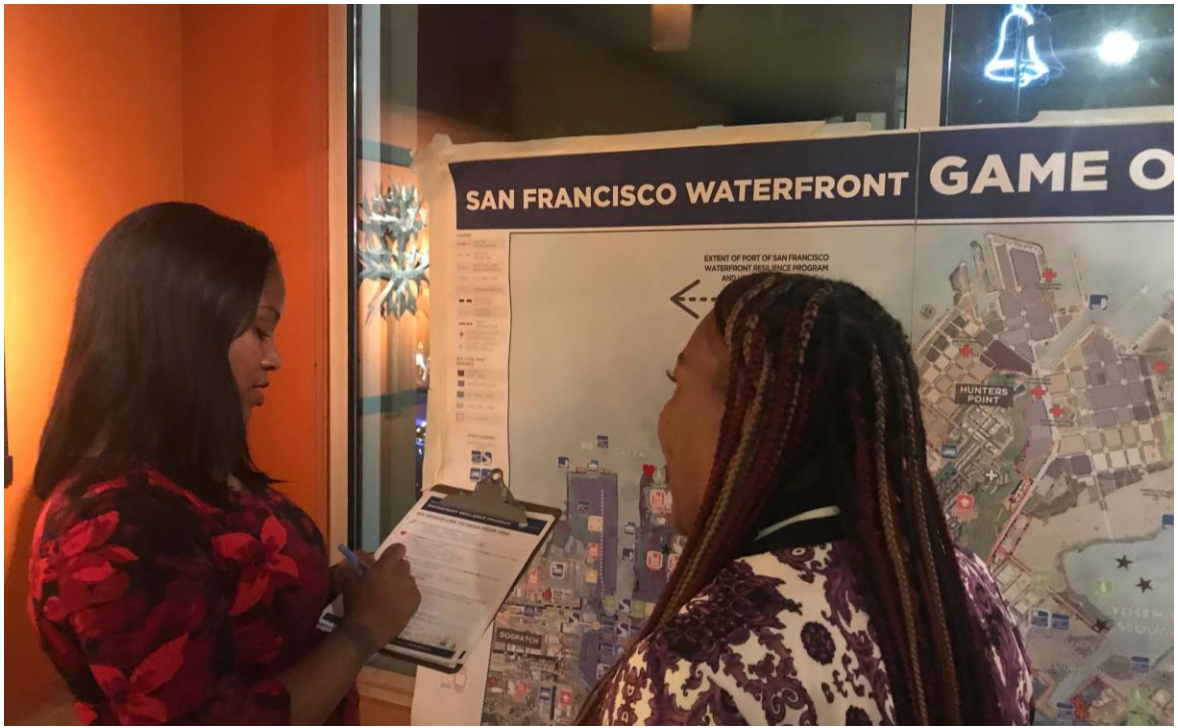

WATERFRONT RESILIENCE PROGRAM UDPATE
Bayview Merchants Association
November 17, 2020
PORT OF SAN FRANCISCO
Waterfront Resilience Program

TODAY'S AGENDA

Presentation Overview

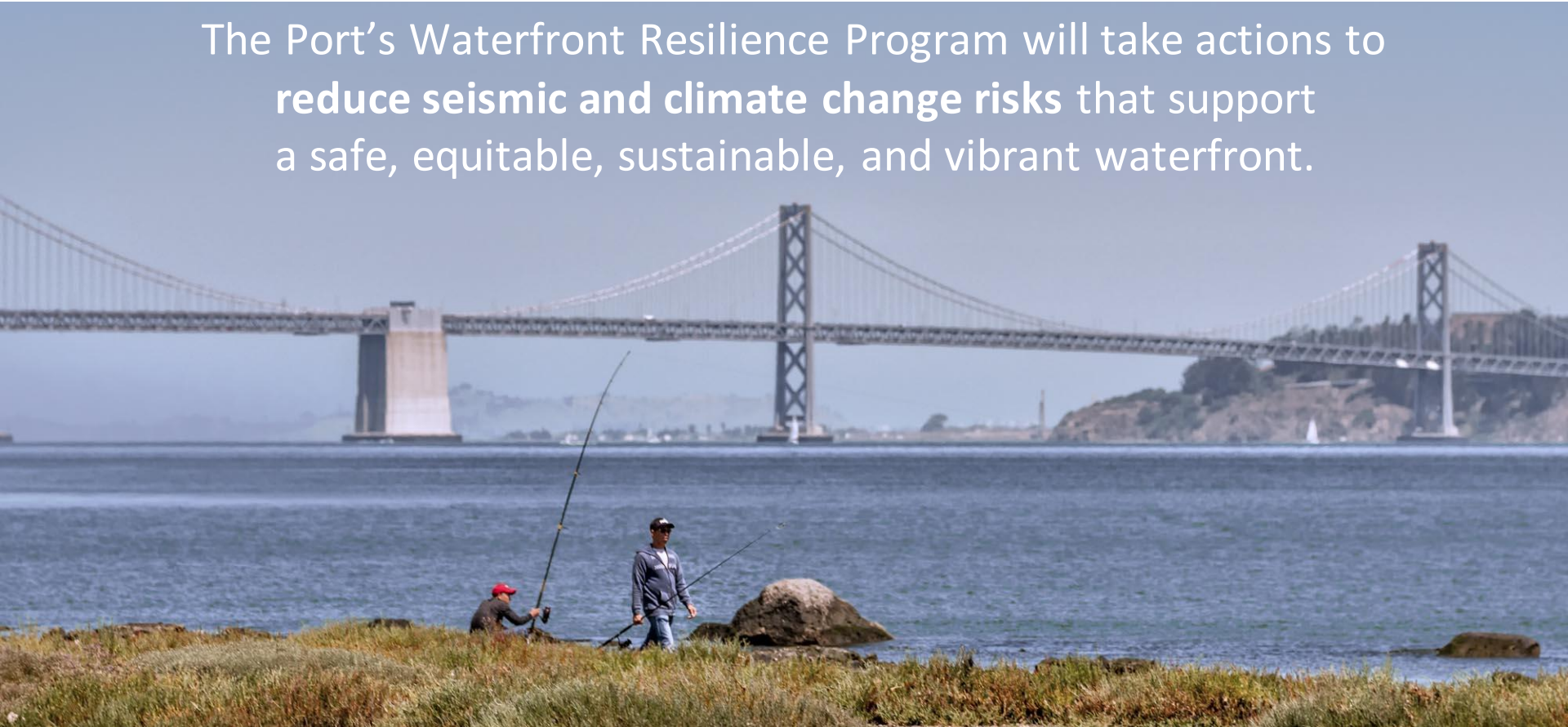


- Overview of the Waterfront Resilience Program
- Embarcadero Seawall Program Update
- USACE Flood Resiliency Study Update
- Measures and alternatives to reduce the risks
- Key priorities from community and stakeholder engagement
- Next steps

WATERFRONT RESILIENCE PROGRAM

Goal Statement

The Port's Waterfront Resilience Program will take actions to **reduce seismic and climate change risks** that support a safe, equitable, sustainable, and vibrant waterfront.



WATERFRONT RESILIENCE PROGRAM DRAFT PRINCIPLES

Affirmed through Robust Community Engagement

- **Prioritize** life safety and emergency response
- **Advance** equity throughout the Waterfront Resilience Program, including through community and stakeholder engagement, planning, contracting, jobs and decision-making
- **Enhance** and sustain economic and ecological opportunities
- **Inspire** an adaptable waterfront that:
  - Improves the health of the Bay
  - Ensures public access to the waterfront and historic places and an inviting waterfront for all
  - Protects and preserves historic and maritime resources
  - Provides opportunities for diverse families, businesses, and neighborhoods to thrive
- **Lead** a transparent, innovative, collaborative, and adaptive Resilience Program

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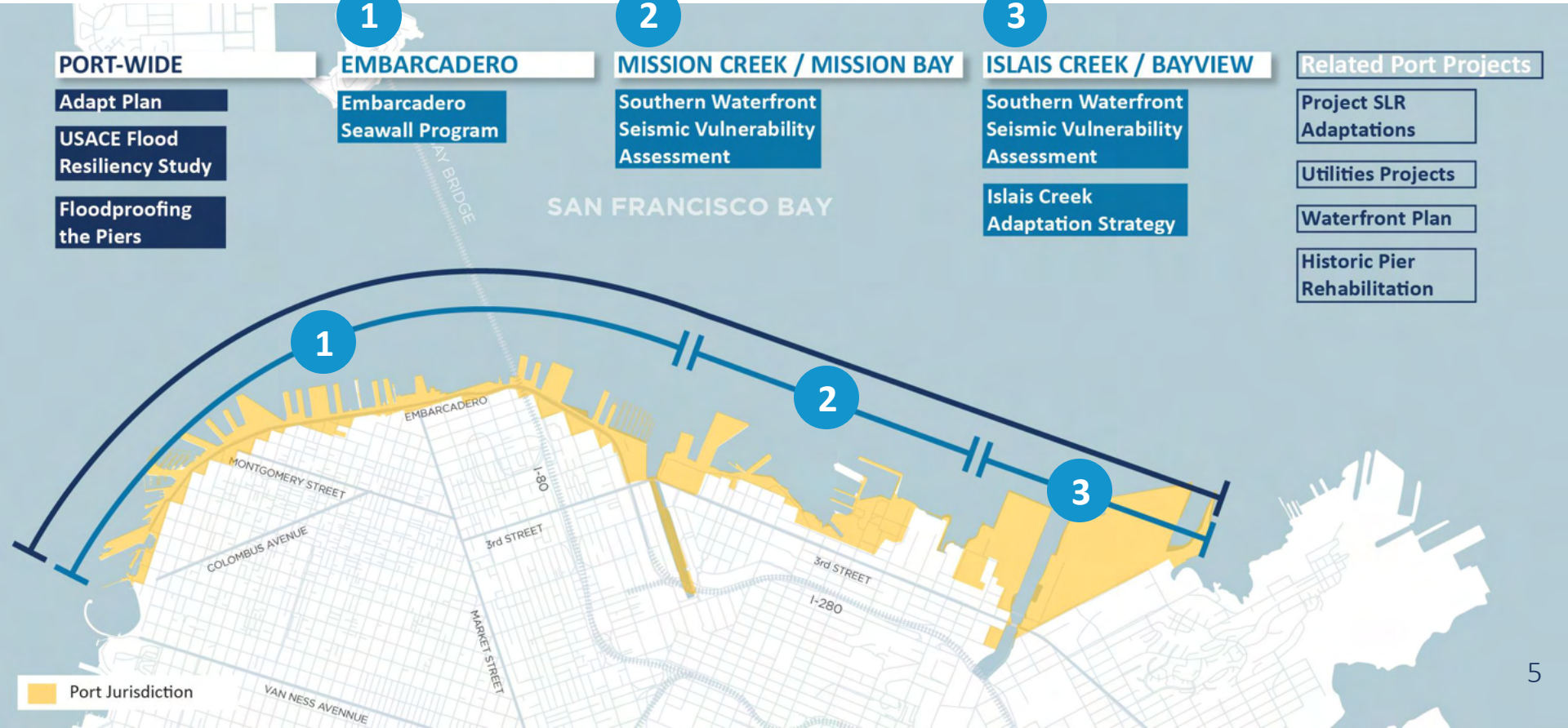
WATERFRONT RESILIENCE PROGRAM EFFORTS

Program and City Resilience Projects and Efforts



Embarcadero Seawall Program

Update and Key Findings from the Multi-Hazard Risk Assessment (MHRA)

EMBARCADERO SEAWALL PROGRAM

Program Overview

- **Project Area:** Fisherman's Wharf to Mission Creek
- **Timing:** 2017 to 2021 project planning followed by implementation / construction
- **Focus:** Seismic and flood risk associated with the Embarcadero Seawall
- **Funding:** $425 million General Obligation Bond passed in November 2018

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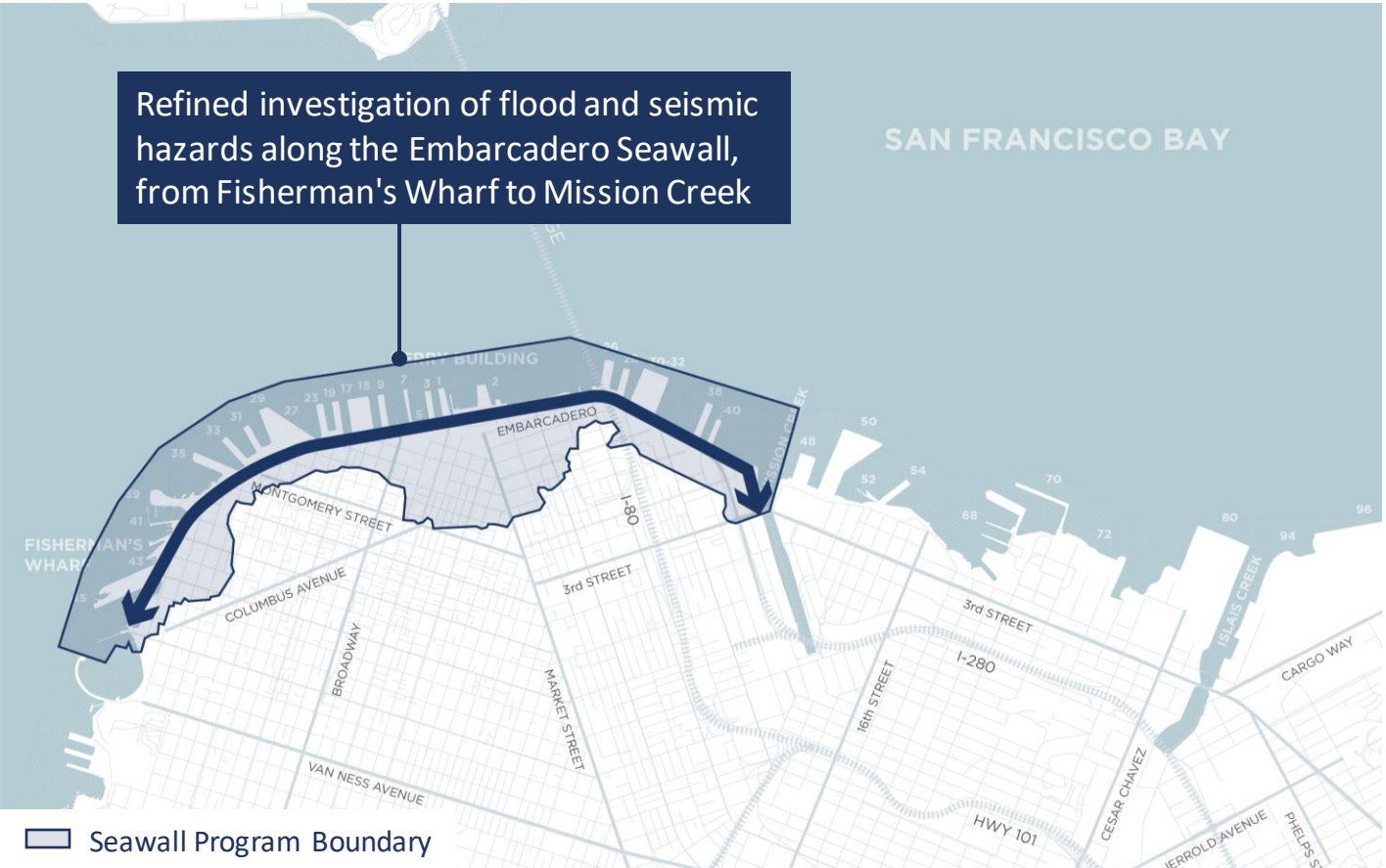
WHAT IS THE MULTI-HAZARD RISK ASSESSMENT (MHRA)?

