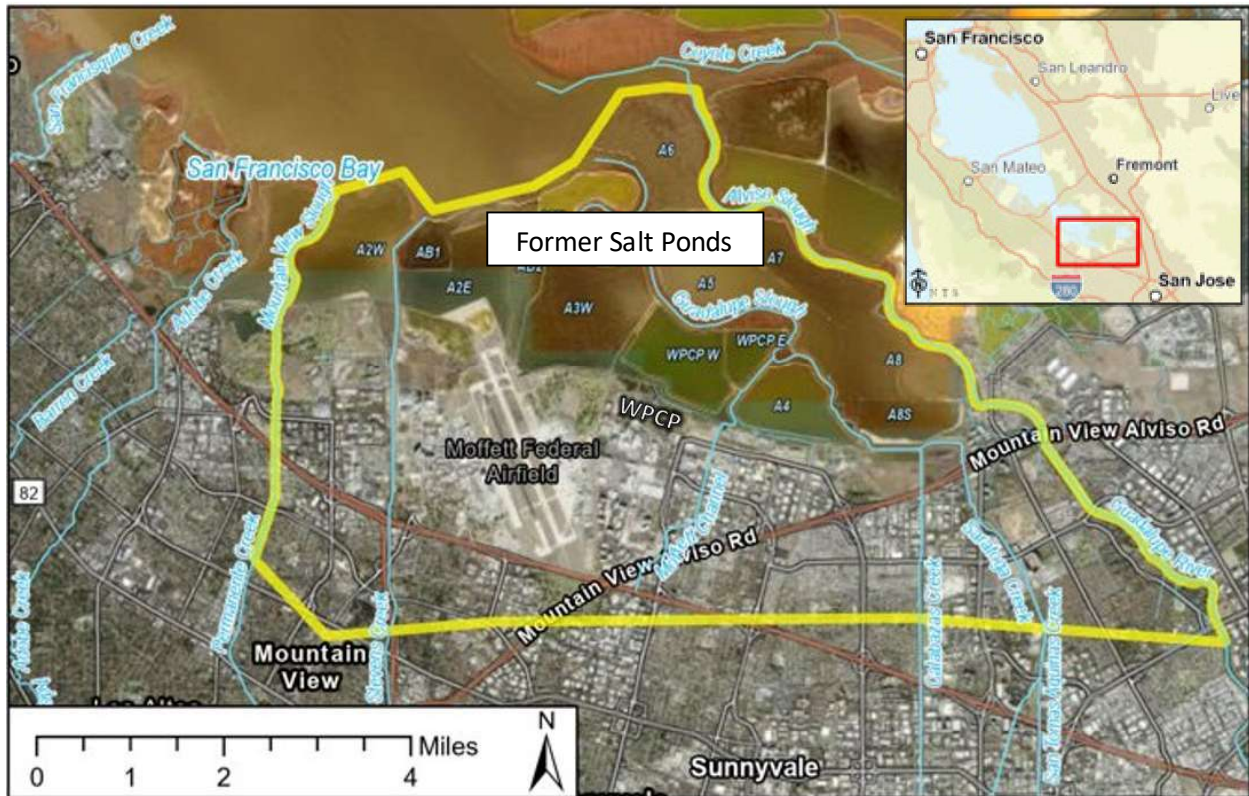


Figure 1. Study Area Map.

Problem Statement

The South San Francisco Bay Shoreline, extending from Permanente Creek to the Guadalupe River, is at risk from coastal forces and riverine flooding, 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 flooding risk may increase with time due to the rising sea level in the bay. The increased risk for tidal flooding is also due to having large areas of low-lying terrain protected by non-engineered berms. 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 of approximately 90 percent of all tidal wetlands.

Specific problems include:

1. The study area is currently at risk from flooding associated from a variety of sources including riverine and coastal storms. This flood risk will increase due to climate change, which will exacerbate riverine flooding during storms due to increased runoff rates, coastal flooding due to sea level change and degradation of the non-engineered salt pond berms. The higher flooding potential will increase life safety, public health, and economic risks.

2. Critical infrastructure is facing existing and increased risk of damage from flooding.
3. Limited remaining salt marsh habitat is at risk of being permanently altered by flooding which could render it unsuitable for special status species. These ponds are currently providing habitat to a variety of birds that are not marsh species but are also protected and for which habitat is also in decline regionally.

