# SAN FRANCISCO WATERFRONT COASTAL FLOOD STUDY, CA

# DRAFT INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT – EXECUTIVE SUMMARY

JANUARY 2024

USACE TULSA DISTRICT | THE PORT OF SAN FRANCISCO

P2: 499856

US Army Corps of Engineers

PORT OF SAN FRANCISCO

# COVER SHEET

## San Francisco Waterfront Coastal Flood Study
## Draft Integrated Feasibility Report and Environmental Impact Statement

## City and County of San Francisco, California

**Lead Agency:** US Army Corps of Engineers, Tulsa District (USACE)

**Cooperating Agencies**: Environmental Protection Agency Region 9 (Formally Accepted), Federal Emergency Management Agency Region IX (Planning and Implementation Branch), National Marine Fisheries Service (Formally Accepted), National Park Service, US Fish and Wildlife Service

**Participating Agency:** California Department of Fish and Wildlife, California Regional Water Quality Control Board, California State Lands Commission, San Francisco Bay Conservation and Development Commission, and San Francisco Planning Department

**Abstract:** Low-lying assets and economic activity along the San Francisco Waterfront are at risk of flooding from coastal storms, extreme high tides, and sea level rise. The frequency and depth of tidal flooding along the shoreline is only expected to increase as sea levels continue to rise. The San Francisco Waterfront Coastal Flood Study, CA coastal flood risk management study (SFWCFS) is authorized to investigate the feasibility of managing tidal and fluvial flooding and sea level rise along 7.5 miles of the San Francisco Waterfront, from Aquatic Park to Herons Head Park, in the City of San Francisco, San Francisco County, California. This report has been prepared by the Tulsa District, Southwestern Division of the U.S. Army Corps of Engineers (USACE), in partnership with the Port of San Francisco (POSF) to document the study results and findings, including the formulation of alternatives, the costs and benefits of alternatives considered, the selection process of the Tentatively Selected Plan and to disclose the impacts the alternatives may have on the human and natural environment. Short- and long-term impacts to existing aquatic habitats, fish and wildlife including federally protected species and their habitat, water, air, aesthetics, noise, transportation corridors, recreation, historic, and socioeconomic resources are expected. Many of the impacts to other resources will be minimized or avoided through project design. Compensatory mitigation is needed for aquatic habitats, water quality, and air quality. Long-term benefits are anticipated to each of the socioeconomic resources such as life safety, critical infrastructure, utilities, historic resources, historically disadvantaged communities, recreation, and the local economy through the management of coastal flooding and sea level rise. All comments on this Draft Integrated Feasibility Report and Environmental Impact Statement are required to be submitted by _____, 2024.

For more information on this Draft Integrated Feasibility Report and Environmental Impact Statement and the tribal, agency, and public involvement process conducted in conjunction with its preparation, write or call:

Ms. Melinda Fisher
U.S. Army Corps of Engineers, Tulsa District
ATTN: RPEC-SFWS
2488 E 81st Street
Tulsa, OK 74137
SFWFRS@usace.army.mil
918-669-7423

# Executive Summary

## ES-1 Purpose and Need

This study is prepared as a partial response to the study authority, investigating only a segment of the authorized San Francisco Bay shoreline. The purpose of the Study is to investigate the feasibility of managing tidal and fluvial flooding and sea level rise along 7.5 miles of the San Francisco Bay shoreline. The project area is at risk of flooding from bay water during coastal storms, extreme tides, and future sea level rise, with the potential for extensive damage to public infrastructure and private property and associated impacts to the San Francisco waterfront. The risk is expected to increase over time as sea levels rise in the bay.

This study is being conducted under the authority of Section 110 of Rivers and Harbors Act of 1950, Section 142 of Water Resources Development Act (WRDA) 1976 as amended by Section 705 of WRDA 1986 and Section 8325 of WRDA 2022, and Section 203 of WRDA 2020 that authorize an investigation of the feasibility of providing protection against tidal and fluvial flooding and measures to adapt to rising sea levels in San Francisco Bay including the City and County of San Francisco.

Low-lying assets and economic activity along the San Francisco Waterfront are at risk of flooding from coastal storms and extreme high tides, and from the potential failure of the century-old San Francisco seawall, which could result from structural deterioration or earthquake induced shoreline instability (liquefaction or lateral spreading). The San Francisco Bay Area is a seismically active region, and a major earthquake could happen within the study area at any time.