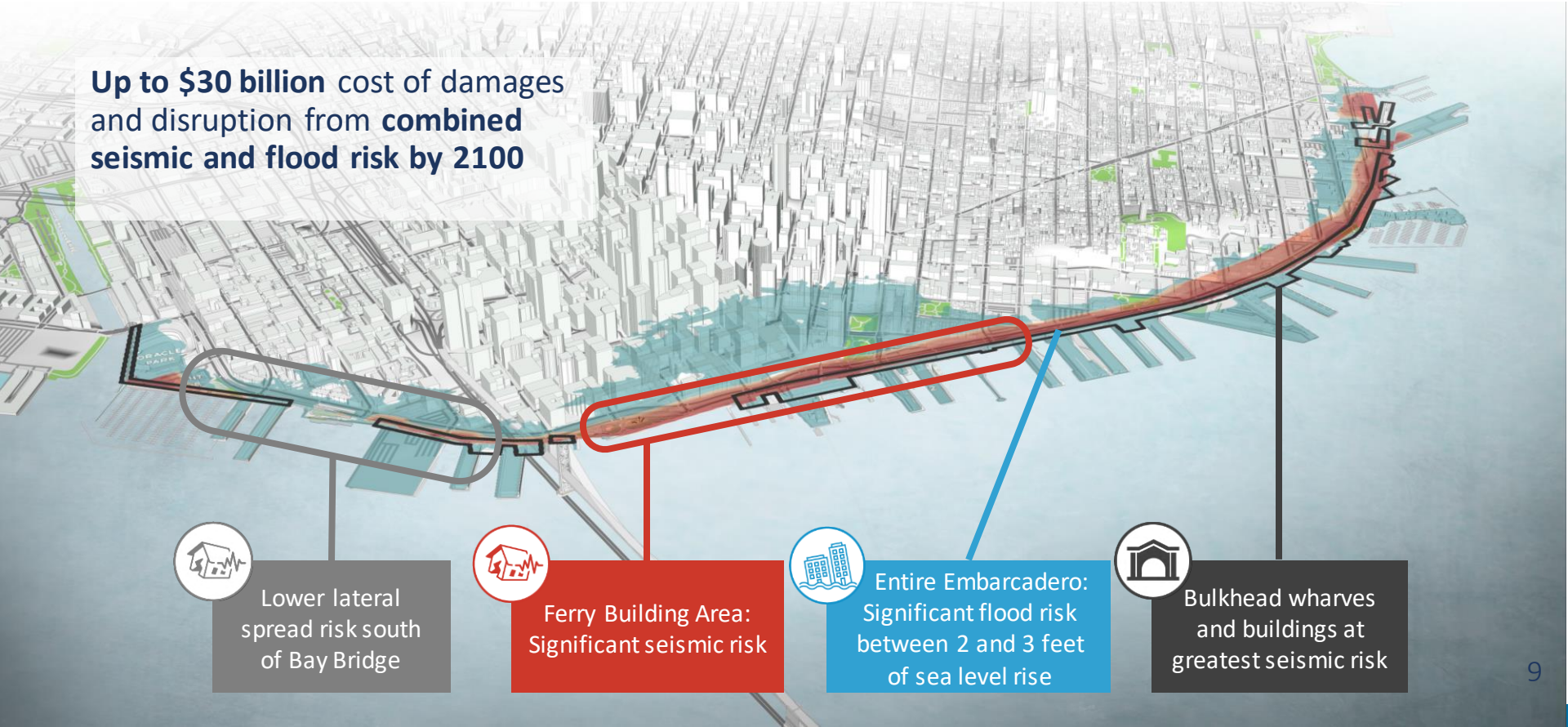
Proposition A Required a Detailed Safety Assessment of the Embarcadero



- Range of seismic hazards assessed within Embarcadero Seawall area
- Range of flood hazard scenarios assessed including impacts to critical City infrastructure
- Methodology: Bored holes and used lasers to uncover what is happening under the Bay and worked closely with agency partners to understand impacts to assets and services that the City and the region rely upon

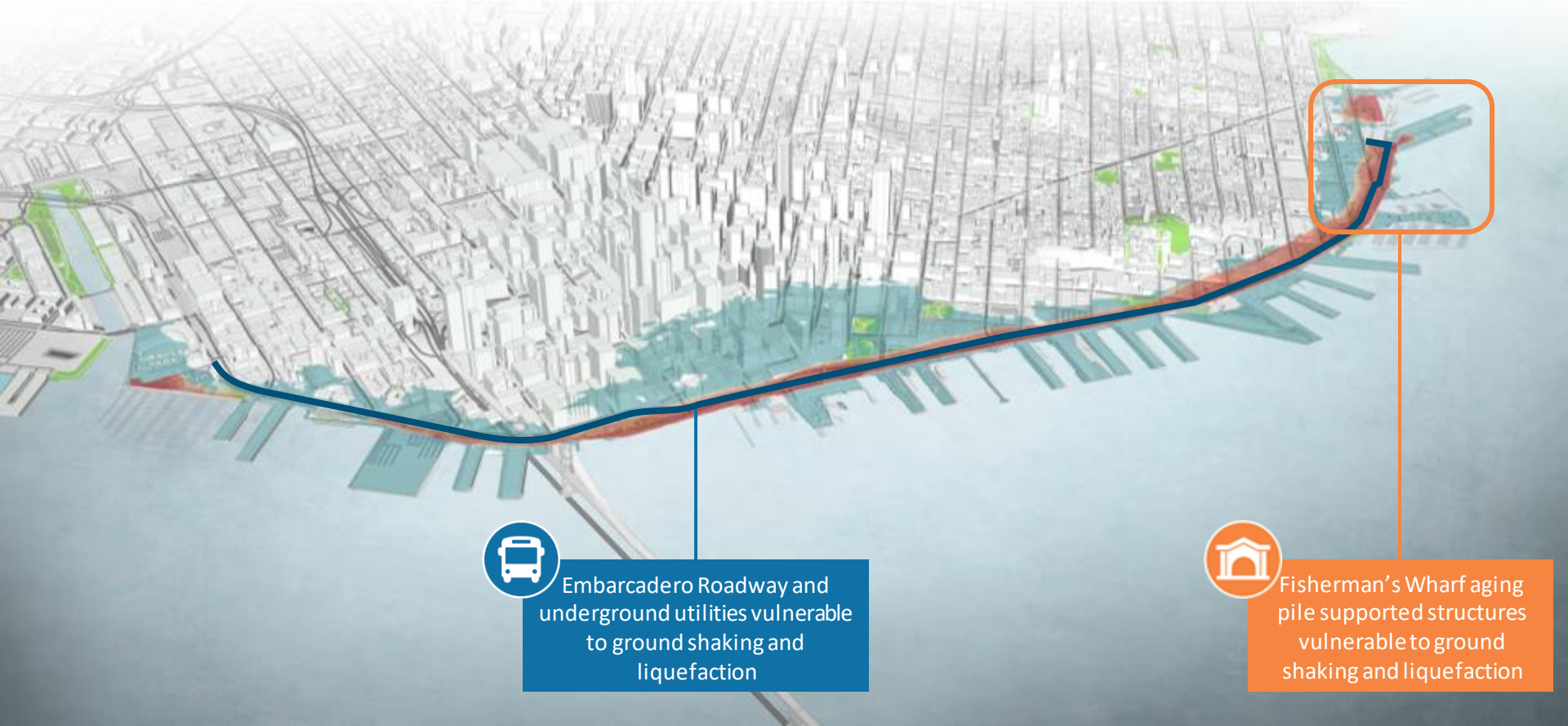
HAZARDS AND CONSEQUENCES

MHRA Key Findings



OTHER EARTHQUAKE HAZARDS AND CONSEQUENCES

MHRA Key Findings



USACE Flood Resiliency Study

Overview and Update

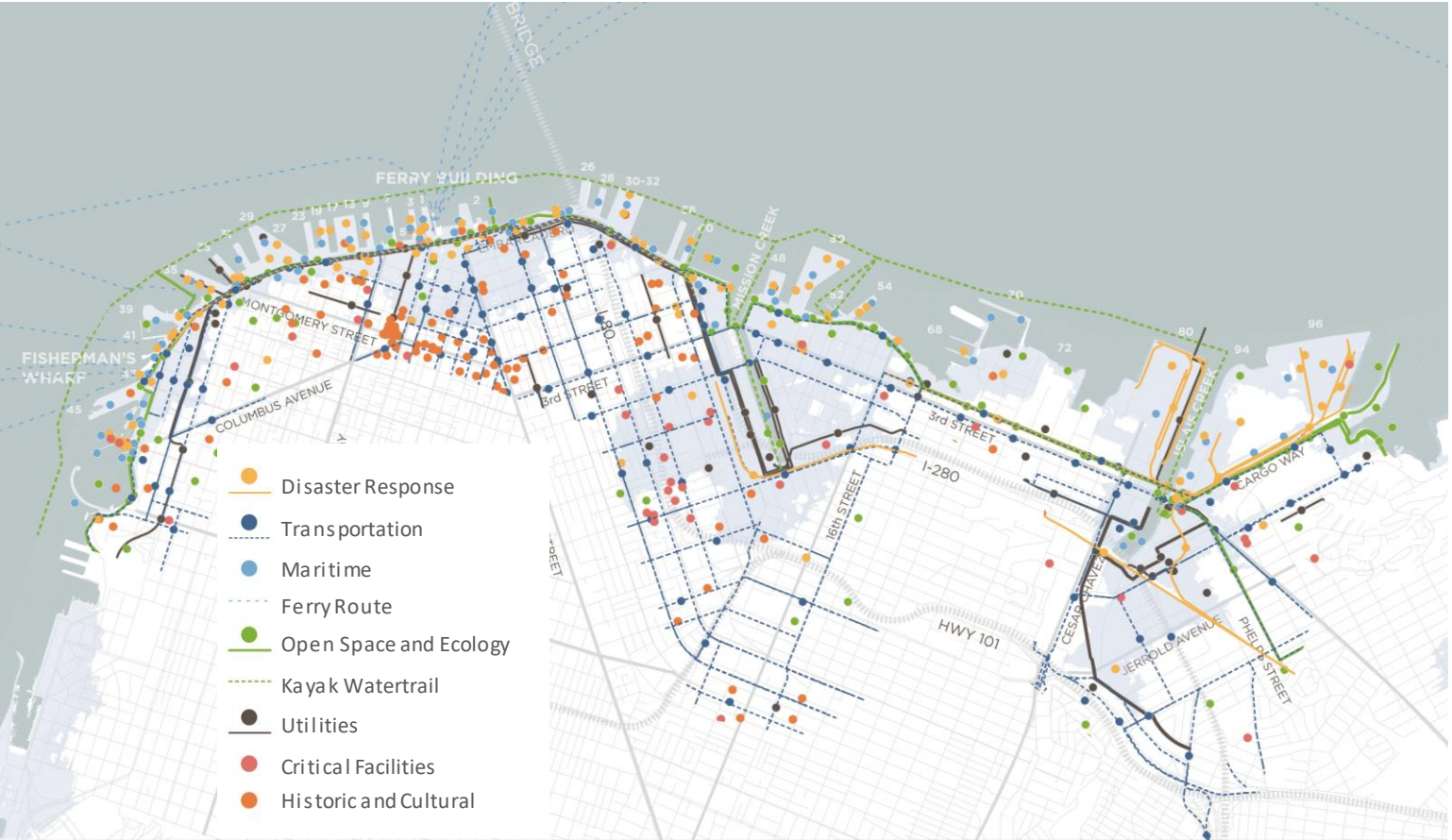
USACE FLOOD RESILIENCY STUDY

Overview and Key Highlights

- Port is local sponsor
- 5 to 6 year study
- Flood risk assessment
- Robust community and stakeholder input
- If USACE finds a Federal interest and Congress authorizes a Project:
  - Design/construction of project cost-shared 65% Federal, 35% Local

USACE FLOOD RESILIENCE STUDY ASSESSMENT

Study Wide



Assets at risk include more than:

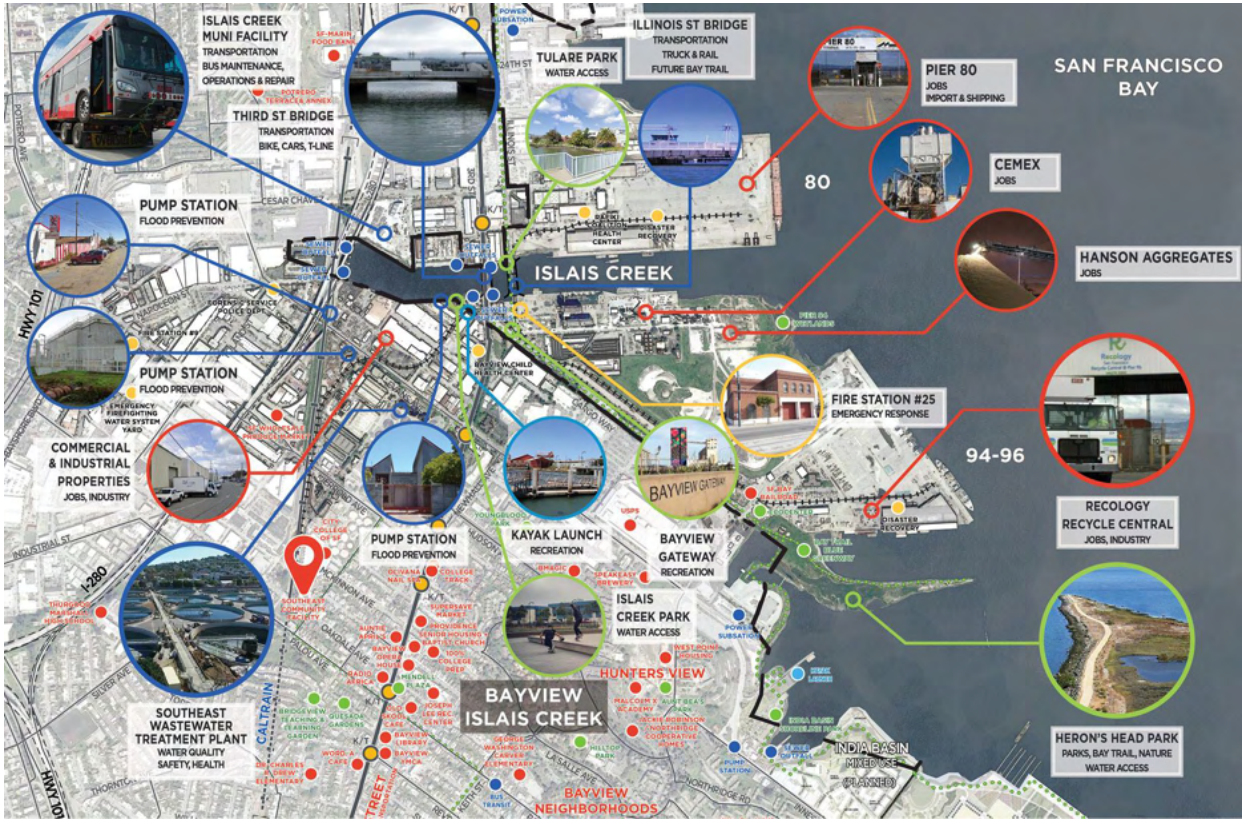
- 40 miles of roadway
- 25 miles of muni & cable car track
- 5 miles of freight railway
- 6 fire stations
- Dozens of other critical facilities 11,000 jobs
- 360,000 regional commuters
- 2,600 residential and commercial buildings
- 13,500 residents, 58% people of color
- Wastewater functions for 580,000 residents

FLOOD RESILIENCE STUDY ASSESSMENT

Islais Creek

Collaborated with City partners, Port tenants and other stakeholders to:

- Assign value to physical infrastructure
- Estimate impact of disruption and downtime for businesses and services
- Evaluate vulnerability of each asset to flood risk based on water depth
- Compile exhaustive database of all assets within the flood plain for use in the planning model



USACE FLOOD RESILIENCE STUDY ASSESSMENT

Near Term/High Likelihood

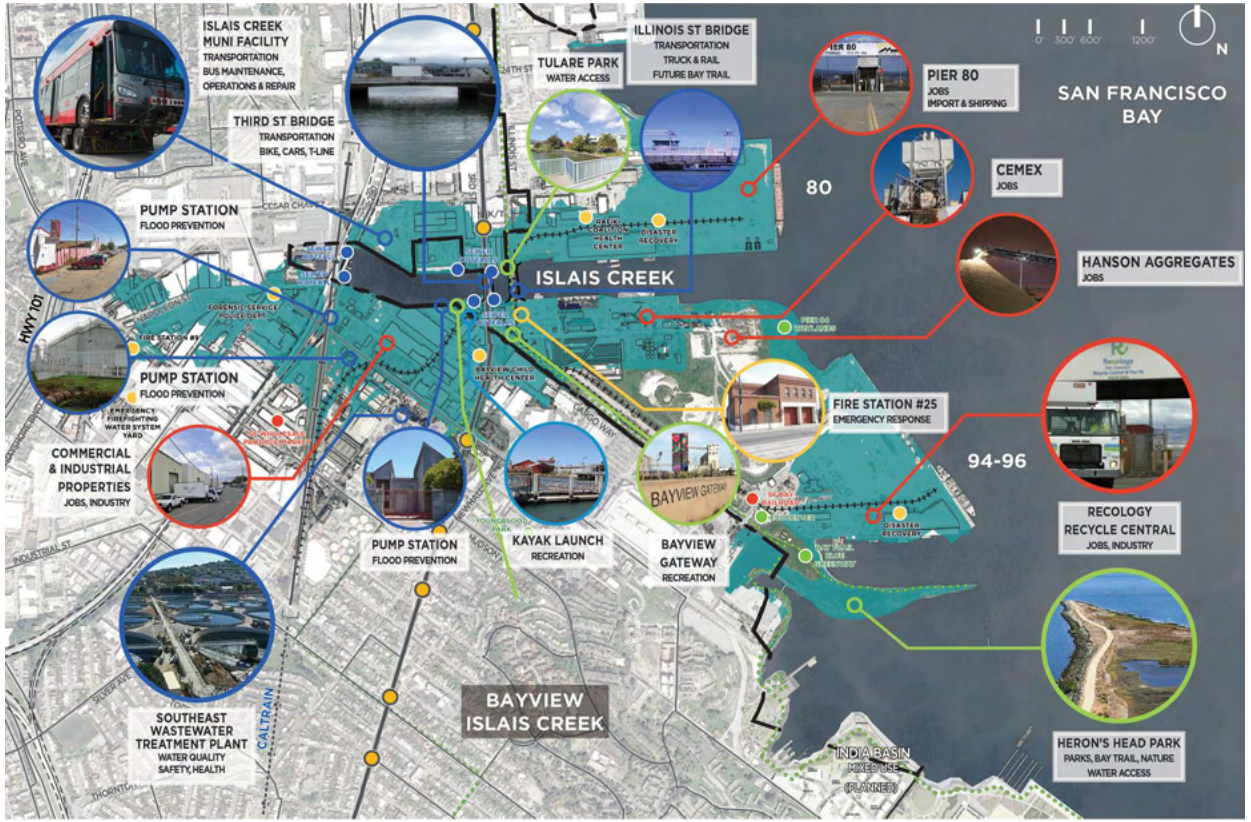
- Areas that will flood earlier in the study period carry more weight in the flood damage assessment because of their high likelihood of flood risk in the near term