Study Objectives

1. Reduce the risk to public health and safety, economic damages, and critical infrastructure due to flooding.
2. Improve the resiliency of natural and engineered systems to sea level change (SLC) and other potential climate changes. Increase the ecological function of tidal wetlands with improved habitat quantity, quality, and sustainability for special-status species and native South Bay species.
3. Increase habitat quantity for special-status species and native South Bay species and enhance existing salt pond habitat to benefit special status wildlife and migratory birds.
4. Increase public access, education, and recreational opportunities.

Constraints

- Do not increase flood risk in developed areas of the study area where loss of life and monetary damages may occur.
- Removal of any regulated wastes would be a responsibility of the non-federal sponsor.

Future Without Project Conditions

The study area is a low-lying area of South San Francisco Bay. In the future, years 2040 – 2090, the area is expected to see an increase in population, infrastructure such as transportation networks and buildings, and be subject to periodic coastal inundation. Utilizing the USACE sea level change projection curve calculator, sea level in the intermediate and high scenarios is expected to reach 4.4 feet and 6.4 feet respective to the NAVD88 Datum, by 2075. Currently, there are several non-engineered berms within the study area have been classified as poor condition and will continue to deteriorate as there are no maintenance plans for them by U.S. Fish and Wildlife Service. Higher tides and waves from sea level rise may inundate the communities and critical infrastructure in the area. A wastewater pollution control plant and a landfill would be at risk of flood damage. The future of the salt-pond laden ecosystem is uncertain at this point. The tidal mudflats support shellfish, snails, and other invertebrates. Multiple bird species such as the clapper rail and the California least tern utilize these periodically inundated flats to feed. Closer to the shore are managed ponds and saltwater evaporation ponds. Within the managed ponds there is no or very limited tidal flow. The salinity of these ponds varies and has an influence on the types of organisms that live in the individual ponds. This ecosystem will be altered as the berms deteriorate and the ponds are subject to tidal action. Changes in salinity, depth, temperature could be expected and would lead to a change in ecosystem productivity.

The loss of outer berms would lead to changes in sediment transport and accretion within the South San Francisco Bay.

Types of Measures/Alternatives Being Considered

This study will develop a plan to address multiple purposes including coastal storm risk management and ecosystem restoration. The list of measures in Table 5 were identified through collaboration with subject matter experts, the Non-Federal sponsors, and vertical team members during plan formulation iterations, including planning charrette. Management measures consisting of structural, non-structural, and nature-based solutions have been formulated for the objectives.

Table 5. Management Measures

Measure	Screening Result
Non-Structural Flood Risk Management Measures	
Update land use planning / zoning / FEMA flood insurance for new structures in the floodplain.	Retained
Update or develop flood / emergency plan.	Retained
Update or install flood warning system(s).	Retained
Add dry or wet flood proofing.	Retained
Elevate structures, utilities, and transportation routes.	Retained
Conduct education and outreach.	Retained
Relocate people and structures out of the floodplain such as through buyouts.	Retained
Remove logs from bay that can damage berms.	Retained
Structural Flood Risk Management Measures	
Construct tidal barrier across San Francisco Bay.	Retained
Construct new levee or floodwall at the shoreline.	Retained
Repair and maintain existing berms.	Retained
Rebuild berms to flood risk design standards.	Retained
Construct retention basins for stormwater.	Screened – outside USACE authority
Convey fluvial flooding out to the bay.	Retained
Construct a ring levee or floodwall around key facilities.	Retained
Retain water upstream with a self-cleaning dam.	Retained
Re-connect creeks to floodplain to capture high flows and logs that could wash down and damage berms.	Retained
Slope runway to tie into levees or high ground.	Retained
Construct breakwaters or habitat islands to reduce wave action on berms and provide nesting bird habitat.	Retained
Encourage stormwater diversion and sustainability.	Screened – outside USACE authority
Environmental Restoration Measures	

Construct managed stormwater ponds.	Retained
Connect rivers and creeks to the ponds.	Retained
Construct wetlands such as at creek mouths.	Retained
Convert ponds to tidal marsh.	Retained
Plant native plants.	Retained
Place oyster beds or other nutrient-capture features.	Screened – ineffective in shallow waters and doesn't address study objectives
Construct ecotones (transitional habitat zones along levees / berms).	Retained
Add sinuosity and remove 90-degree angles in creeks.	Retained
Reconnect creeks to tidal and freshwater marshes to reduce overall flooding and provide habitat benefits beyond those on the immediate shoreline.	Retained
Manage HTRW by designating an infiltration exclusion zone or installing landfill monitoring wells.	Screened – outside USACE authority
Divert and process natural runoff and infiltration.	Screened – outside USACE authority
Replace existing infrastructure with permeable infrastructure.	Screened – does not address study objectives
Recreation Measures	
Construct boardwalk into marsh.	Retained
Repurpose closed areas for recreation.	Retained
Place floating docks.	Retained
Build walking trails on new / modified / repaired berms.	Retained