The waterfront is currently at risk of coastal overtopping and damages to property and critical infrastructure because of coastal storms, including the contribution of stillwater, waves and wave runup, which will be exacerbated by rising sea levels. The rate of RSLC is uncertain and could rise from 1 to 10 feet by 2140.

By 2040 under the High SLC curve, over 500 structures will be vulnerable to flooding from the 1% annual exceedance probability (AEP) event, which is an extreme storm with a 1% chance of happening in any given year. Some of these assets include San Francisco Municipal Transportation Agency (SFMTA) facilities and track, City facilities, and commercial real estate. Under the High SLC curve, average annual damages exceed $100 million by 2046; this is driven both by potential damages from infrequent, high water level events, but also from repetitive flooding occurring in low-lying areas.

By 2090 under the High SLC curve, there could be up to three feet of sea level change. This increases both the spatial extent of infrequent storm events and the effects of frequent flooding events.

Absent any federal action, coastal storm risk to the study area will increase. The rate and severity of increasing risks is directly connected to rates of RSLC. Without any federal action, the study area may be subject to intense inundation by a 1% AEP flood event by 2140, though the extent of inundation is dependent on the rate of SLC (Figure 1).

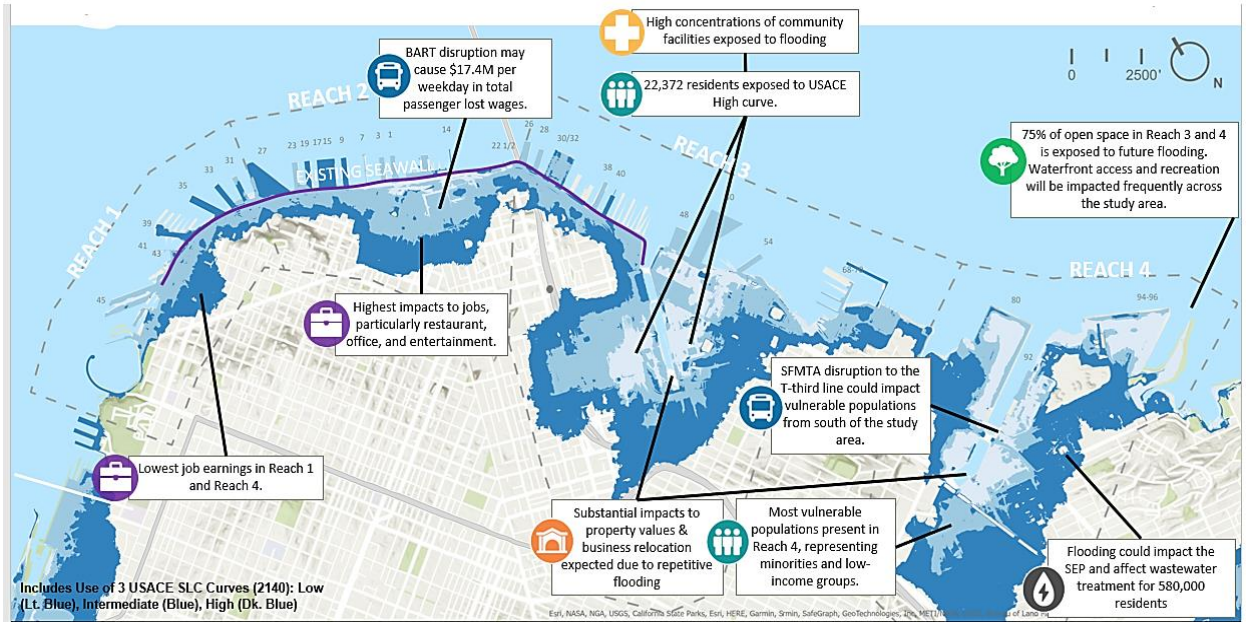


**Figure 1 - Extent of inundation expected under 1% AEP flood event in FWOP Conditions under the three RSLC curves**

**Note: The shades of blue reflect the three SLR curves, with the lightest blue being the USACE low curve, and darkest the high curve.**

## ES-2 Plan Formulation

Plan formulation in response to the study authority was conducted in two broad phases. An initial planning iteration considered distinctly different conceptual approaches to manage the coastal flood risk in the region. The USACE San Francisco District PDT conducted an initial screening of measures including a deployable water management structure at the Golden Gate Bridge, an offshore wave attenuator, several scales of offshore barriers, perimeter plans along the Bay coastline and two forms of retreat.