100 years flood event

USACE FLOOD RESILIENCE STUDY ASSESSMENT

Long Term/Lower Likelihood

- Areas that will flood later in the study period carry less weight in the flood damage assessment because of their low likelihood of flood risk in the near term
- These assets are still important, but the benefit to cost ratio to protect these structures on an individual basis will be lower



100 years flood event + 3' SLR

Measures and Alternatives Development

Introducing Improvements or “Measures” for Consideration Along the Waterfront

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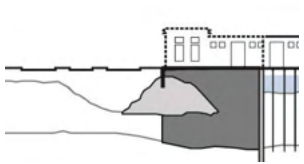
Waterfront Resilience Program

EMBARCADERO SEAWALL SEISMIC MEASURES

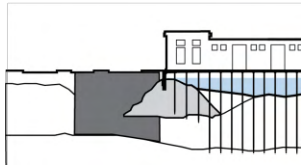
Draft Seismic Improvements Under Consideration by the Port

Seismic Measures

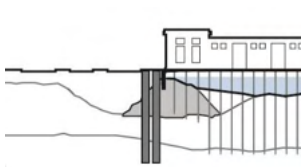
Shoreline Stabilization



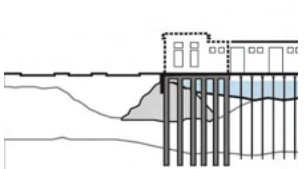
Nearshore Buttress



Landside Buttress

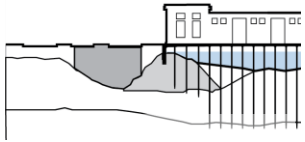


Drilled Shafts



Super Bulkhead Wharf

Targeted Measures



Liquefaction Mitigation

Bulkhead Wharf Retrofits

For each seismic measure:

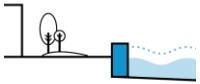
- Preliminary Engineering
- Cost Estimates
- Construction Production Rates
- Construction Impacts
- Feasibility
- Adaptation for Sea Level Rise

WATERFRONT-WIDE FLOOD MEASURES

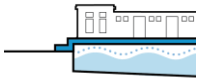
Draft Flood Improvements Under Consideration by the Port

Physical

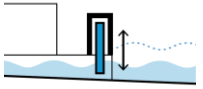
Levees



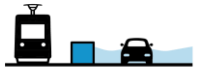
Seawalls



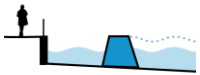
Raised Marine Structures



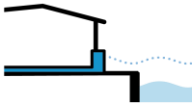
Tide Gates



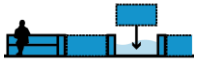
Floodwalls



Breakwaters



Building Adaptations



Deployables

Ecological

Ecological Marine Structures

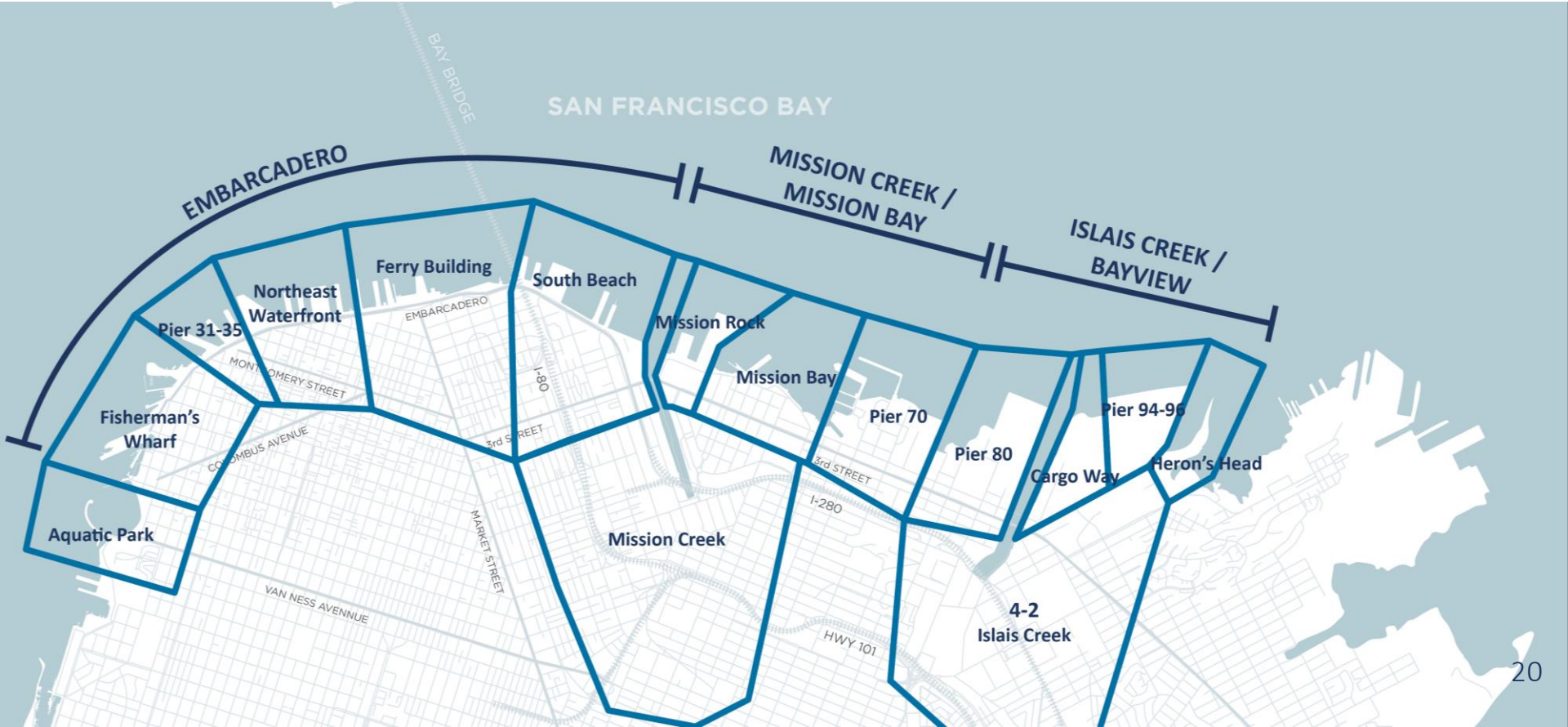
Ecological Features

Aquatic Habitat

Ecological Shorelines

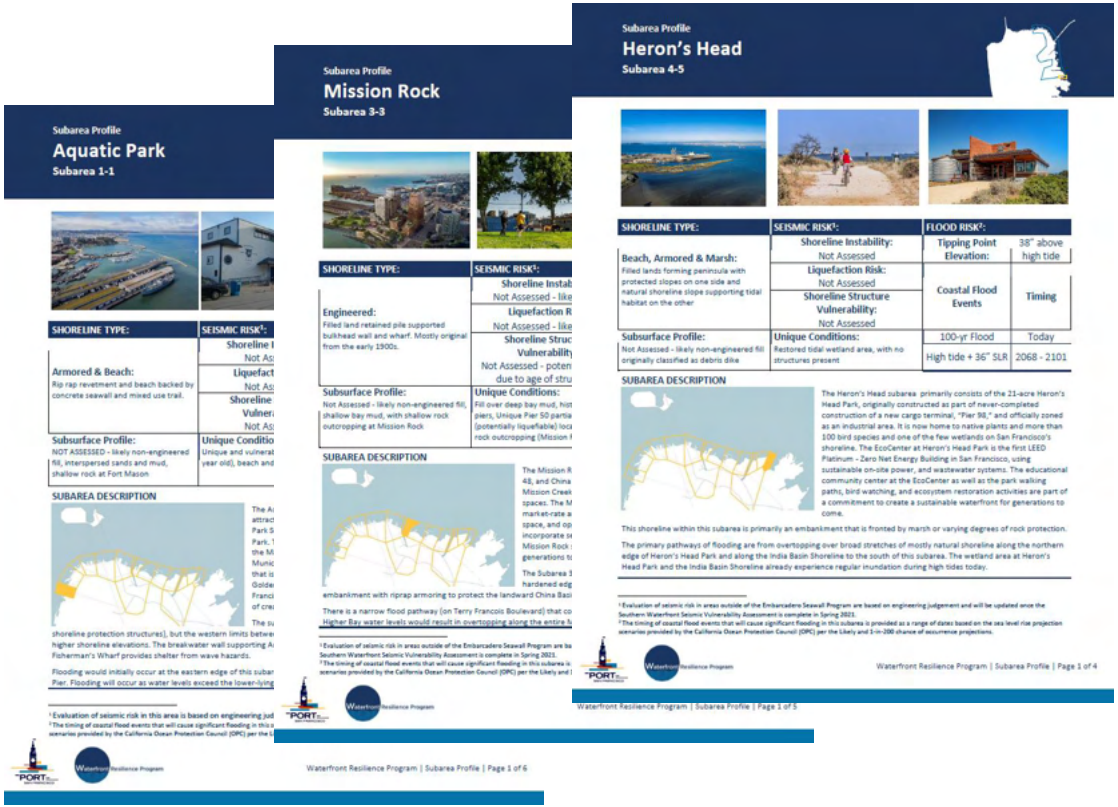
USACE FLOOD RESILIENCY STUDY AREA

Subareas Support Community Prioritization and Evaluation of Conditions / Measures



SUBAREA PROFILES

Subarea Overviews



- One of the many tools created to support the development of alternatives
- All Subarea Profiles, POOCCs, and Flood Risk Profiles for all 15 subareas are online
- Includes data on flood and seismic risk
- Includes community-prioritized assets

FOCUSED ARRAY THEMES

Introduction and Overview by Measure Classes

- A theme is a planning tool to spark brainstorming of alternatives
- A theme can serve as an alternative that addresses a set of specific issues and illuminate trade-offs
- Some themes work better in certain locations and not as well or at all in other locations

ALTERNATIVES DEVELOPMENT

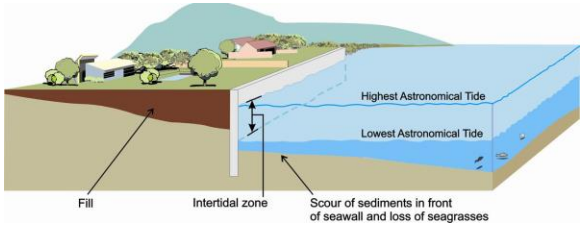
Overview

SUBAREA MATERIAL AND MEASURES

Includes information critical to alternatives development, including Problems and Objectives, Flood and Seismic Hazards, Stakeholder Input, Applicable Measures and Unique Characteristics of a subarea.

FOCUSED ARRAY

Flood and seismic measures used to create thematic alternatives that resulted in a wide range of approaches to reduce risk. Process provided the team with information about applicable approaches and trade-offs along the entire waterfront.

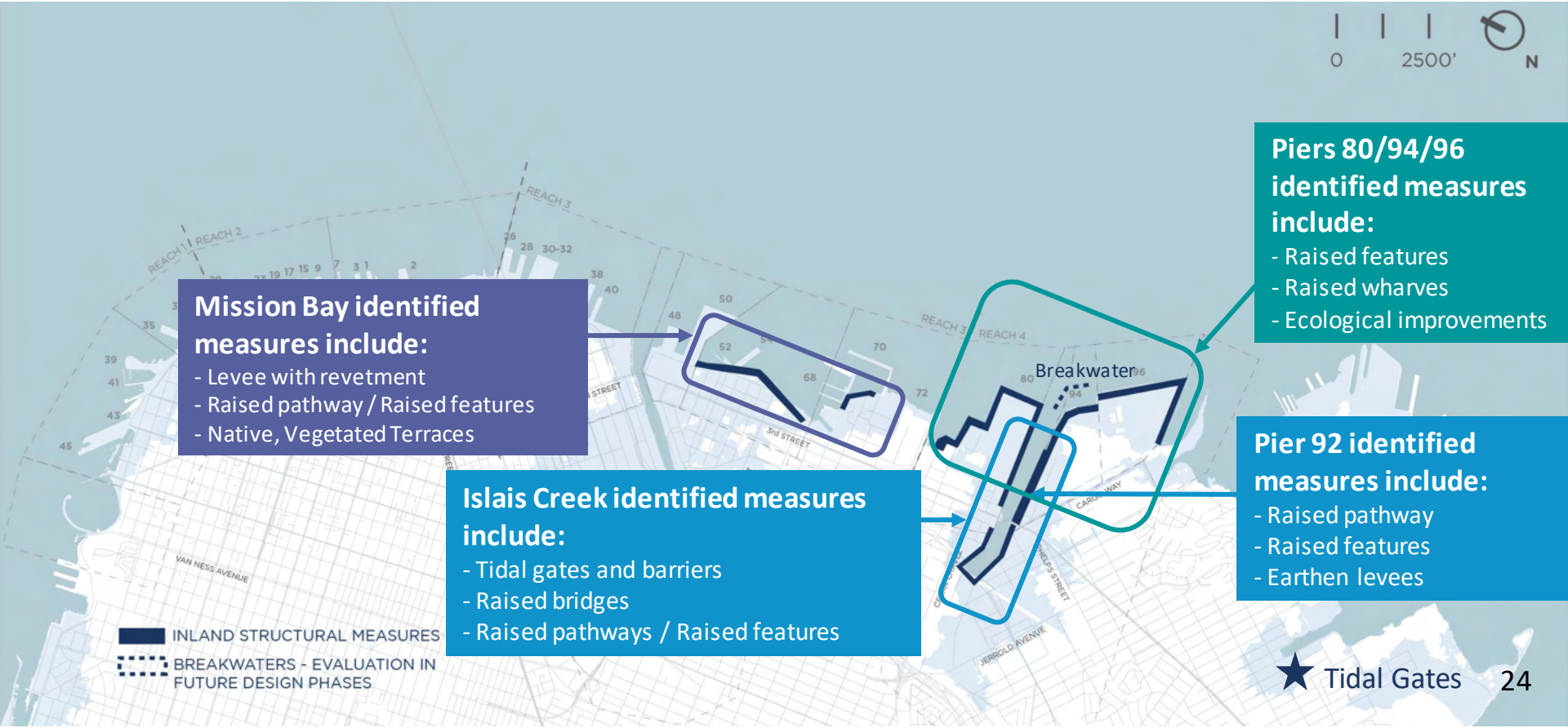


ALTERNATIVES AND ACTIONS

Based on the key findings, four concept alternatives and associated actions were identified for further development, refinement, consideration of phasing, and preliminary evaluation.