Table 6. Initial Array of Alternatives

Alternative Plan	Abbreviated Description
Alternative 1 - No Action	<ul style="list-style-type: none"> No Action.
Alternative 2 – Nonstructural	<ul style="list-style-type: none"> Minimize flooding consequences. Aggregate structures by type, floodplain characteristics, and block characteristics. To be developed after FWOP modeling complete and economic analysis.
Alternative 3 – Multi-Benefit Adaptation	<ul style="list-style-type: none"> Near term ecosystem restoration that provides secondary Coastal Storm Risk Management (CSRM), long-term structural CSRM.
Alternative 4 – Repair the Bay-Facing Berms	<ul style="list-style-type: none"> Repair berms to the condition they were in upon transfer to the USFWS.
Alternative 5 – Structural CSRM	<ul style="list-style-type: none"> Structural CSRM with ecotones.

Estimated Cost/Range of Costs

Based on previous Shoreline phases and local efforts and the range of alternatives, the costs could potentially exceed \$200M but not \$1B.

6. Models to be Used in the Study

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 following planning models may be used to develop the decision document:

Table 7. Planning Models

Model Name and Version	Brief Model Description and How It Will Be Used in the Study	Certification / Approval
LifeSim2.0	Assesses life safety risk. Quantifies flood risk through a life safety lens for levees. Tool provides a basis for communicating risk to USACE, sponsor, and stakeholders.	Single use approval for CSRM needed
IWR Planning Suite Version 2.0.9	Cost Effectiveness / Incremental Cost Analysis. Used to determine best buy plans when alternatives are developed and compared.	Certified
RECONS 2.0 (Regional Economic System)	Used to conduct economic analysis at different geographic scopes. Used to make attributes within the Regional Economic Development account.	Certified
NEAT V 1.0 (Net Emissions Analysis Tool)	Quantification of net emissions of greenhouse gases to include their social costs, for NEPA purposes.	Certified
THREM (Tidal Habitat Restoration Ecological Model)	Ecological decision support model encompassing restoration features, particularly of marshland in the San Francisco Bay.	Certified
HEC-FDA 2.0 (Flood Damage Reduce Analysis)	Perform integrated hydrologic and economic analysis to evaluate flood risk management measures.	Single use approval for CSRM required
WARMER (Wetland Accretion Rate Model for Ecosystem Resilience)	1-D marsh elevation model incorporating biological and physical processes which affect vertical marsh accretion.	Approval currently in process

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. For example, HH&C models need to comply with the requirements of HH&C CoP Enterprise Standard 08101.

These engineering models may be used to develop the decision document:

Table 8: Engineering Models

Model Name and Version	Brief Model Description and How It Will Be Used in the Study	Approval Status
HEC-RAS 6.5 (River Analysis System)	Perform 2-D flow calculations to evaluate the future without-project and future with-project conditions.	CoP Preferred
HEC-SSP 2.3 (Statistical Software Package)	Statistical software for frequency curve analysis of hydrologic data.	CoP Preferred
Cost Risk Analysis (Crystal Ball)	A DoD-licensed application applied on top of Excel to provide the capability of evaluating risks associated with the project and how they affect the construction costs for the proposed project.	Required
Cost Engineering software Microcomputer Aided Cost Engineering System (MCACES) MII	Software program for the preparation of detailed construction cost estimates.	Required

All civil works planning studies must document compliance with CECW-P memo (28 July 2023), Model Coordination for Civil Works Planning Studies, to coordinate models and confirm assigned modelers possess the requisite knowledge and experience to complete modeling tasks. A questionnaire for each model is attached in Appendix G.