In early 2021, when USACE developed new guidance for the study to support development of the perimeter plan to balance cost effective implementation and performance under uncertain timing of RSLC. The guidance included the following formulation direction:

- Develop multi-hazard formulation strategies that reflect timing, location, and severity differences in risk.
- Develop at least one stand-alone nonstructural alternative.
- Incorporate engineering with nature, when practicable.
- Formulate with all 3 USACE RSLC projections, plus additional State of CA projections if a Locally Preferred Plan (LPP) is requested.

As a result of this guidance, the PDT developed a plan formulation strategy that is described in the following section.

## ES-2.1 Plan Formulation Strategy

Coastal flooding will increase at an uncertain rate over the period of analysis. Although coastal flood events may occur in the study area, the scale of flood event is primarily influenced by the water surface elevations that result from a coastal flood event in combination with sea level rise. The plan formulation strategy sought to identify different approaches to reduce flood risk now and into the future with an array of alternatives that would inform whether early, phased, or later interventions would be most cost effective and avoid or minimize study area impacts.

Formulation of alternatives to reduce coastal flood risk included:

- An overall approach to defend, accommodate, or retreat from coastal flood risk consisting of structural and nonstructural measures and natural and nature-based features along different lines of defense including:
    - the existing shoreline,
    - a more bayward alignment, and
    - an inland alignment requiring partial retreat of buildings and infrastructure over time;
- Varied scales of features to reflect uncertain timing of RSLC; and
- Phased implementation of features within most alternatives.

## ES-3 Array of Alternatives

Consistent with study guidance, the following alternative plans were developed by the Project Delivery Team and evaluated under three USACE RSLC scenarios:

**Alternative A** No Action

**Alternative B** Nonstructural (e.g., floodproofing)

**Alternatives C and D**

Alternative C Defend, Scaled for Lower Risk (low rate of SLC)

Alternative D Defend, Scaled for Low-Moderate Risk (intermediate rate of SLC)

**Alternatives E, F, and G**

Alternative E Defend Existing Shoreline, Scaled for Higher Risk (high SLC)

Alternative F Manage the Water, Scaled for Higher Risk (high SLC)

Alternative G Partial Retreat, Scaled for Higher Risk (high SLC)

Alternatives D, E, F, and G were all designed to be adaptive, with a second action occurring in 2090.

The PDT identified representative scales of RSLC as building blocks of 1.5 feet, 3.5 feet, and 7 feet of SLC and are depicted in Table **Error! No text of specified style in document.**-1**.**

**Table** Error! No text of specified style in document.**-1 - Sea Level Change Performance by Alternative**

| Alternative | 2040 Target Performance | 2040 Finish Elevation | 2090 Target Performance | 2090 Finish Elevation |
|---|---|---|---|---|
| **Alternative A** | No Action | | | |
| **Alternative B** | Floodproof areas at risk of 1% AEP coastal flooding; retreat areas at risk of monthly coastal flooding; add assets as risk increases over time. | | | |
| **Alternative C** | 1.5’ SLC | 13.5’ NAVD88 | N/A | N/A |
| **Alternative D** | 1.5’ SLC | 13.5’ NAVD88 | 3.5’ SLC | 15.5’ NAVD88 |
| **Alternative E** | 3.5’ SLC | 15.5’ NAVD88 | 7.0’ SLC | 19.0’ NAVD88 |
| **Alternative F** | 3.5’ SLC | 15.5’ NAVD88 | 7.0’ SLC | 19.0’ NAVD88 |
| **Alternative G** | 3.5’ SLC | 15.5’ NAVD88 | 7.0’ SLC | 19.0’ NAVD88 |

The features of these alternatives are summarized in Chapter 3, Plan Formulation and Evaluation. More detailed information on these alternatives can be found in *Appendix A: Plan Formulation*.

## ES-4 Tentatively Selected Plan

The PDT evaluated the alternatives listed above and identified the three NED plans (one for each RSLC curve) and then added metrics for the RED, OSE, and EQ accounts to determine a Total Net Benefits Plan (TNBP). The TNBP was formulated by combining the features of the initial array of alternatives to create a plan that maximizes total net benefits across all possible SLC scenarios and was selected as the Tentatively Selected Plan (TSP).

The TSP is a cost effective, hybridized plan that combines retreat and defend measures, scaled to perform under the lowest initial risk and to adapt to risk of a higher rate of RSLC as a potential subsequent action. Initial actions are shown in Figure 2.