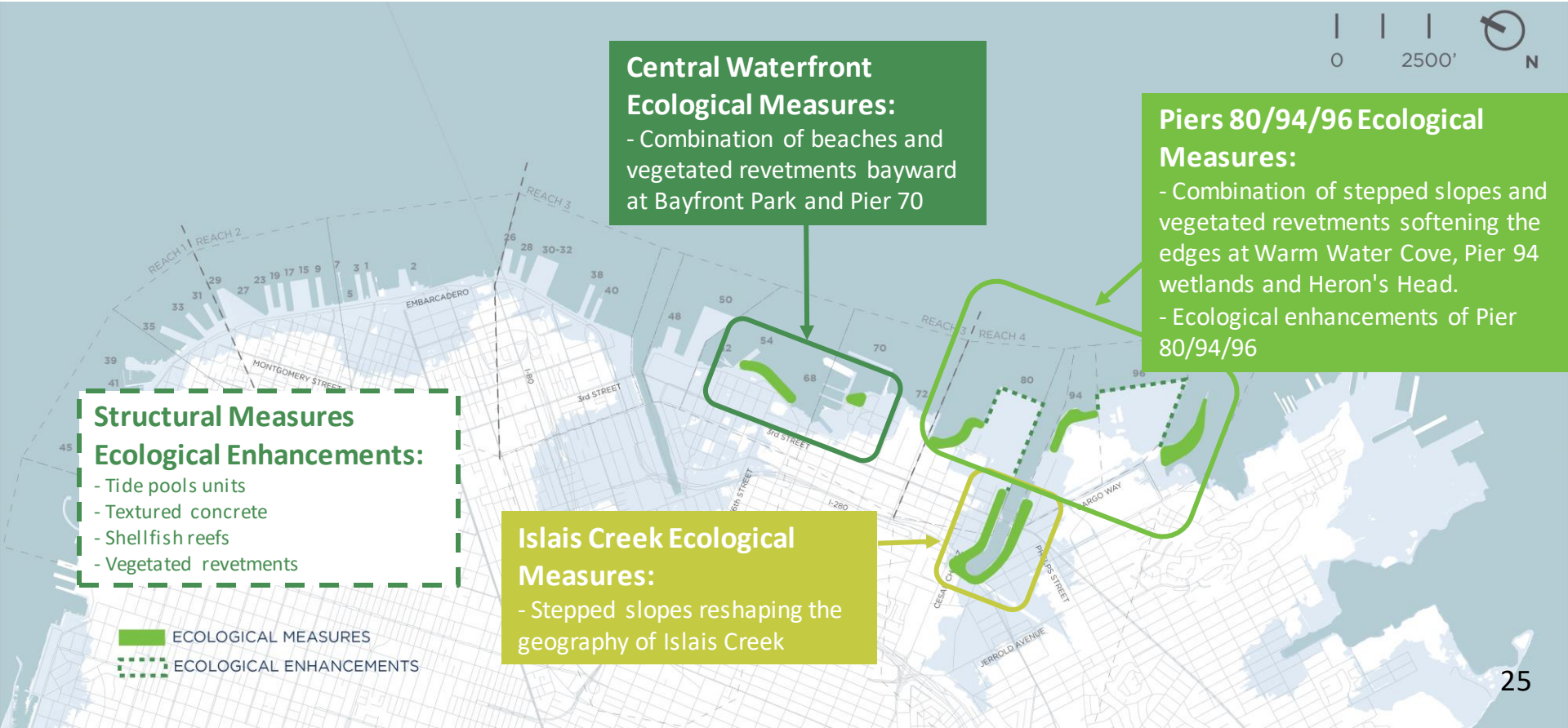
MEASURES KEY FINDINGS

Structural Measures / Southern Waterfront



MEASURES KEY FINDINGS

Ecological Measures / Southern Waterfront



Stakeholder Engagement

A Community-Driven Process

WRP COMMUNITY AND STAKEHOLDER ENGAGEMENT

Community / Advisory Group Engagement

COMMUNITY GROUPS

Coordinated over 115+ community and stakeholder group presentations

WATERFRONT-WIDE

Presentations to groups along the entire waterfront, including Embarcadero and Islais Creek / Bayview

ADVISORY GROUPS

The Port continues to collaborate with Port advisory groups, including regular presentations and opportunities for input

WRP COMMUNITY AND STAKEHOLDER ENGAGEMENT

Community Event Outreach

STREET TEAM OUTREACH

Grassroots outreach at 100+ local events continues to be an integral part of introducing residents to the Seawall

KEY PARTNERSHIPS

Highlights include partnerships with Rec & Park Cal Academy, WorldWideWomen Girls' Festival, and more

HOSTED EVENTS

The Port has hosted a series of free "mixers" and pop-up events in the Bayview, along with a free waterfront-wide boat tour

FEEDBACK FROM "ASSET MAPPING" EXERCISE

Islais Creek / Bayview Feedback

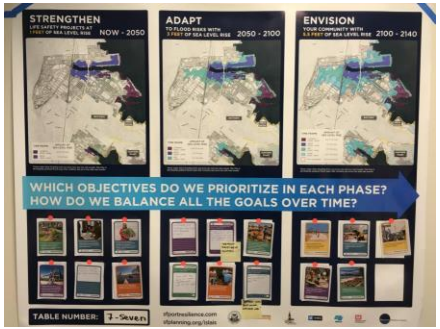
- Bayview Opera House
- Candlestick Point
- Neighborhoods
- Parks and Open Space
- Heron's Head
- Water Access
- Families and Communities
- Schools
- Community Based Organizations

- Housing
- Wastewater/ Sewage
- Third Street Bridge
- Transportation and Utilities
- Critical Facilities
- Jobs and Workforce Development
- Commercial Corridors and Local Industry

- Emergency Response
- Transportation
- Hospital Access
- Neighborhood Function
- Water Quality
- Contaminated lands
- Bayview/Hunters Point

FEEDBACK ON GEOGRAPHIC PROGRAM GOALS

Islais Creek / Bayview Feedback



- Prioritize homes, including low-income housing
- Prioritize environmental concerns and ensure anti-displacement is centered in any work
- Broad support for the Embarcadero Seawall Program as addressing risk is important to the entire City, including the Bayview
- That said, prioritize resilience projects in the southern waterfront
- Continue engagement with the communities in the southeast to ensuring equitable and sustainable outcomes along the Port's entire 7.5 mile jurisdiction

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HOW THIS ENGAGEMENT EFFORT INFORMED THE WRP

Community Input Helped Refine WRP

1

Community feedback affirmed focus on **life safety & emergency response** and offered ideas for evolving how we understand "inspiring an adaptable waterfront":

- Connecting
- Accessible
- Supporting jobs, housing, seniors & youth

2

Community feedback affirmed the Port goals and encouraged:

- Transparency
- Accountability
- Engagement
- **Prioritize assets most loved by the community and most important to the city**
- Select projects that responsibly use tax dollars

3

Community feedback on evaluation criteria affirmed the Port's key focus on life safety and disaster response

- **"Put people first"**
- Assets and services most prioritized: housing, disaster recovery facilities, utilities, and businesses
- Key focus on transportation assets

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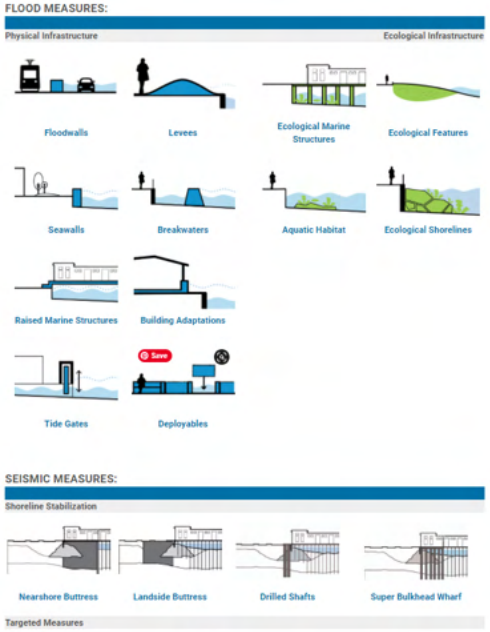
DIGITAL ENGAGEMENT HIGHLIGHTS

Feedback via Waterfront Resilience Story Maps and a Measures Explorer



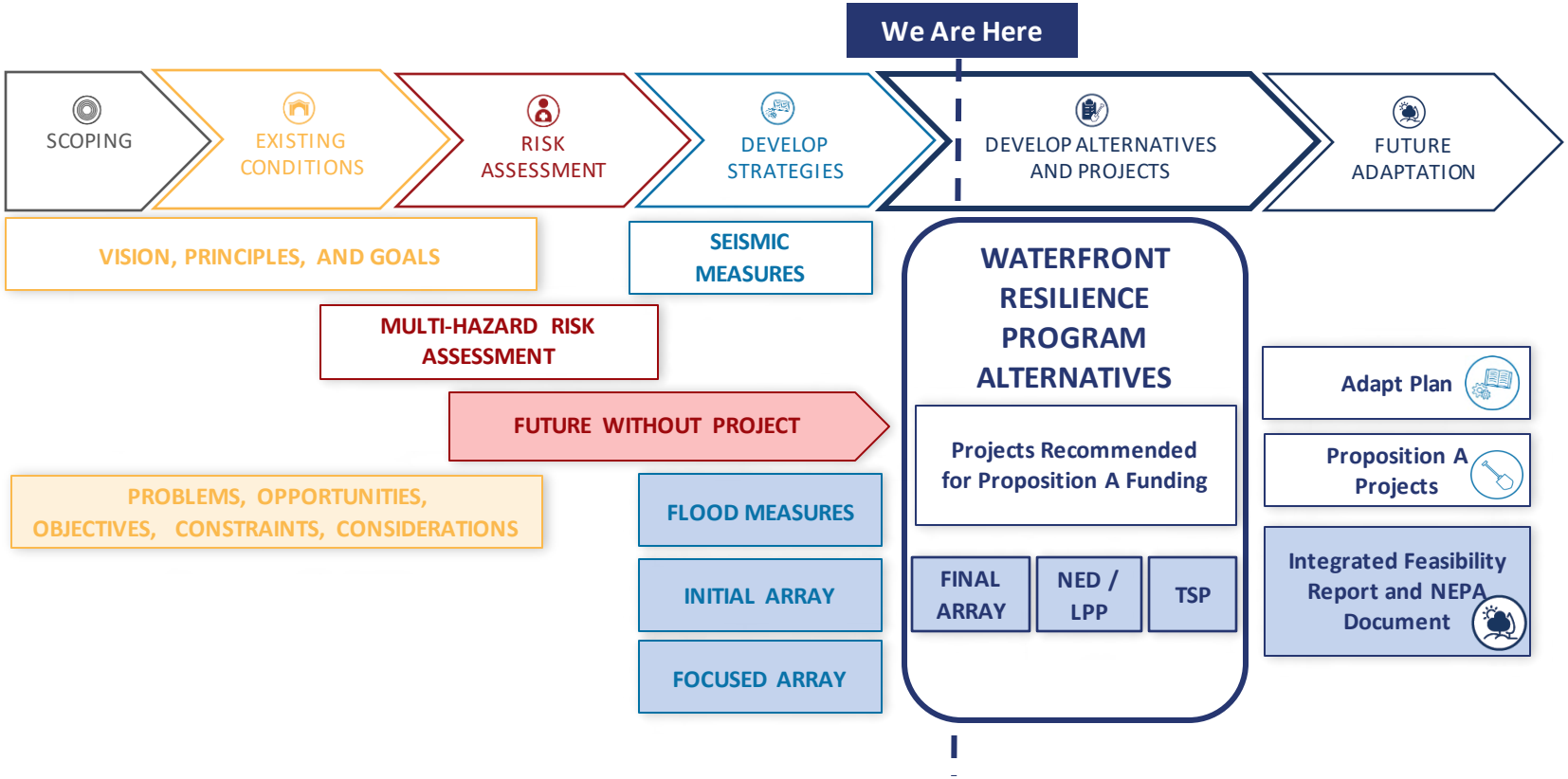
https://www.sfportresilience.com/planning-for-our-future

- To date, there have been more than **100K page visits** across all Measure Explorer and Story Maps pages
- The top three measures with the most page views: **Levees, Floodwalls, Seawalls**
- The top three themes with the most page views: **Open Space, Transportation, Maritime**

Next Steps

What's Next for the Waterfront Resilience Program?

ALTERNATIVES DEVELOPMENT PROCESS



UPCOMING COMMUNITY ENGAGEMENT

Engagement planned before the end of 2020 and early 2021

- Meetings co-hosted with community-based organizations in Islais Creek / Bayview and Mission Creek / Mission Bay
- Ongoing digital engagement, including feedback on waterfront-wide measures and Waterfront Resilience Story Maps
- Ongoing tenant engagement
- Youth engagement with youth-serving organizations that serve citywide youth

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Thank You!

Lindy Lowe, Port of San Francisco
lindy.lowe@sfport.com

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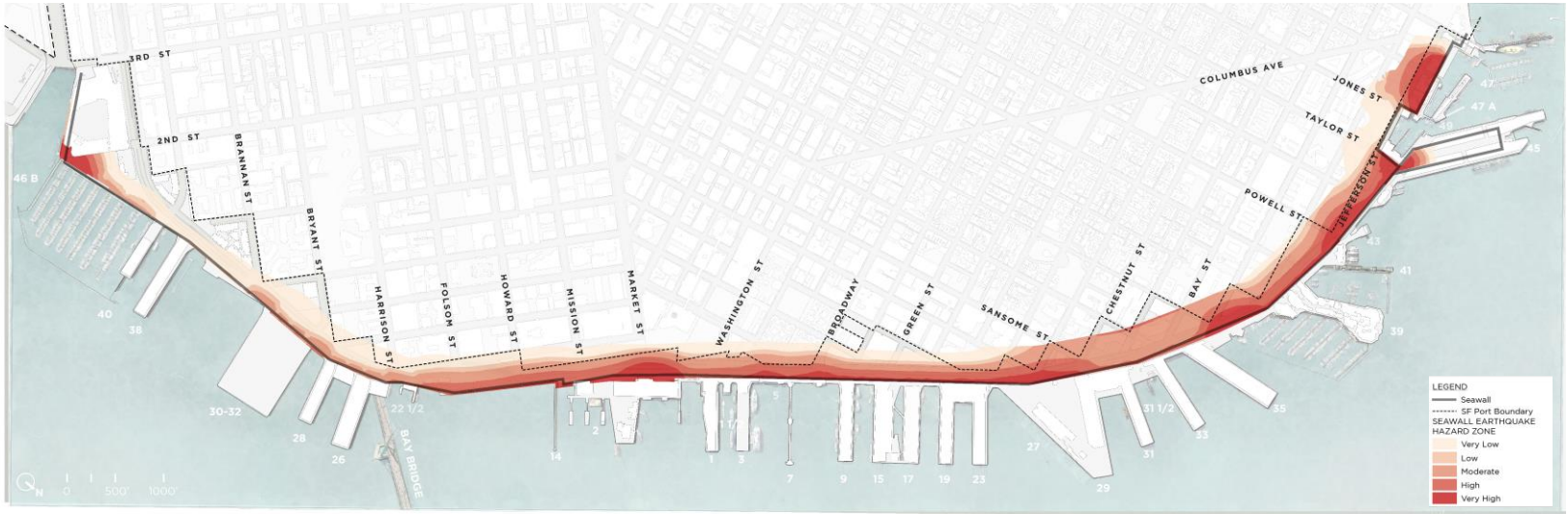
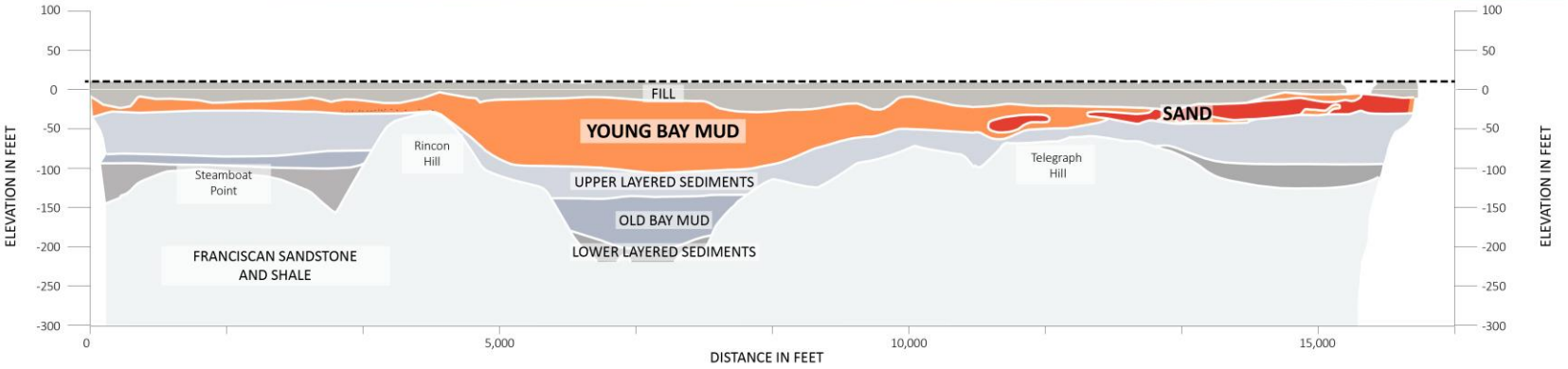
Waterfront Resilience Program