Extreme water level and wave runup values in the Shoreline Sunnyvale project domain are sourced from a regional Delft 3D and SWAN base model and hindcast for the San Francisco Bay/Delta, which is considered by local practitioners to be a state-of-the-practice, standardized dataset available for use in sea level rise adaptation projects throughout the estuary (Alameda County, 2023). The Delft 3D regional hindcast included 70-years of simulation (1950-2019), which allowed for derivation of extreme water levels for return periods up to 500 years. To support H&H modeling (HEC-RAS) of future conditions, a USACE coastal engineer has developed future extreme water levels based on existing extreme water levels and USACE sea level change curves (Low/Int/High) to use as the downstream boundary. Through a meeting 04 SEP 2024, the PDT

has confirmed alignment around this approach and that these coastal models do not need to be added to Table 8: Engineering Models.

7. Factors Affecting Level and Scope of Review

All planning products are subject to the conduct and completion of District Quality Control. Most planning products are subject to Agency Technical Review and a smaller sub-set of products may be subject to Independent External Peer Review and/or Safety Assurance Review. Information in this section helps in the scoping of reviews through the considerations of various potential risks.

Assessing the Need for IEPR

The team believes IEPR will be triggered by the total project cost. Unique, high-value properties are at risk in the study area, and the project is likely to be multi-purpose, which presents complications. Independent experts with knowledge of the Bay Area will provide a valuable review.

Mandatory IEPR Triggers

- Has the Chief of Engineers determined the project is controversial? **No**
- Has the Governor of an affected state requested an IEPR? **No**
- Is the cost of the project more than \$200 million? **Likely yes.**

Discretionary IEPR

- Has the head of another Federal agency requested an IEPR? **No**

Potential IEPR Exclusion

- Is the project cost greater than \$200 million? **Likely**; and
- Does the project have an Environmental Impact Statement (EIS)? **Unlikely at this time.**
- Is the study being conducted under the general continuing authorities of the CAP? **No**

Assessing Other Risk Considerations

• Risk Identification:

- **Flood Risk:** Uncertainty regarding existing flood risk management provided by non-engineered berms in the study area. Assumption: Although they were not designed to do so, the berms currently provide limited flood risk management. Due to their un-engineered condition (they were constructed of sandy/silty material), and because they are not expected to be maintained, the study team will develop fragility/system response curves for the berms. The curves will address breaching prior to overtopping. The team is also modeling scenarios with breaching upon overtopping.
- **Economics:** Uncertainty regarding the structural inventory within the floodplain. Unique, high-value properties within the study area include NASA, Google, and Lockheed Martin. Assumption: Expert elicitation or hiring a valuation consultant may be required to estimate structure and content values. Building types could include office spaces,

campuses, research and development facilities for testing aircraft, spacecraft, and defense systems, manufacturing plants for components used in new technologies, aeronautics, and robotics. Expert elicitation may be required to develop valuations.

- **Engineering:** The berms in the study are non-engineered. It is possible no further information regarding their construction can be included, as a result assumptions about design and design for liquefaction may be inaccurate. Additional uncertainty is from the bay mud. The mud could be both deeper and weaker than anticipated.
- **Cost Engineering:** The salt ponds bathymetry is unknown. Because the amount of material for potential new marshes is highly sensitive to the elevation profiles of the pond bottoms, bathymetric surveys will be conducted as part of the study. Having the bathymetry increases the accuracy of the material quantity estimates and associated costs.
- **Cultural:** Archaeological surveys need to be completed. A project could impact site or tribal resources. Surveys will be done concurrent with study work.
- **HTRW:** Due to the presence of HTRW and the risk of it constraining planning, conduct an environmental site assessment during the study.

- Will the study likely be challenging? If so, describe how?

Yes. Because flood risk increases with expected sea level rise, the study team will evaluate plans over a 100-year period of analysis. Doing so increases the number of technical analyses and makes the study more challenging to conduct.

An additional challenge is communicating with multiple key stakeholders, including two other Federal agencies.

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

Key risks and uncertainties include:

Risk/Uncertainty	Mitigation	Magnitude
Economic valuations of unique, high-value properties.	Conduct expert elicitation and/or hire valuation consultant.	High
Berm performance.	Develop fragility curves for the berms.	High
The project might manage risk to a single owner (NASA).	Include time for a policy exception.	High
Evaluating future conditions (e.g. flood risk) from combined riverine and coastal processes, including sea level rise through H&H modeling	Evaluate plans over a 100-year economic period of analysis. Propose having one base year for ecosystem restoration and another for flood risk.	High