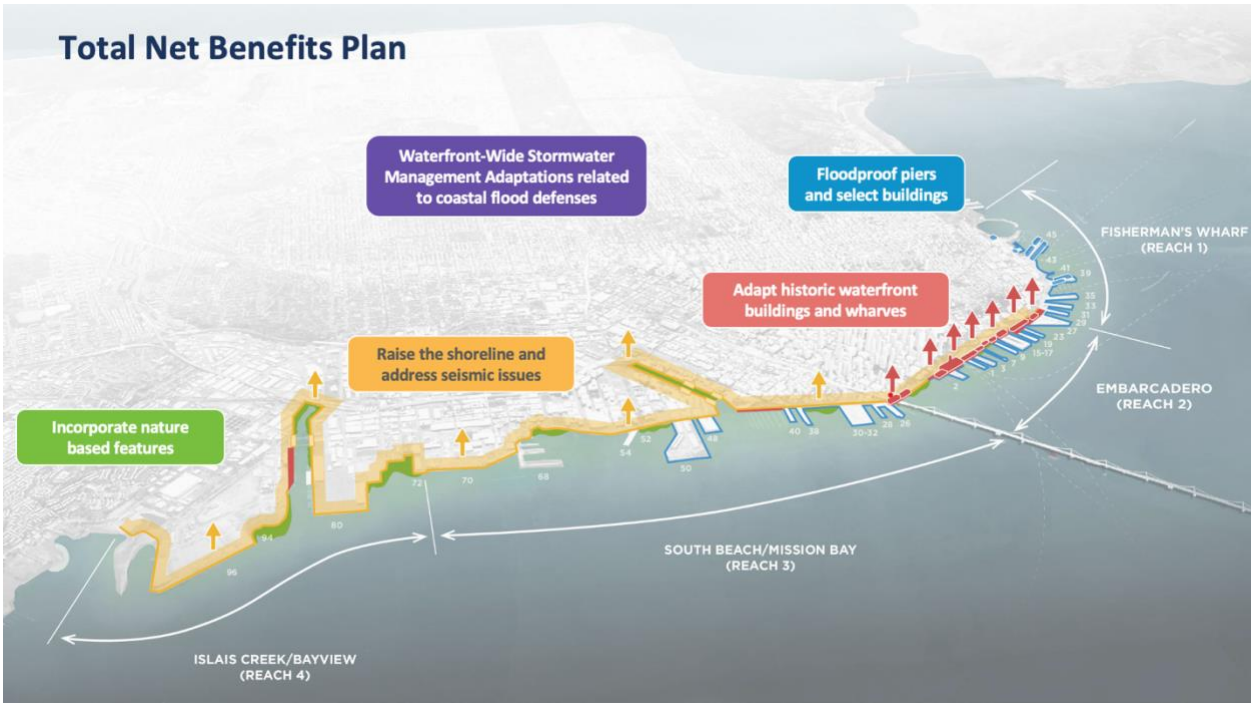


**Figure 2 - TSP Initial Actions**

Table 2 illustrates the conceptual framework for the range of TSP subsequent actions.

**Table** Error! No text of specified style in document.**-2 - TSP First and Second Actions**

| Table 2: Conceptual Framework for TSP Subsequent Actions | | | | |
|---|---|---|---|---|
| **Reach** | **First Action** | **Second Action Low RSLC** | **Second Action Intermediate RSLC** | **Second Action High RSLC** |
| Fisherman's Wharf, Reach 1 | Alternative B | No action | Alternative B (Additional NS) | Alternative G 19’ |
| Embarcadero, Reach 2 | Alternative G 15.5’ | No action | No action | Alternative G 19’ |
| South Beach/Mission Bay, Reach 3 | Alternative D 13.5’ | No action | Alternative D 15.5’ | Alternative E 19’ |
| Islais Creek/Bayview, Reach 4 | Alternative D 13.5’ | No action | Alternative D 15.5’ | Alternative E 19’ |

Further technical engineering, environmental, and economic details can be found in the appendices. Chapter 5 describes how the TSP complies with relevant environmental laws, regulations, and executive orders. The TSP includes adaptive action at Year 50 to refine the feature scales and alignments if coastal flood risk increases and could vary in its ultimate implementation.

The TSP manages coastal flood risk through a suite of Coastal Flood Risk Management (CFRM) measures that function as a system, based on rising sea levels, and are implemented over time based on the risk of sea level rise. The TNBP with seismic ground improvements is proposed as the TSP because it is responsive to the study guidance and aligns with a resilience strategy that maximizes effectiveness across a broad array of future risk scenarios.