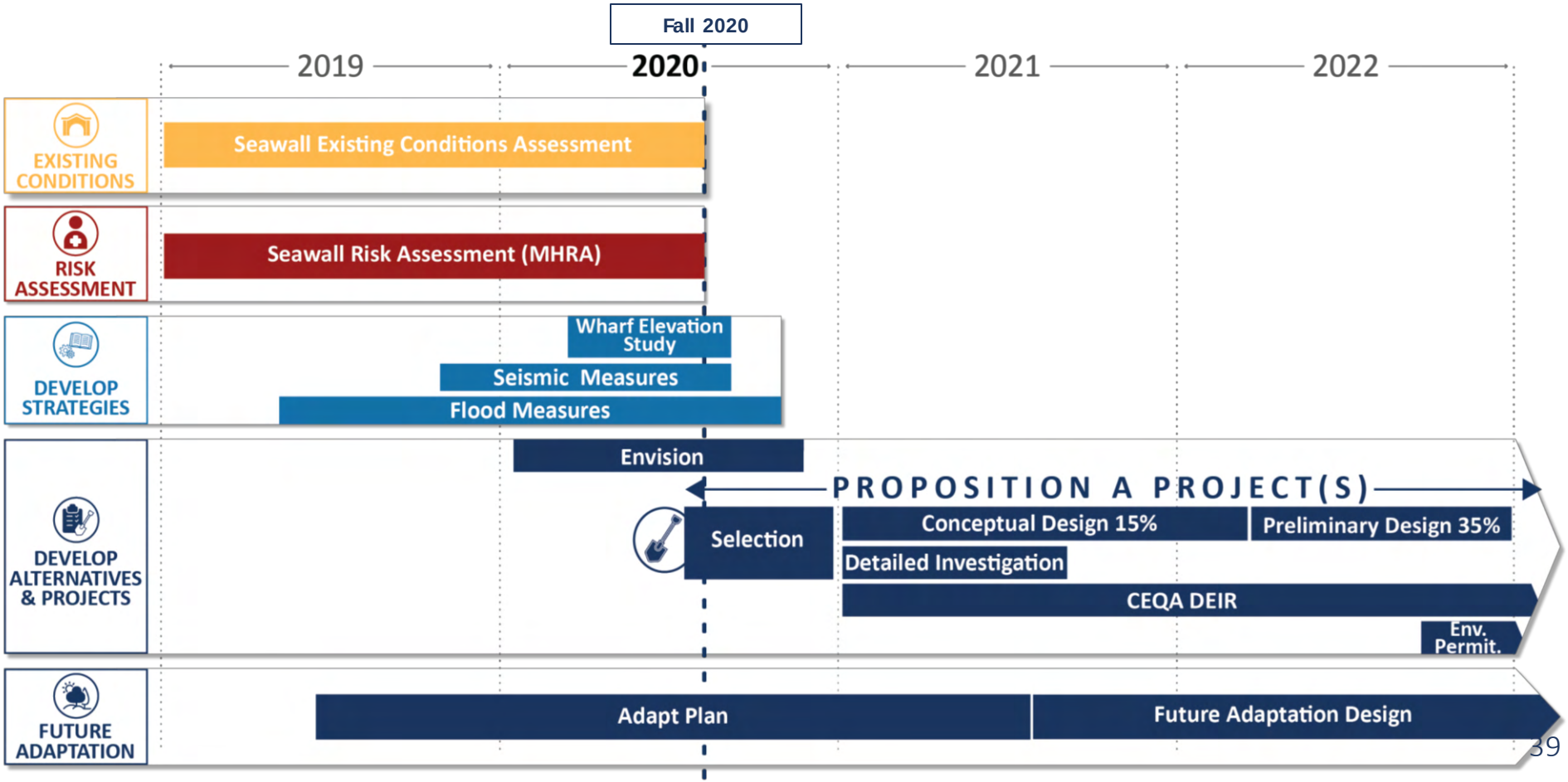
UNUSED SLIDES…

SEAWALL EARTHQUAKE HAZARD ZONE





EMBARCADERO SEAWALL PROGRAM SCHEDULE



CEQA: California Environmental Quality Act | **DEIR**: Draft Environmental Impact Report

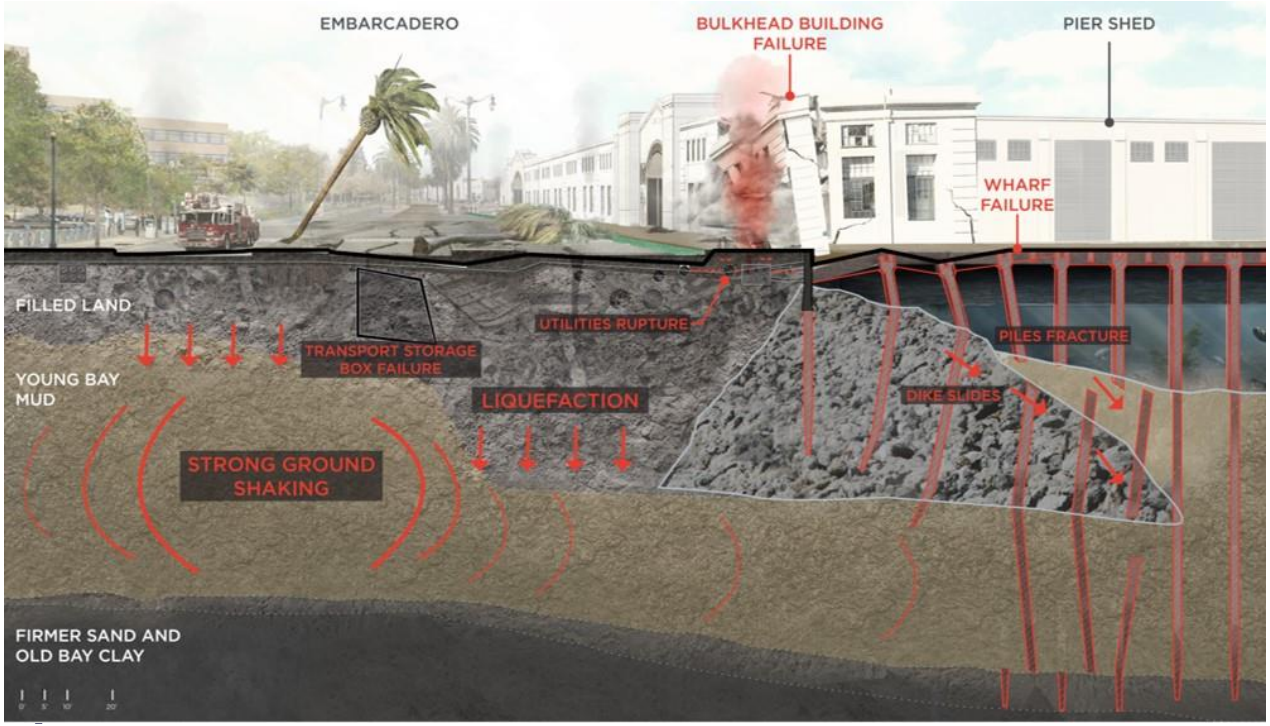
EXISTING SHORELINE

Critical Components of the Waterfront

- Seawall and Bulkhead Wharves are the city's flood protection and are highly vulnerable to seismic events

BULKHEAD WHARF EARTHQUAKE HAZARDS

MHRA Key Findings



Liquefaction induced lateral spreading at Port de Port-au-Prince

Lateral spreading cause by 1906 earthquake in San Francisco

BULKHEAD WHARF

WHARF TODAY AT CURRENT WATER LEVEL

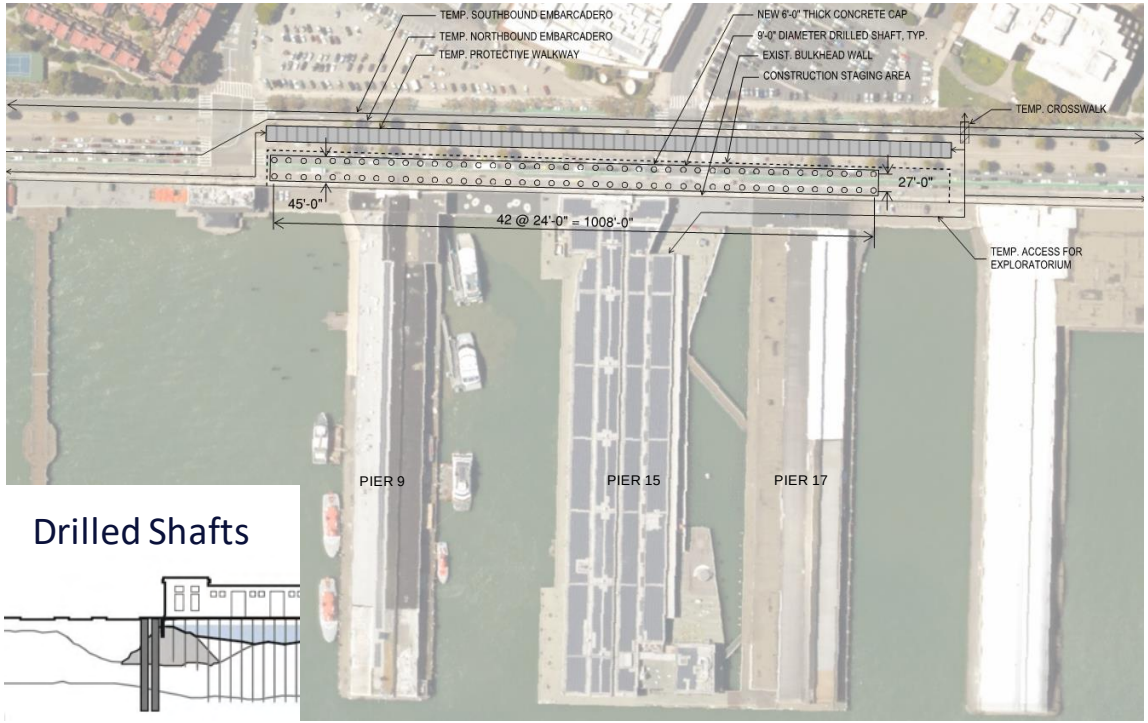
WHARF TODAY WITH WATER LEVEL SURGE

Wharf is a current protection measure – King Tide conditions today

LOCATIONS OF INTEREST

SEAWALL SEISMIC MEASURES DEVELOPMENT

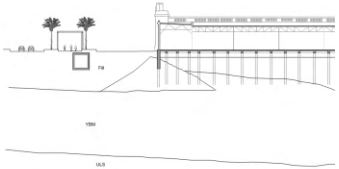
Example Measure Construction Process



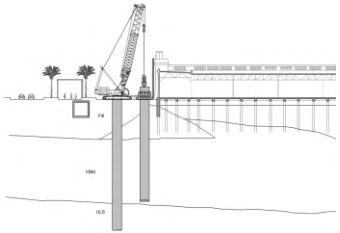
Drilled Shafts

Construction Stages

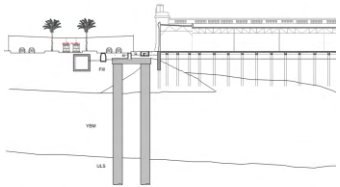
Remove / relocate utilities:



Close northbound lanes, reroute traffic, install concrete shafts:



Place slab, restore Embarcadero:

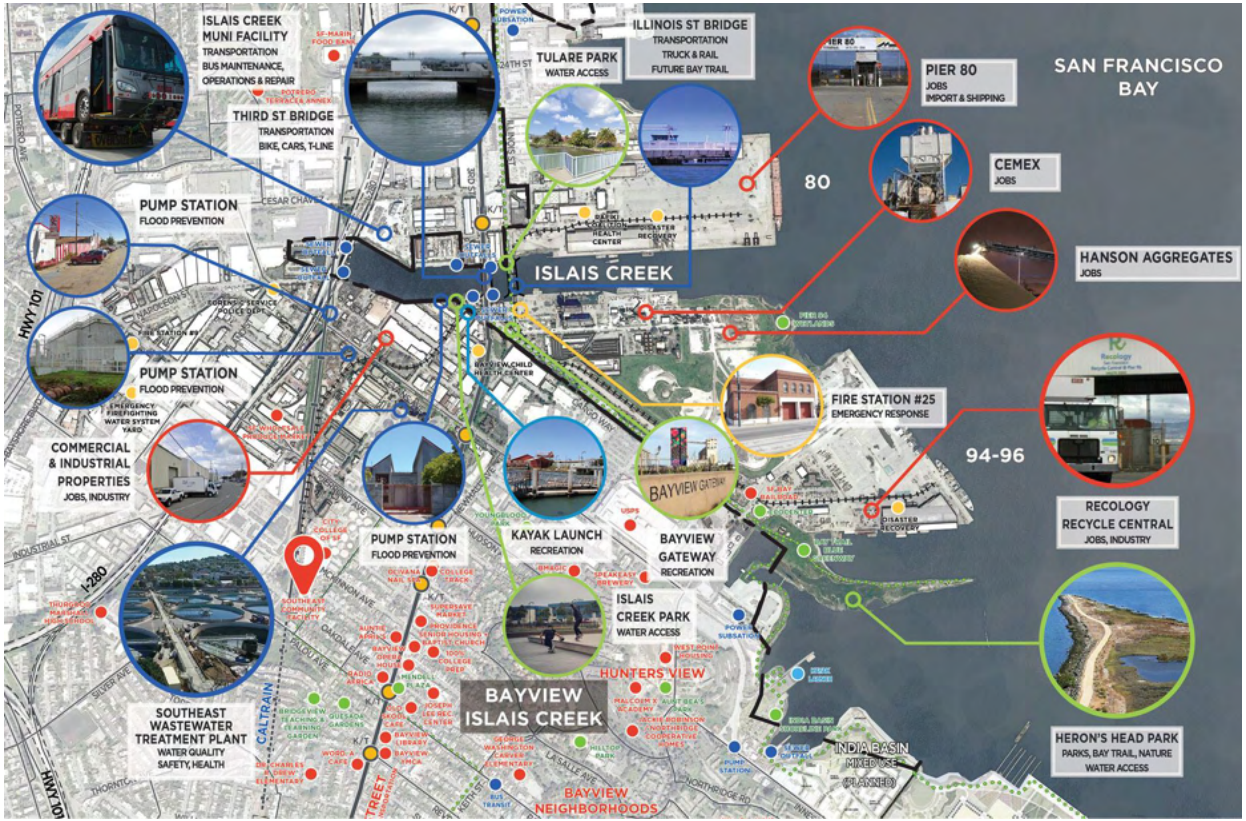


COMPILE ROBUST INVENTORY OF ASSETS

FWOP – Step 1

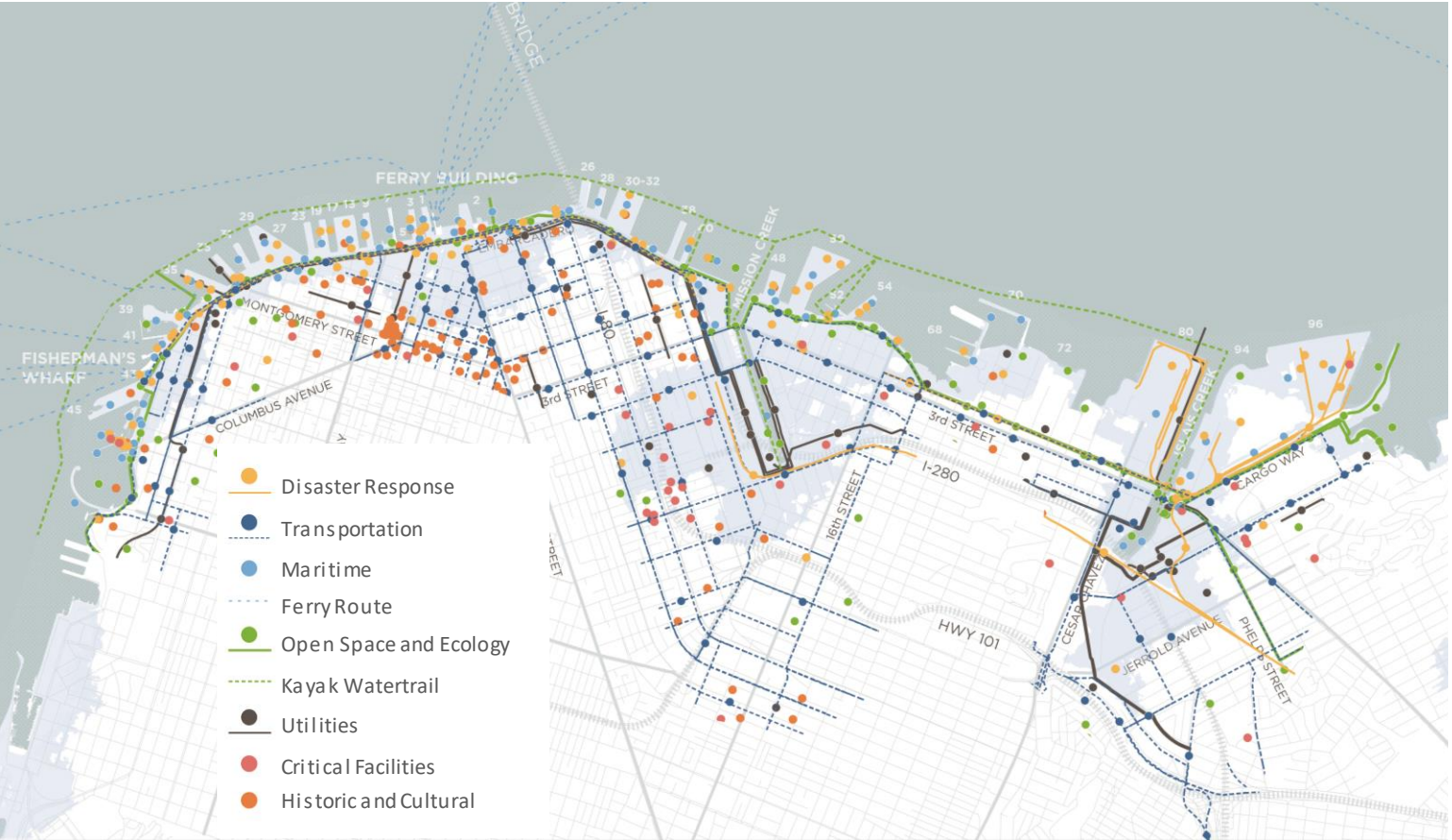
Collaborated with City partners, Port tenants and other stakeholders to:

- Assign value to physical infrastructure
- Estimate impact of disruption and downtime for businesses and services
- Evaluate vulnerability of each asset to flood risk based on water depth
- Compile exhaustive database of all assets within the flood plain for use in the planning model



COMPILE ROBUST INVENTORY OF ASSETS

FWOP – Step 1

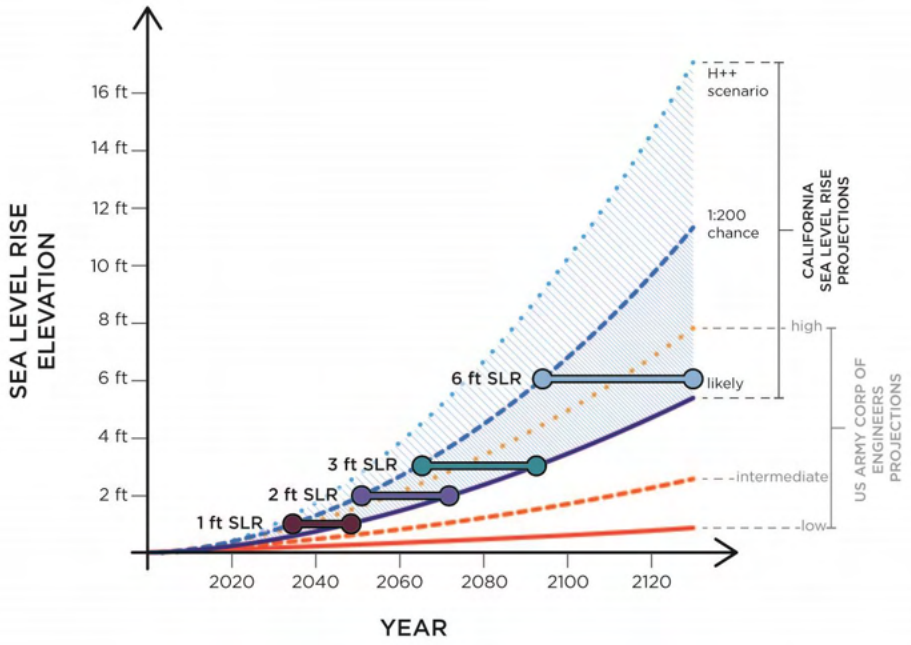


Assets at risk include more than:

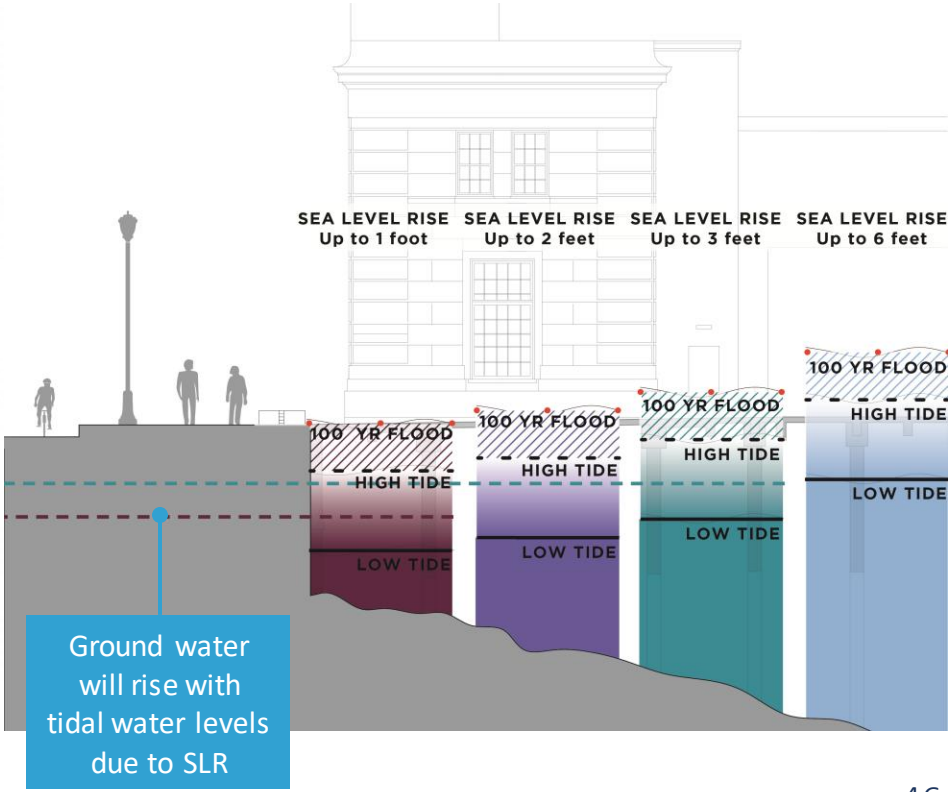
- 40 miles of roadway
- 25 miles of muni & cable car track
- 5 miles of freight railway
- 6 fire stations
- Dozens of other critical facilities 11,000 jobs
- 360,000 regional commuters
- 2,600 residential and commercial buildings
- 13,500 residents, 58% people of color
- Wastewater functions for 580,000 residents

DETERMINE FLOOD SCENARIOS

FWOP – Step 2

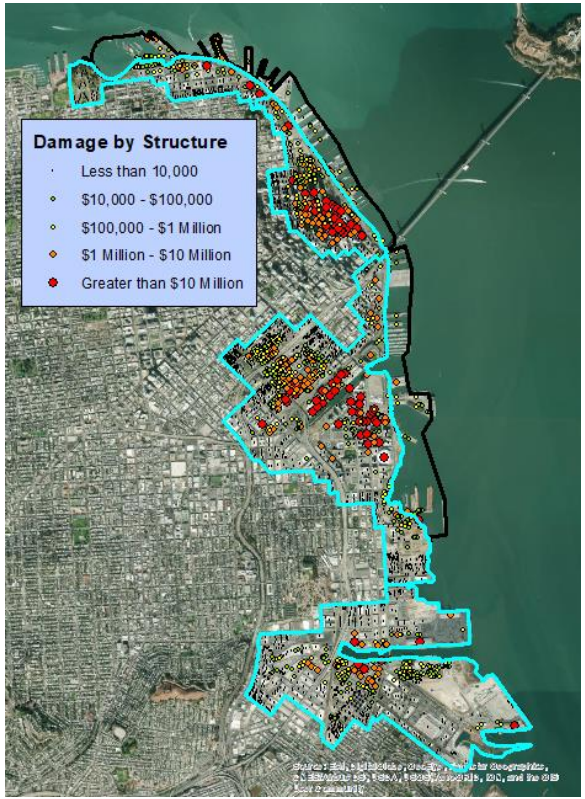


State of CA – Updated 2018; USACE – Updated 2013



PLANNING MODEL TO ANALYZE FWOP DAMAGES

FWOP – Step 3



Coastal Flood Scenarios

+

Robust Asset Inventory

↓

Planning Model (Economic Damages)

*DRAFT – work in progress

FUTURE WITHOUT PROJECT (FWOP)

Summary

1. The Future Without Project (FWOP) scenario effectively defines the size and scope of a potential federal investment in flood risk reduction for the San Francisco waterfront

2. Due to the complexity of the San Francisco Waterfront and challenges with USACE technical tools, this milestone is delayed

3. The Port and USACE have been working together to identify to accurately define the potential federal investment, consistent with USACE rules, policies, and guidelines

4. The study is at the nexus of several issues that are new to USACE:

   - Use of the computerized life-cycle planning model (G2CRM)
   - Application of future tidal flood damages which equate to frequent disruption of city function
   - Integration of RED/OSE into decision making – updated USACE policy in development

PORT OF SAN FRANCISCO

FUTURE WITHOUT PROJECT (FWOP) CONDITION

Purpose

1. Flood events will cause damages and impacts felt throughout the city, region and beyond as sea level rises

2. The Flood Resiliency Study will quantify damages and impacts to determine the level of "Federal Interest"

3. Future Without Project (FWOP) is which all Federal actions are measured

4. Account for all projects taken by the Port or City in advance of a Federal project which will impact flood risk (i.e. Mission Rock, Pier 70, Potrero Point)

5. There is a high likelihood of Federal investment to prevent future damages when the cost of mitigation actions are less than the potential damage

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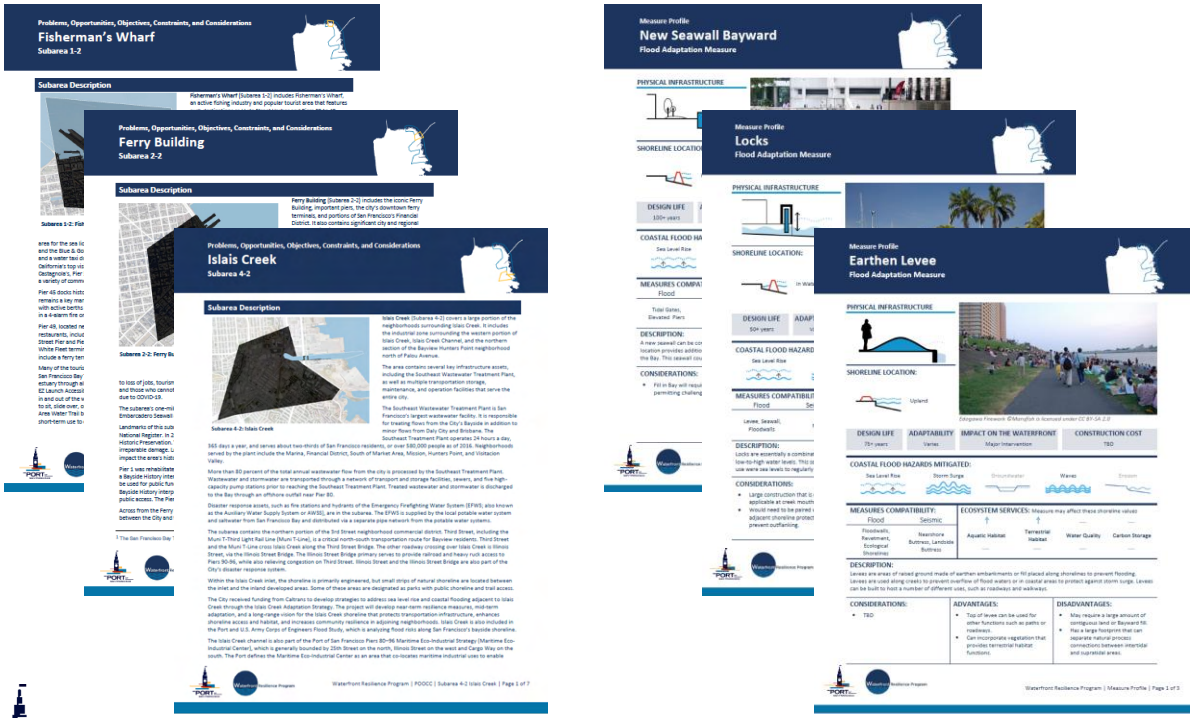
STAKEHOLDER ENGAGEMENT HIGHLIGHTS

Ongoing engagement with City departments, local and regional agencies, resource agencies, and more



- The **Interagency Coordinating Team**, which is convened jointly by USACE and Port staff, enables each agency to partner in the Study
- A Cooperation and Participating **Resource Agency Working Group** (RAWG) was established consisting of representatives from the USACE, the Port, and the various State and Federal agencies concerned with the study area

COMMUNITY & STAKEHOLDER ENGAGEMENT OVERVIEW

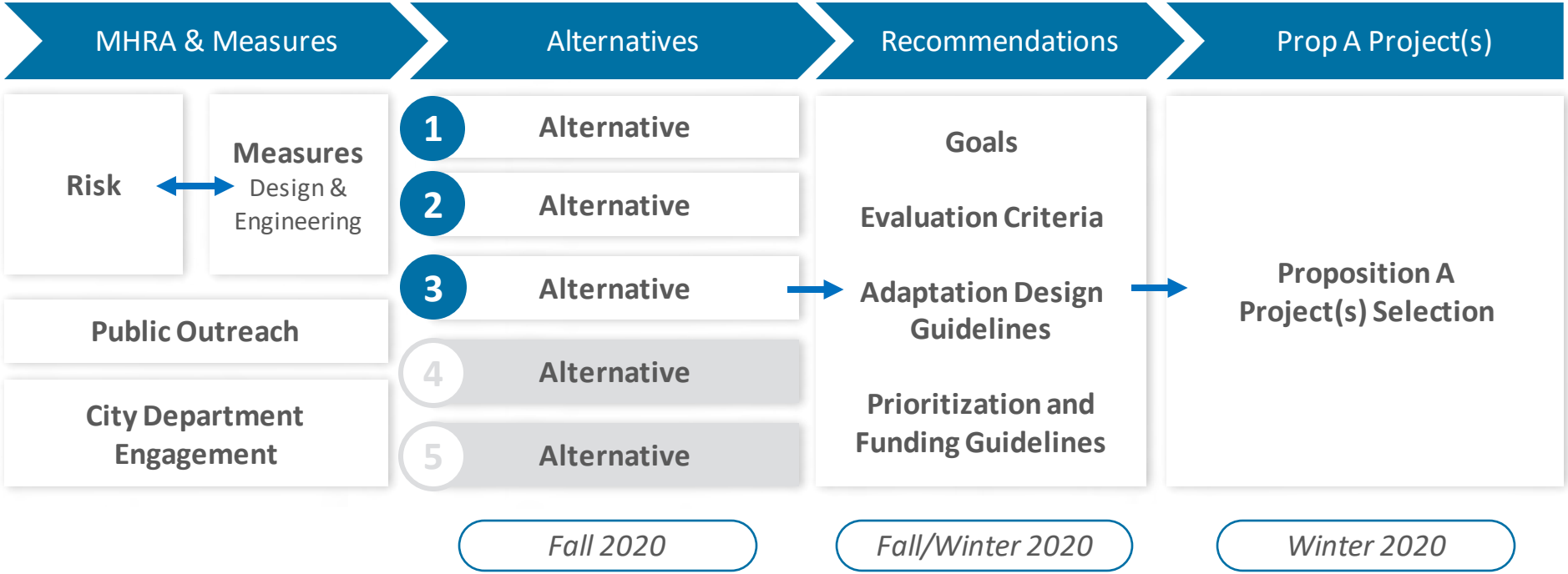
Ongoing Engagement

The Port is proud to work with a diverse group of LBE, WBE, and MBE subcontractors to plan and execute engagement, which has included:

- Connected with thousands of San Francisco residents at City wide neighborhood events
- Community meeting series in three waterfront geographies
- Casual "mixers" to engage key stakeholders and interested public
- Digital engagement
- Youth engagement
- Public housing engagement
- Over 100 presentations to neighborhood, business, community, and CAC groups along the waterfront and citywide
- Targeted Port tenant engagement
- Press

ALTERNATIVES DEVELOPMENT

Embarcadero Seawall Program Proposition A Project Selection



PROBLEMS, OPPORTUNITIES, OBJECTIVES, CONSTRAINTS AND CONSIDERATIONS

Subarea Scale "POOCCs"

- Longer, more detailed document required by USACE effort to inform subarea scale alternatives development
- Informed by City department engagement, community meetings, events and advisory group discussions, City and Port plans and policies and direct review and input from Port staff

Waterfront Resilience Program Update

Bayview Citizens Advisory Committee

January 6, 2021

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Waterfront Resilience Program

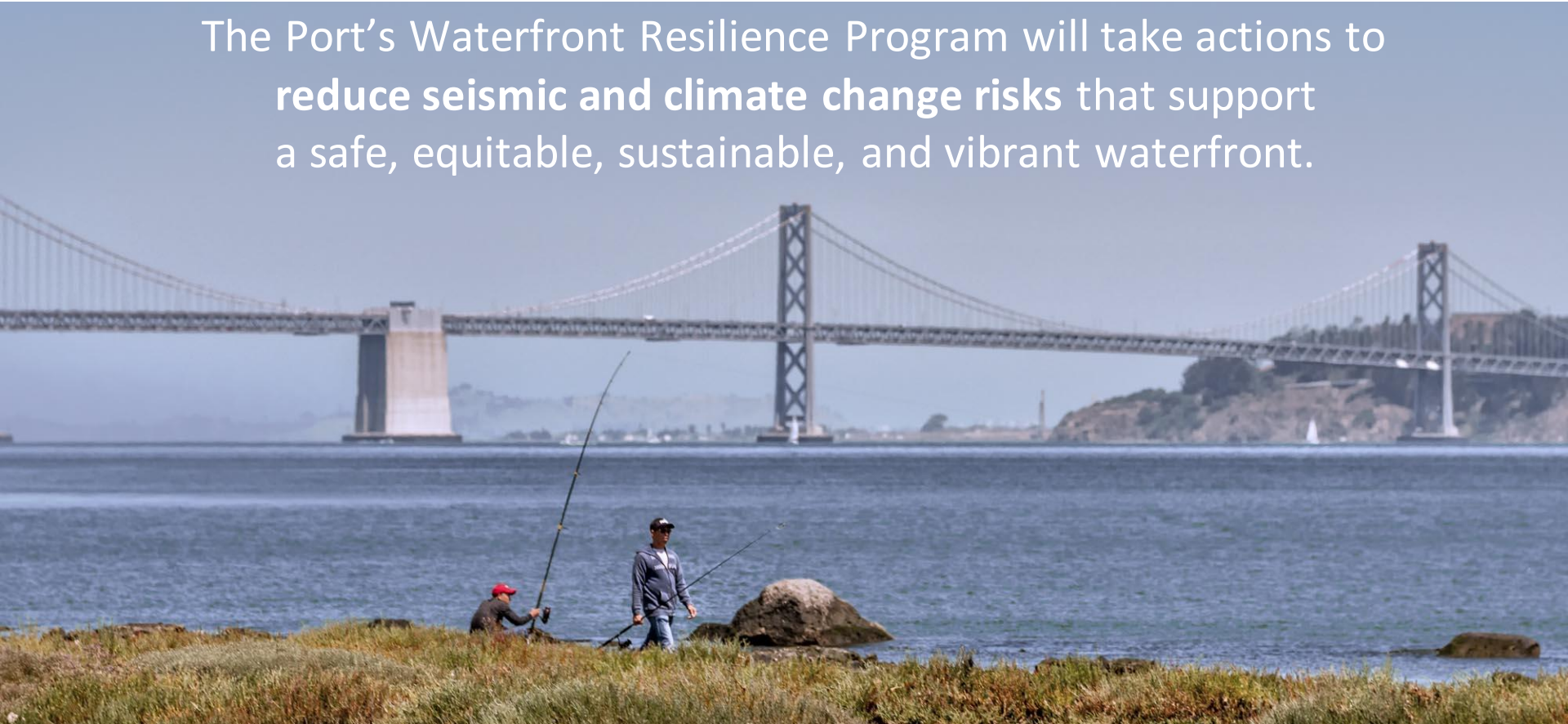
Waterfront Resilience Program

Overview

WATERFRONT RESILIENCE PROGRAM

Goal Statement

The Port's Waterfront Resilience Program will take actions to **reduce seismic and climate change risks** that support a safe, equitable, sustainable, and vibrant waterfront.