- Is the project likely to be justified by life safety or is the study or project likely to involve significant life safety issues? Briefly describe the life risk, including the District Chief of Engineering’s assessment as to whether there is a significant threat to human life associated

with aspects of the study or failure of the project or proposed projects. **No, this project is not justified on life safety. The PDT will use the Life Safety Risk Indicator (LSRI) software to estimate existing/future life safety risk and potentially inform alternative formulation/plan selection. The PDT will conduct a LifeSim/TotalRisk evaluation if the results from the LSRI show significant life safety risk, requiring the PDT to complete a more in-depth life safety analysis utilizing LifeSim/TotalRisk. By signing this review plan, the Chief of Engineering agrees with this assessment, fulfilling the requirement of ER 1165-2-217. Levee safety will be considered over the course of the study and during the DQC and ATR review process and will include an Independent External Peer Review (IEPR).**

- 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? If so, how? **No innovative material, techniques, or designs are being proposed.**
- Is there significant interagency interest? **No, while other agencies are active as participating agencies, they don't have an outsized interest in what the recommendation becomes.**
- Is the project expected to have significant economic effects? **No, the project should contribute to the Nation's economic well-being.**
- Does the project design require redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design/construction schedule? If so, how? **Resiliency will be incorporated as required by the USACE Resilience Initiative (EP 1100-1-2).**
- Is the project expected to have more than negligible adverse impacts on scarce or unique tribal, cultural, social, or historic resources? If so, what are the anticipated impacts? **Adverse impacts on buried archaeological sites and / or tribal cultural resources are possible. If this were to occur construction would need to pause and the project may need to be reformulated or redesigned. To mitigate this risk cultural resources surveys will be conducted.**
- Is the project expected to have substantial adverse impacts on fish and wildlife species and their habitat prior to the implementation of mitigation measures? If so, describe the impacts? **No. The project is not expected to have adverse impacts on fish and wildlife species and their habitat prior to implementation of mitigation measures.**
- 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? If so, what are the anticipated impacts? **No adverse impacts to endangered or threatened species or their designated critical habitats are anticipated from any mitigation measures.**

8. Risk Informed Decisions on Level and Scope of Review

Targeted ATR. Will a targeted ATR be conducted for the study?

Yes. The HEC-RAS and HEC-FDA FWOP modeling will undergo a targeted ATR.

IEPR Decision.

Likely. The cost trigger defined in the above section, “Assessing the Need for an IEPR,” is expected to be met. Project cost alone does not trigger IEPR, as exclusions might apply (ER 1165-2-217, Section 6.5.2). Because two exclusions in particular might be met—controversial and/or adverse impacts might not be negligible—the team determined that the study should assume that IEPR will be conducted. This decision can be revisited approximately six months prior to concurrent review.

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 on a regular schedule before construction begins and until construction activities are completed.

Decision on Safety Assurance Review.

Based on the current scope and scale of the study, it is assumed that a Safety Assurance Review may be required; however, there is insufficient detail at this time to make a final determination. The decision will be made upon initiating PED as to whether a Safety Assurance Review will be conducted.

9. Policy and Legal Compliance Review

Policy and legal compliance review of draft and final planning decision documents is delegated to the MSC (see EP 1105-2-61).

(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 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.
- 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.

10. Public Comment

This Review Plan will be posted on the District’s website. Public comments on the scope of reviews, technical disciplines involved, schedules and other considerations may be submitted to the District for consideration. If the comments result in a change to the Review Plan, an updated plan will be posted on the District’s website.

11. Documents Distributed Outside the Government

For information distributed for review to non-governmental organizations, the following disclaimer shall be placed on documents:

“This information is distributed solely for the purpose of pre-dissemination review under applicable information quality guidelines. It has not been formally disseminated by USACE. It does not represent and should not be construed to represent any agency determination or policy.”

Appendix A - Brief Description of Each Type of Review

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 will undergo DQC. This internal review covers basic science and engineering work products. It fulfills the project quality requirements of the Project Management Plan. The DQC team will read all reports and appendices. The review must evaluate the correct application of methods, validity of assumptions, adequacy of basic data, correctness of calculations (error-free), completeness of documentation, and compliance with guidance and standards. Districts are required to check all computations and graphics by having the reviewer place a highlight (e.g., place a “red dot”) on each annotation and/or number indicating concurrence with the correctness of the information shown.

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.

Independent External Peer Review. IEPR is likely 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.