Further refinement of the TSP to vary scale and implementation time of measures at the sub-reach geographic level will likely increase cost effectiveness of the plan. Potential refinements will be explored in the next phase of study when performance metrics are available to support tradeoff analysis. A waiver of policy will be required to recommend a plan other than the NED plan as the TSP, and a request for that waiver is currently under review by the Office of the Assistant Secretary of the Army for Civil Works (OASACW).

## ES-5 Pertinent Data

The physical quantities and extents of the TSP features are summarized in Table **Error! No text of specified style in document.**-3.

**Table** Error! No text of specified style in document.**-3 - Physical quantities and extents of 2040 TSP actions**

| Feature | Volume (CY) | Area (SF) | Length (Miles) |
|---|---|---|---|
| Levees | 98,979 | | 2.92 |
| Combi Wall | 33,788 | | 1.96 |
| T-Wall | 979 | | 0.78 |
| Sidewalk | 16,585 | 1,739,070 | 2.60 |
| Wharf | | 609,840 | |
| Building Raise | | 326,435 | |

Plan costs were estimated using the MicroComputer Aided Cost Estimating System, Second Generation (MCACES 2nd Generation, or MII) cost engineering model. The detailed cost estimate is based on a combination of MII's Cost Book, estimator-created site-specific cost items, and local subcontractor and material supplier cost quotes. Cost contingencies were developed through a standard Cost and Schedule Risk Analysis (CSRA). Appendices C and F include details of the engineering and real estate cost estimates, respectively.

At current price levels (Fiscal Year 2024 price level), the Tentatively Selected Plan has an estimated project first cost of $15.4B and an annualized cost of $525,000,000 based

on 2.75% discount rate. The annualized cost includes planning, engineering and design, construction management, interest during construction, and operation and maintenance, including contingencies. The Tentatively Selected Plan provides a range of annualized net benefits between -$120,000,000 and $353,000,000 and has a benefit cost ratio range of .27 to 2.26 depending on which sea level curve is realized. This includes costs of future actions to sustain benefits as sea levels rise. The plan would be cost shared as 65 percent Federal ($8,810,880,000) and 35 percent Non-Federal ($4,744,320,000). Within the non-federal share, the costs for the value of lands, easements, rights-of-way, and relocations are estimated to be $1,370,100,000. The cost of operation and maintenance is estimated at $67,000,000 annually.

**Table** Error! No text of specified style in document.**-4 - Tentatively Selected Plan First Cost**

*(FY 24 Price Level)*

| **Total First Cost** | **$13,555,200,000** |
|---|---:|
| Lands & Damages** | $91,700,000 |
| Relocations | $1,278,400,000 |
| Fish & Wildlife Facilities | $23,900,000 |
| Breakwaters & Seawalls | $9,965,100,000 |
| Levees & Floodwalls | $96,100,000 |
| Pumping Plant | $281,300,000 |
| Bank Stabilization | $4,800,000 |
| Cultural Resource Preservation | TBD |
| Mitigation | TBD |
| Buildings, Grounds, & Utilities | $13,700,000 |
| Remaining Construction Items | $54,000,000 |
| Planning, Engineering, & Design | $1,139,900,000 |
| Construction Management | $606,200,000 |

**Lands and Damages costs are referenced from the Appendix F: Real Estate Plan

**Table** Error! No text of specified style in document.**-5 - Project Annual Costs**

***FY24 Price Level; 2.75% Interest)***

| | |
|---|---|
| **First Cost*** | **$13,555,200,000** |
| Interest During Construction | $1,984,000,000 |
| Fully Funded Cost | $20,524,300,000 |
| Annual Operation, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) | $67,000,000 |
| **Total Annual Cost** | $525,000,000 |

* Note: First Cost is presented as the initial action construction cost, including seismic costs at current price levels, consistent with Planning and Economic uses.

## ES-5.1 Construction and Engineering Risk

HTRW concerns exist in the project area and will require additional investigation and testing prior to construction. Per USACE policy, the NFS will be required to provide a clean site prior to advertisement of any construction contract.

As previously stated, construction will occur along and adjacent to the Embarcadero Roadway. This will cause traffic to be reduced in those areas or completely rerouted, thus congesting other parts of the city further inland. Lack of staging areas will also be a construction risk for the project, specifically from Crane Cove Park to Fisherman's Wharf. All materials will need to be stored in locations outside of these areas and hauled to the worksite or delivered on-site when needed.