WATERFRONT RESILIENCE PROGRAM DRAFT PRINCIPLES

Affirmed through Robust Community Engagement

- **Prioritize** life safety and emergency response
- **Advance** equity throughout the Waterfront Resilience Program, including through community and stakeholder engagement, planning, contracting, jobs and decision making
- **Enhance** and sustain economic and ecological opportunities

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WATERFRONT RESILIENCE PROGRAM DRAFT PRINCIPLES CONT.

Affirmed through Robust Community Engagement

- **Inspire** an adaptable waterfront that:
  - Improves the health of the Bay
  - Ensures public access to the waterfront and historic places and an inviting waterfront for all
  - Protects and preserves historic and maritime resources
  - Provides opportunities for diverse families, businesses, and neighborhoods to thrive
- **Lead** a transparent, innovative, collaborative, and adaptive Resilience Program

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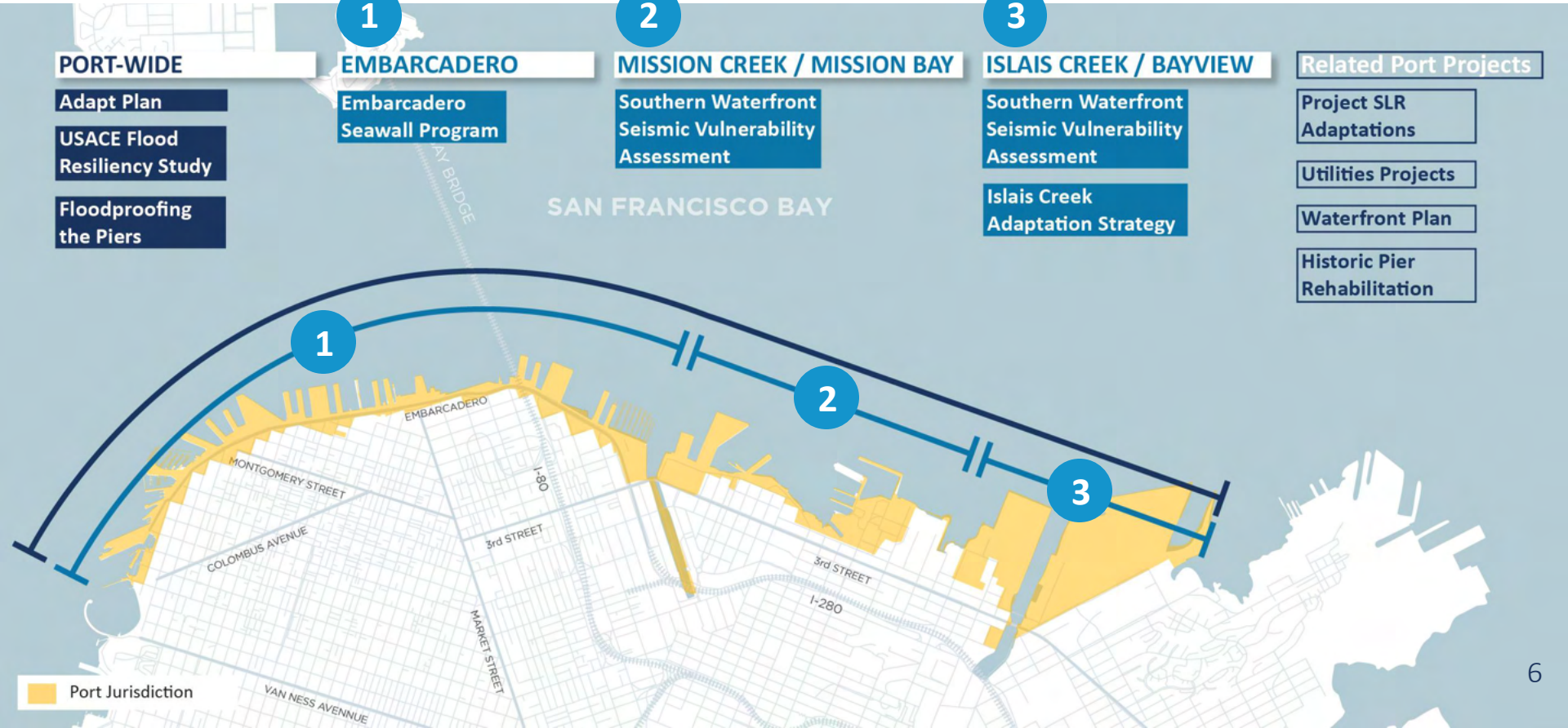
WATERFRONT RESILIENCE PROGRAM EFFORTS

Program and City Resilience Projects and Efforts



INTER-AGENCY CLIMATE RESILIENCE EFFORTS

SLR Vulnerability & Consequences Assessment

Waterfront Resilience Program (Flood Study & Seawall)

Strengthen Adapt Envision

Waterfront Plan Update

Hazard & Climate Resilience Plan

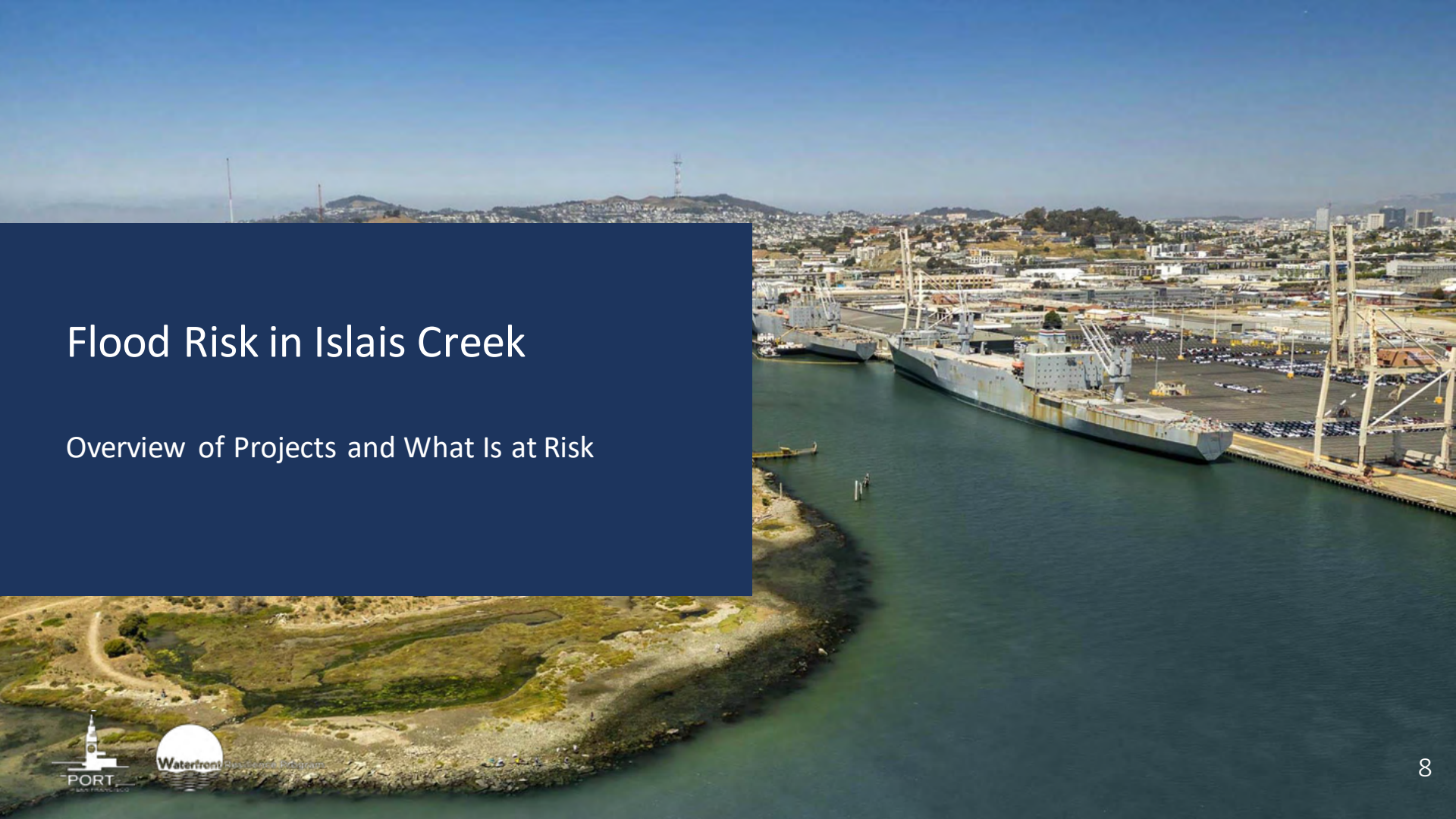
Climate Action Strategy

Islais Creek Adaptation Strategy

CR General Plan Updates

Ocean Beach Adaptation

Bayview Resilience Strategy



Flood Risk in Islais Creek

Overview of Projects and What Is at Risk

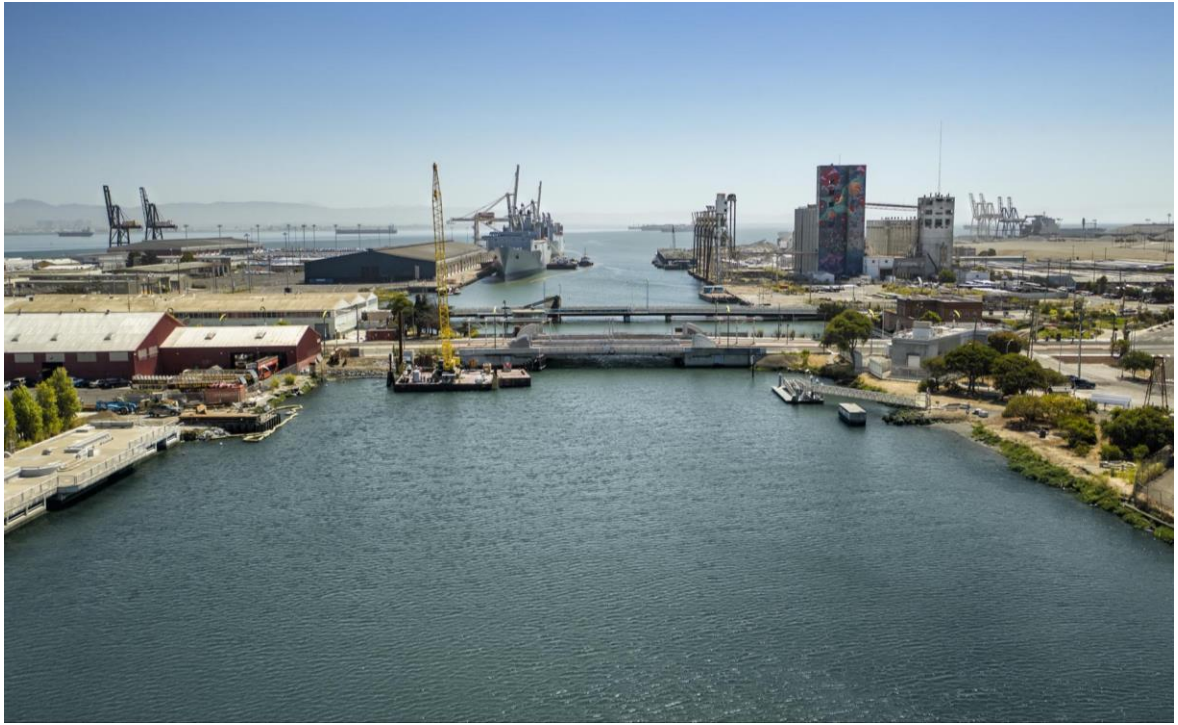
U.S. ARMY CORPS OF ENGINEERS (USACE) FLOOD RESILIENCY STUDY

Overview and Key Highlights

- Port is local sponsor of 5- to 6-year study
- Flood risk assessment to identify near- mid- and long-term strategies to address shoreline and creek flooding and sea level rise
- Robust community and stakeholder input
- If the Federal government partners with the Port on a project, they will contribute 65% of its cost

ISLAIS CREEK ADAPTATION STRATEGY

Overview and Key Highlights



- Led by SF Planning in partnership with Port, SFMTA, SFPUC
- Two-year community planning process
- Develop a long-range vision for the Islais Creek shoreline and identify near- and mid-term strategies to address sea level rise

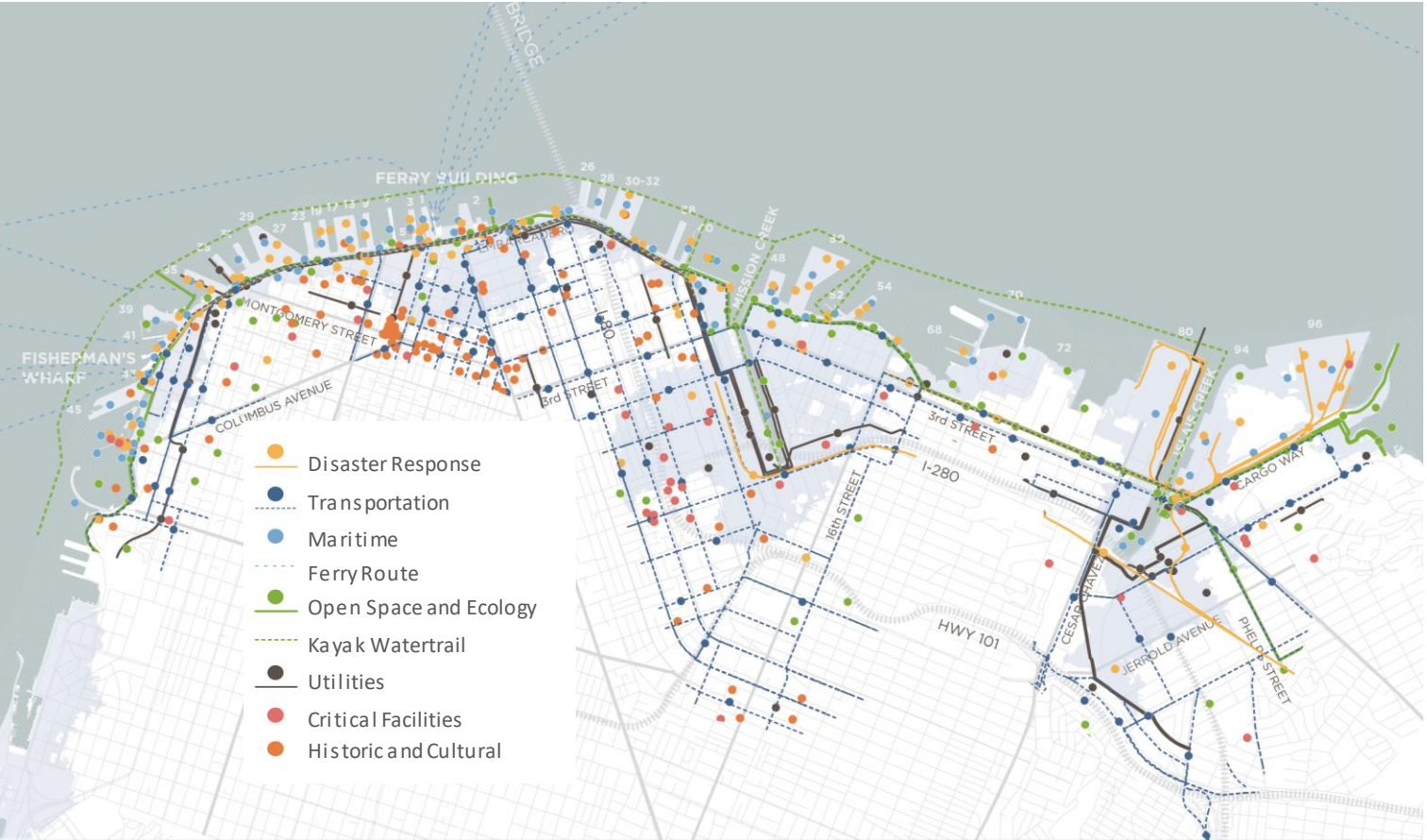
ISLAIS CREEK VISION & GOALS

Islais Creek adapts to flood risks while ensuring healthy and resilient communities.