Cost Engineering Review. All decision documents will be coordinated with the Cost Engineering Mandatory Center of Expertise (MCX). The MCX assists in determining the expertise needed on the ATR team. 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. The PDT will prepare a Class 3 cost estimate for the recommended plan.

Policy and Legal Compliance Review. 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’s 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.

Appendix C – Checklist – District Quality Control

DQC Checklist		Response	Initials	Comments
General Issues				
1.	Has a PDT Review been completed?			
2.	Was the allotted time for DQC in the review plan adhered to?			
3.	Has the DQC Team verified the information presented in the current study issue checklist (Pre-AMM, Pre-TSP, Final Report) is accurate?			
4.	Is the identified problem well understood and are the risks and uncertainties properly characterized?			
5.	Has an appropriate array of alternatives been considered that could solve the problem?			
6.	Does the Tentatively Selected Plan (TSP) solve the problem needs and have implementation risks been appropriately considered?			
7.	Are the proposed construction methods appropriate?			
8.	Are the schedules and cost estimates reliable (comprehensive, well-documented, accurate, and credible)?			
9.	What is the risk of potential cost and schedule growth?			
10.	Are there lessons learned that need to be considered?			
11.	Does the product comply with USACE criteria and policy requirements including environmental compliance requirements?			
12.	Have life-safety risks been appropriately assessed?			
13.	Are the methods used to develop analyses and conclusions clearly and fully presented to ensure transparency if applicable?			
Items for Verification				
14.	Are the assumptions, methods, procedures, computations (including quantities), and materials used in the analyses consistent with the project purpose or decisions being made?			
15.	Are the array of alternatives considered comprehensive?			
16.	Are the methods used to develop analyses and conclusions clearly and fully			

presented?				
17. Are the data, level of data, assumptions, and safety risk based on deterministic criteria and RIDM information is appropriate?				
18. Are the results compared to project purpose in compliance with applicable laws and USACE policies reasonable?				
19. Correctness of calculations – before this is checked yes, the DQC reviewer must have highlighted (placed a red-dot) on each annotation, computation, and model input parameter indicating concurrence with the correctness of the information. By checking yes, the reviewer is assuming the same level of responsibility as the author.				
a. H&H				
b. Economics				
c. Environmental				
d. Climate Change				
e. Geotechnical				
f. GIS				
g. Civil				
h. Real Estate				
20. Correctness, accuracy, and clarity of graphic/plan presentation – before this is checked the DQC reviewer must have highlighted (placed a red-dot) critical graphic/plan elements (e.g., dimension/elevation, note, or reference) showing concurrence with the correctness of the information shown. By checking yes, the reviewer is assuming the same level of responsibility as the author.				
a. H&H				
b. Economics				
c. Environmental				
d. Climate Change				
e. Geotechnical				
f. GIS				
g. Civil				
h. Real Estate				

Concurrence

District Planning Chief
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VE.1385598781
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Date: 2025.03.31 14:34:25 -0700
Date: 3/31/25

District Engineering Chief
Robin K. Inaba
Digitally signed by Robin K. Inaba, DN: cn=Robin K. Inaba, o=, ou=, email=Robin.K.Inaba@ve.1385598781, c=US
Date: 2025.03.31 16:10:11 -0700
Date: 3/31/25

DQC Lead
SCHLENKER, BROOKE.E
OKE.E.1262654105
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Date: 2025.03.27 16:28:29 -0400
Date: _____

Appendix F – Review Plan Change Log

Revision Date	Description of Change	Page / Paragraph Number
Oct 2024	Additional details based on SPD review	Throughout
Nov 2024	Changed IEPR is now Likely	18, 22, 23
Mar 2025	Added RMO endorsement date and revised based on SPD comments	Throughout

MEMORANDUM FOR JEFF HOEFT, P.G.

SUBJECT: Technical Lead assignment
South San Francisco Bay Shoreline Sunnyvale Feasibility Study
Sunnyvale, California

1. You are hereby assigned as the Technical Lead for the above-noted flood risk management project.
2. As Technical Lead you are responsible for the overall engineering quality of the product. The Technical Lead shall author the Quality Management Plan with input from the PDT and shall ensure all quality requirements are followed in accordance with Engineering Regulations and SPN BQP's. Specific Technical Lead responsibilities are outlined in the Technical Lead SOP.

Son Ha Digitally signed by Son Ha
Date: 2025.01.28 15:56:57
-0800'
Son T. Ha, P.E., PMP
Chief, Engineering Branch