## ES-5.2 Cost-Sharing

Project First Cost is the constant dollar cost of the TSP at current price levels and is the cost used in the authorizing document for a project. The "Total Project Cost" is the constant dollar fully funded cost with escalation to the estimated midpoint of construction. Total Project Cost is the cost estimate used in Project Partnership Agreements (PPA) for implementation of design and construction of a project. Total Project Cost is the cost estimate provided to a NFS for their use in financial planning as it provides information regarding the overall non-Federal cost sharing obligation. For this project, the TSP First Cost was calculated to be $13,555,200,000, while the TSP Total Project Cost (Fully Funded) was determined to be $20,524,300,000.

In accordance with the cost share provisions in Section 103 of the WRDA of 1986, as amended (33 U.S.C. 2213), project design and implementation are cost shared 65 percent Federal and 35 percent non-Federal. The non-Federal costs include credit for the value of LERRDs. Total LERRDs are estimated to be $1,370,100,000. The cost

share apportionments for the Project First Costs and Total Project Costs are provided in Error! Reference source not found. and Error! Reference source not found. respectively.

**Table** Error! No text of specified style in document.**-6 - Apportionment of Project First Cost**
*(FY 24 Price Level)*

| | |
|---|---|
| **Project First Cost** | **$13,555,200,000** |
| **Federal Share (65%)** | $8,810,880,000 |
| **Non-Federal Share (35%)** | $4,744,320,000 |
| Less: LERRD Cost | $1,370,100,000 |
| Non-Federal Cash Contribution | $3,374,220,000 |

**Table** Error! No text of specified style in document.**-7 - Total Project Cost (Fully Funded) Apportionment**
*(FY 24 Price levels, fully funded to FY 26)*

| | |
|---|---|
| **Total Project Cost (Fully Funded)** | **$20,524,300,000** |
| Federal Share (65%) | $13,340,795,000 |
| Non-Federal Share (35%) | $7,183,505,000 |

## ES-5.3 PED and Construction Sequencing

At the completion of this feasibility study, and upon approval by the Chief of Engineers, the Recommended Plan would be provided to Congress for authorization and funding. If authorized and funded by Congress, subsequent phases of the project would include PED, Construction, and Operations and Maintenance.

Completion of PED and construction of the Recommended Plan, specifically the pace of construction, is highly dependent on Congressional approval and funding. Assuming an ample funding stream, the initial actions of the TSP could be designed and then constructed over a period of about 14 years. Phased implementation will consider the priorities of the NFS, communities benefitted by the project, resource agencies, and efficiencies in the construction and/or contracting process. Ultimately, implementation activities will be optimized to consider the size and frequency of funding infusions, environmental clearance of individual components including the requirements of the California Environmental Quality Act (CEQA), and beneficial sequencing.

USACE and/or the NFS will complete detailed analyses and design in the PED phase that will inform the final design and ultimately construction. POSF, as the NFS, may seek approval to design and/or construct portions of the TSP under the authority of Section 221 of the Flood Control Act of 1970, as amended and Section 204 of WRDA

1986, as amended. Detailed analyses in the PED phase will include but are not limited to:

- A review of changed conditions since the completion of the study that may affect project design
- Updated engineering modeling
- Detailed surveys of physical and engineering data
- Detailed environmental and cultural resources surveys
- Detailed assessment of structures identified for nonstructural measures
- Additional environmental coordination that may be required if there are environmental, cultural, and/or historic resource impacts that were not identified during this Study

## ES-5.4 Monitoring and Adaptation

Adaptive actions are proposed to be implemented at the 50-year mark after the initial actions are implemented, although the timing could and likely would vary based on the initial recommended action implemented in each reach and under different RSLC rates.

A monitoring plan will be developed to track the rate of relative SLR in the area, and to support decisions about scale and timing of adaptation. Appendix G proposes a Monitoring and Adaptation Plan that will define the appropriate personnel, method, and data to monitor the coastal flood risk in the area and processes to initiate subsequent actions defined in the Resilience Strategy.

## ES-5.5 Environmental Considerations

The TSP utilizes a combination of CFRM and NNBF to reduce risks from coastal flood hazards across the study period. It is expected that in-water and shore-based construction activities will be required to construct these features. Because the protection predominately remains at the existing shorefront, the TSP minimizes the need for building demolition, replacement, floodproofing, and relocations throughout the study area in the first construction period. In 2040, more shore-based measures are constructed including t-walls, vertical walls (mostly around piers), and berms. New lengths of seawall will also be constructed; however, these are intended to occur landward of the existing seawall and thus, should not require in-water activities. As compared to the other action alternatives analyzed, the TSP has the greatest acreage of seismic ground improvements, but the least amount of roadway impacts in 2040. In-water work would include the replacement of 14 acres of wharf, as well as placement of ecological armoring (i.e., NNBF).

In 2090, the major extent of seawall replacement is constructed, which does include extension bayward of the existing seawall in select areas. Thus, five acres of bay fill is

proposed in some areas of seawall construction. The majority of non-structural measures such as building demolition, relocation, and floodproofing occur in 2090 for the TSP when some of the line of defense is moved landward of the existing shoreline. Shore-based construction includes additional t-wall and berm, as well as seismic ground improvements and roadway impacts.

In general, shore-based construction and landward retreat is expected to have greater impacts to human resources such as transportation, communities, recreation, and access, etc., while in-water construction would have more impacts to natural resources such as marine mammals, fish, essential fish habitat, threatened and endangered species, water quality, etc. Construction impacts are mostly temporary and localized, with the construction area expected to return to baseline conditions upon completion. However, some impacts are expected to be permanent, and significant and unavoidable. The addition of NNBF would help to offset the adverse impacts to natural resources and include features such as marsh enhancement, ecological armoring, naturalized shorelines, and ecotone levees. However, the loss of open bay habitat with bay fill in 2090 is likely to result in the need for compensatory mitigation unless the offset from NNBF is enough to compensate for the habitat loss. Addition and augmentation of marsh at Heron's Head Park would significantly improve suitable and preferred habitat for threatened and endangered federally listed and state-listed species, both terrestrial and aquatic, as well as provide new habitat areas for migratory birds. The inclusion of NNBF would be beneficial to resident and transient species, including special status species, as it provides new or expanded habitat in an otherwise urbanized area.

## ES-5.6 Views of the Non-Federal Sponsor

The Port of San Francisco (POSF) as lead agency for the City and County of San Francisco (City) supports publishing the San Francisco Waterfront Coastal Flood Study Draft IFR/EIS and continuation of their partnership with USACE in engaging the public with and further improving the TSP, with a focus on reducing costs and environmental impacts and increasing benefits where possible.

POSF is grateful to USACE and was particularly pleased that USACE allowed POSF staff and consultants to play such an active role in the PDT. The POSF is eager to work with USACE to advance public engagement and to receive robust feedback from the public, resource agencies, other practitioners in the resilience field and any other commenter who has suggestions about how to improve the TSP as we advance towards a final report from the Chief of Engineers to Congress.

City issues for further consideration include:

**A Design Process** which enables the City to play a significant role in waterfront design, potentially through Water Resources Development Act Sections 221 and 204. The City is particularly interested in leading the design process for what is implemented "on top"

of future coastal flood defenses (e.g., roadway configuration, alignment and approach to bulkhead buildings and piers, parks and open space, utilities, etc.).

**Shoreline Elevations, Reaches 3 & 4:** Initial actions in Reaches 3 & 4 are scaled to the USACE Intermediate SLC projection but require very robust ground improvements. To manage construction impacts and provide for efficient project delivery, the City team would like to explore higher shoreline elevations in these areas.

**Reach 1 Modification:** The City team believes that there is value in extending the structural measures utilized for Reach 2 several hundred feet into Reach 1 to provide similar life safety, historic preservation, inland drainage, and flood risk reduction benefits as part of the 1st Action.

**Sub-reach Optimization:** POSF believes that there is an opportunity to optimize the Plan at the sub-reach level to reduce costs and impacts and increase benefits.

**Historic Finger Piers:** The TSP currently includes short floodwalls to protect the historic pier sheds. POSF is interested in exploring 1) how the POSF can utilize public-private partnerships to rehabilitate piers before, concurrent with or after implementation of the TSP, and 2) full pier replacement for a limited number of assets to ensure their preservation and use through the end of their useful life.

**Pier 70 Historic Resources:** The TSP currently includes demolition of two significant historic buildings in the Pier 68/70 Shipyard. POSF is interested in exploring approaches to avoid these demolitions including adjusting the alignment of coastal berm features in this area to avoid demolition of historic resources.

**Environmental Remediation:** Implementation of the TSP will require further site investigation to determine the nature and extent of hazardous materials in the footprint of the plan. The City team wishes to explore options other than avoidance of hazardous materials that would enable implementation of the TSP and associated expenditures by the City or responsible parties to address hazardous materials where they have not already been remediated within the TSP footprint. The City team also wishes to collaborate with USACE to understand and address the risk of rising groundwater tables on contaminated sites in the near-shore area.

**EWN:** The City team has a strong interest in incorporating NNBFs, both to reduce flood risk and to mitigate project impacts. Many of these features are currently included in the Draft Report and EIS as independent measures.

**Inland Drainage Scope & Cost:** The infrastructure improvements necessary to manage inland drainage do not currently consider the effect of the non-structural alternative in Reach 1 (Fisherman's Wharf) and hydraulic connection to neighborhoods outside of the study area. The City team also wishes to advance additional cost estimates and additional modeling of inland drainage systems (the combined sewer) in a TSP scenario to inform decision-making and to achieve a higher level of certainty in the estimated cost.

**New Waterfront Open Space:** There is a desire to explore opportunities for improved public realm both within and outside of the footprint of the TSP, which could include parks inland of the alignment, within the existing right-of-way and promenade, on pile-supported structures, or on top of new Bay fill.

**Bay Fill:** There is an interest in exploring up to 50' of additional Bay fill for the area roughly between Broadway Street and Bay Street and along Rincon Park (roughly from Howard Street to Harrison Street) in Reach #2 to minimize Embarcadero Roadway and light rail impacts and to avoid the SFPUC transport storage boxes if needed. This is currently included in the environmental analysis as Alternative F.

**Tenant Impacts:** Given the number of Port tenants likely to be impacted by construction and the importance of the waterfront to the City's economic vitality, POSF has a strong desire to develop an implementation plan that includes a thoughtful approach to tenant access during construction when possible and tenant relocation when needed.

**Light Rail Impacts:** The San Francisco Municipal Transportation Agency team has emphasized the importance of avoiding transit impacts that would affect transit access to the MUNI Metro East rail facility and to the Southeast community, for example along the southern Embarcadero (south of the Bay Bridge) and across the 4$^{th}$ Street bridge over Mission Creek and to minimize transportation impacts to the multi-modal transportation system during the construction period.

**Seismic Performance of Critical Infrastructure near the TSP:** The City would like to continue evaluating the seismic performance of key infrastructure close to the alignment of the TSP – such as SFMTA light rail track in fill areas outside of the TSP footprint.

## ES-6 Next Steps

The SFWCFS is the first USACE coastal flood risk management study in the nation where sea level rise is the primary driver of projected coastal and combined flood risk. This SFWCFS is also one of the first coastal flood risk management studies in a major urban area under which plan formulation is focused on maximizing net benefits across multiple planning criteria including effects on the nation's economy, the regional economy, other social effects, and environmental quality.

The recommendations contained in this Draft IFR/EIS report reflect the information available at this time and current USACE policies governing formulation of individual projects and may be modified by the Chief of Engineers before they are transmitted to the Congress as proposals for authorization and implementing funding. The Draft IFR/EIS report is a draft for public review.

This Draft IFR/EIS presents a sea level rise adaptation plan based on a series of actions over time with monitoring of climate change and sea level rise to inform subsequent action. The opportunities afforded by the potential investment

recommended under the TSP are numerous: a waterfront that is more resilient to flood and seismic risks, improved connections to the Bay, equitable engagement and investment, improved habitat along the shoreline, adaptation of historic resources, a safe space for future investment in downtown and other waterfront neighborhoods, and improved mobility along the waterfront.

San Francisco already enjoys one of the most inviting waterfronts along the California coast and in the nation, with over 24 million visitors annually prior to the COVID-19 pandemic. The risk management investment has the potential to provide improved experiences and sustain its diverse population.

Much work lies ahead. The PDT must invite and consider public and resource agency comments, and additional technical and policy comments from USACE experts and City and regional agencies and refine the TSP as appropriate. The PDT will then refine the TSP in response to comments to refine the Plan. A Final report will be prepared and ultimately, the Chief of Engineers will decide whether to forward the Recommended Plan to Congress (currently expected in 2026). Congress must then decide whether to authorize and fund the Recommended Plan.

If authorized and funded by Congress, future phases of work will include a Preconstruction, Engineering and Design (PED) phase and a Construction phase. During the PED phase, USACE and the City will develop a phasing and implementation plan to design and construct elements (or geographic segments) of the Recommended Plan based on risk and related factors.

During the remainder of the SFWCFS and the PED phase, City departments will continue to engage the public in the design of the future Port waterfront, including design of streets, open spaces and Bay access, ecological improvements, and improvements and modifications to historic properties, consistent with local values and priorities. The City will be responsible for addressing hazardous materials in the future construction right-of-way and paying for any improvements (“betterments”) to the Recommended Plan requested by the City which USACE determines do not have a federal interest.

This effort will extend over decades and require active engagement with stakeholders across the City and the region. USACE and the City welcome that engagement.