1. A socially & environmentally resilient neighborhood
2. Authentic & transparent public engagement during & beyond Planning
3. A transportation system that is resilient & adaptable to flood risk
4. A Healthy environment for residents, workers & ecologies
5. A sustainable economy that benefits local residents, workers & industries

Study Wide Assets at Risk

U.S. Army Corps of Engineers Flood Resilience Study



At Risk:

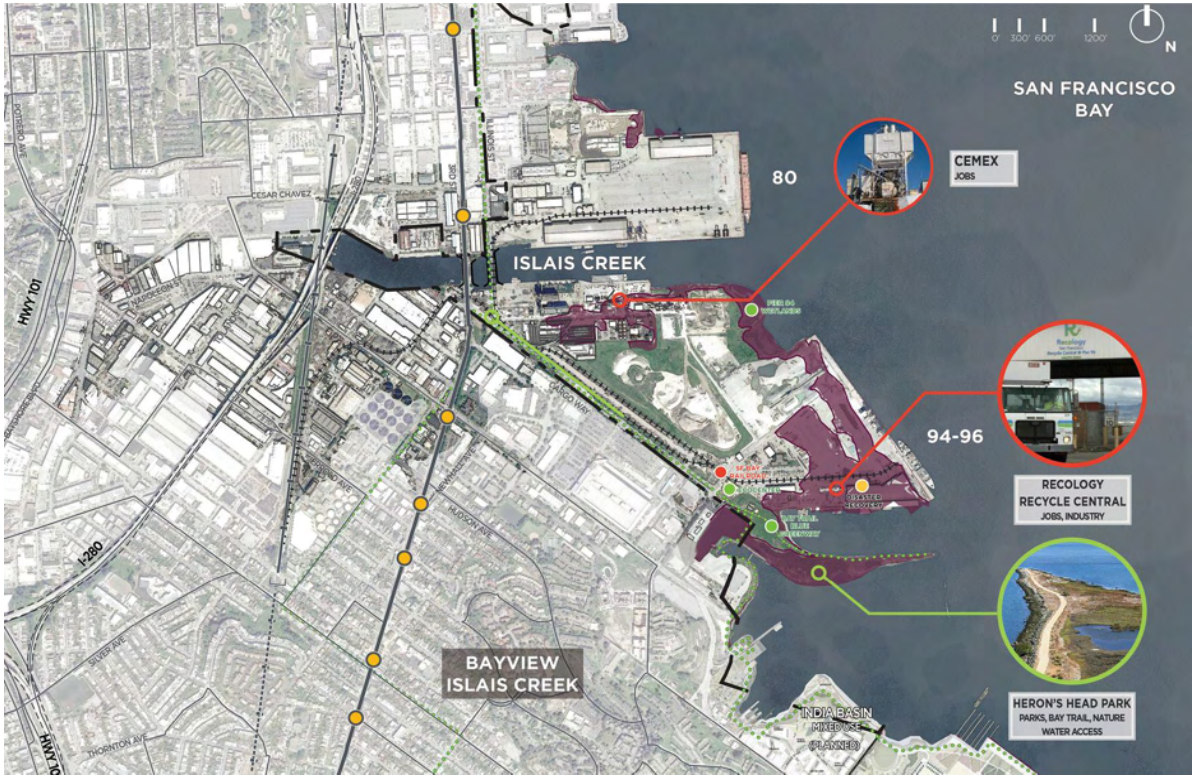
- 40 miles of roadway
- 25 miles of muni & cable car track
- 11,000 jobs
- 13,500 residents, 58% people of color
- Wastewater functions for 580,000 residents

NEAR-TERM FLOOD RISK IN ISLAIS CREEK / BAYVIEW

U.S. Army Corps of Engineers Flood Resiliency Study

Assets with current and near-term flood risk include:

- Heron's Head Park
- Recology
- Industrial and Maritime Uses and Jobs
- Pier 94 wetlands



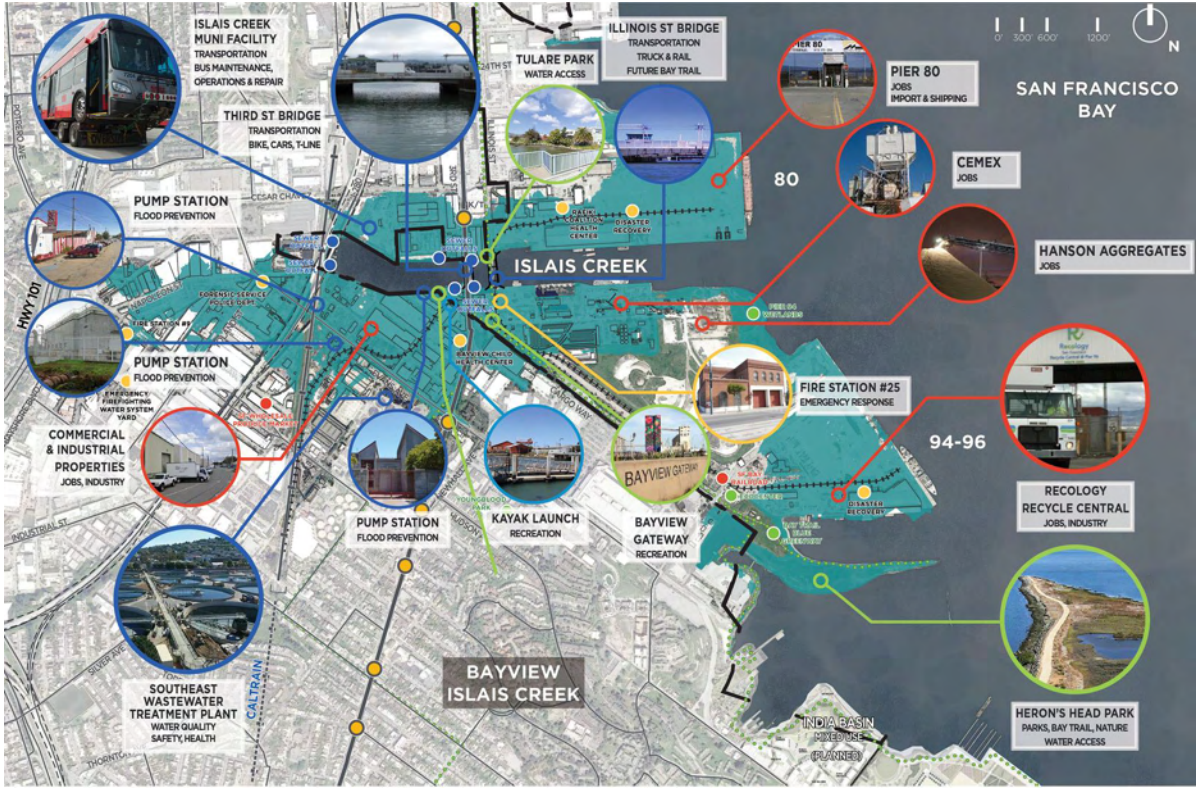
100 years flood event

MID- TO LONG-TERM FLOOD RISK IN ISLAIS CREEK / BAYVIEW

U.S. Army Corps of Engineers Flood Resiliency Study

Mid- to long-term flood risk includes:

- Third Street and Illinois Street Bridges
- MUNI facilities that provide Citywide transit
- Industrial and Maritime uses and jobs
- Parks and open spaces
- Fire Station #25



FEEDBACK FROM "ASSET MAPPING" EXERCISE

Islais Creek / Bayview Feedback

- Bayview Opera House
- Candlestick Point
- Neighborhoods
- Parks and Open Space
- Heron's Head
- Water Access
- Families and Communities
- Schools
- Community Based Organizations

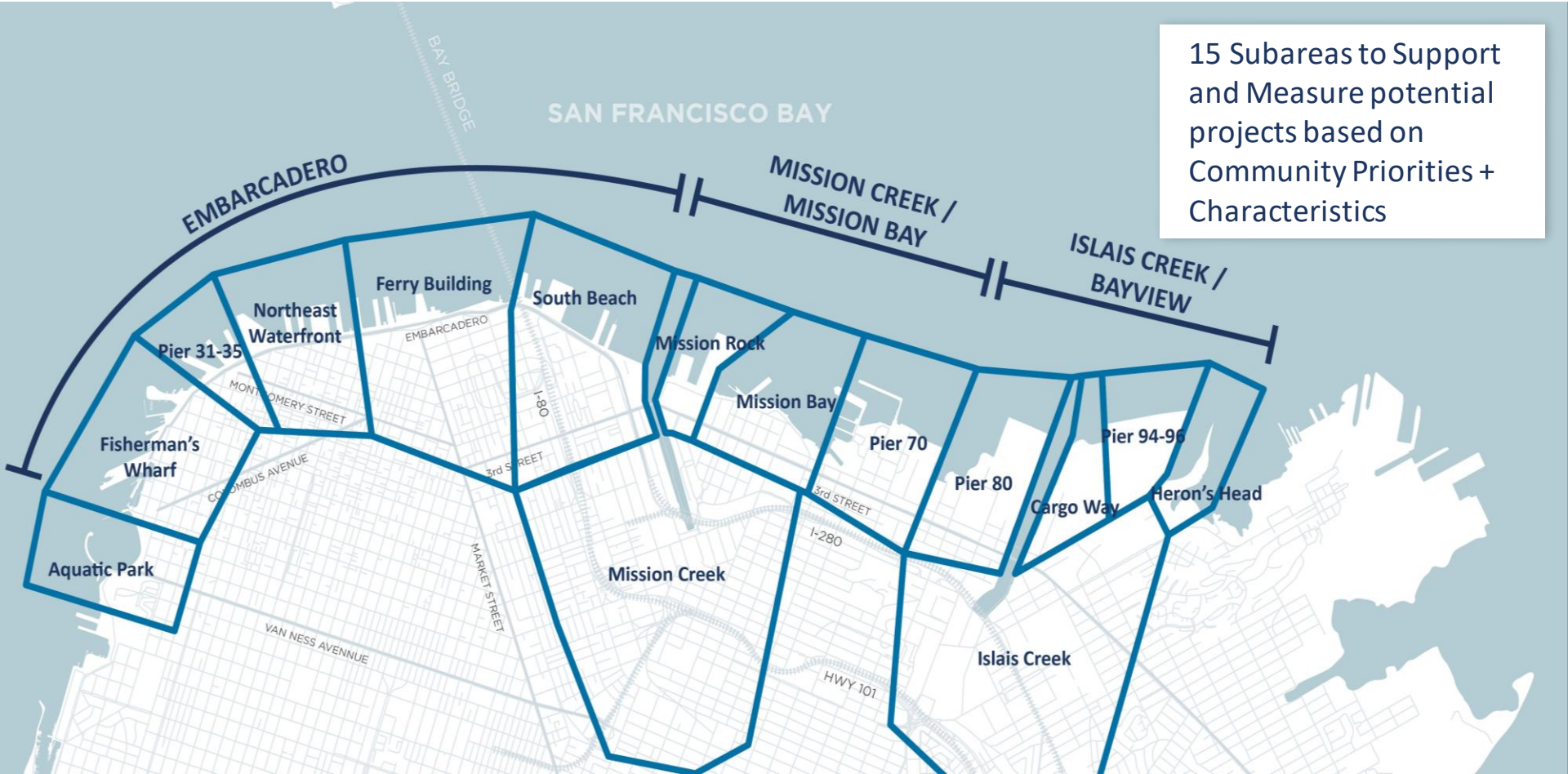
- Housing
- Wastewater/ Sewage
- Third Street Bridge
- Transportation and Utilities
- Critical Facilities
- Jobs and Workforce Development
- Commercial Corridors and Local Industry

- Emergency Response
- Transportation
- Hospital Access
- Neighborhood Function
- Water Quality
- Contaminated lands
- Bayview/Hunters Point

How Can We Reduce the Risk?

Waterfront "measures" to reduce risk

UNITED STATES ARMY CORPS OF ENGINEERS FLOOD STUDY AREA

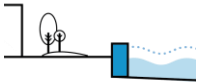


HOW CAN WE REDUCE FLOOD RISK?

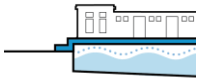
Measures to Reduce Flood

Physical and Policy

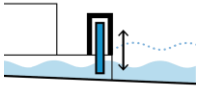
Levees



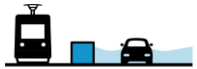
Seawalls



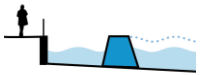
Raised Marine Structures



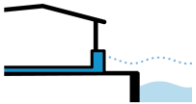
Tide Gates



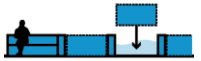
Floodwalls



Breakwaters



Building Adaptations



Deployables

Ecological

Ecological Marine Structures

Ecological Features

Aquatic Habitat

Ecological Shorelines

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HOW WILL WE DECIDE HOW TO REDUCE THE RISK?

For Each of the 15 Subareas We Have Identified:

Measure Profile
Vegetated Revetment
Flood Adaptation Measure

ECOLOGICAL INFRASTRUCTURE

WATER LEVEL RANGE:
Intertidal to supratidal

SHORELINE LOCATION:
Shoreline

DESIGN LIFE	ADAPTABILITY	IMPA
Decades	Medium	

COASTAL FLOOD HAZARDS MITIGATED:
Enhancements can provide flood protection when
Sea Level Rise
Storm Surge

MEASURES COMPATIBILITY:	
Flood	Seismic
Seawalls, Levees	Nearshore Buttress, Landside Buttress, Liquefaction Mitigation

DESCRIPTION:
Plantings can be added to the voids between a revetment to create riparian and fish habitat. Plants can slow flow and revetments protect coastal shorelines and river banks. articulated concrete blocks (ACB), marine mattress or bare slopes in low wave and/or weak flow locations

CONSIDERATIONS:
- Design should anticipate migration pathways or re-planting as sea levels rise

Measures Profile
Super Bulkhead Wharf
Seismic Adaptation Measure

SHORELINE STABILIZATION

TYPE: Structural

SHORELINE LOCATION:
Nearshore

Example of piles installed to support new wharf structure ©SGH

DESIGN LIFE	ADAPTABILITY	IMPACT ON THE WATERFRONT	CONSTRUCTION COST
75+ years	Medium	Moderate Waterside Intervention	High

SEISMIC HAZARDS MITIGATED:		SEISMIC PERFORMANCE IMPROVED:	
Lateral Spreading	Liquefaction	Structures	Utilities and Transportation

MEASURES COMPATIBILITY:	Flood	Seismic
	Raised Marine Structures	Liquefaction Mitigation | Utility Retrofit

DESCRIPTION:
New robust wharf structure that would replace the existing bulkhead wall & wharf and be strong and stiff enough to stabilize the rock dike. This will reduce lateral spreading ground displacements to The Embarcadero, but will not stop liquefaction of the Embarcadero fill.

CONSIDERATIONS:	ADVANTAGES:	DISADVANTAGES:
• The quantity and diameter of the piles would be defined by the depth of the Young Bay Mud and bedrock which varies along the waterfront. • Measure is less effective in areas of medium to deep Young Bay Mud.	• Less construction impact to the Embarcadero and Promenade compared to landside shoreline stabilization measures. • Replaces deteriorated wharf structures. Can elevate wharf for future sea level rise protection.	• Construction would require closure of waterfront buildings and relocation of tenants when the work occurs at an occupied pier. • Construction duration likely longer than other shoreline stabilization measures. • Does not mitigate liquefaction-induced settlements.

Waterfront Resilience Program | Measures Profile | Page 1

- Community, city, and Port priorities and characteristics
- Critical assets and facilities
- Shoreline conditions and character
- Feasible ways to reduce seismic and current and future flood risk

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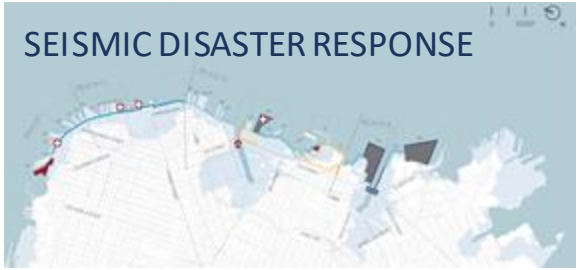
HOW WILL WE DECIDE HOW TO REDUCE THE RISK?

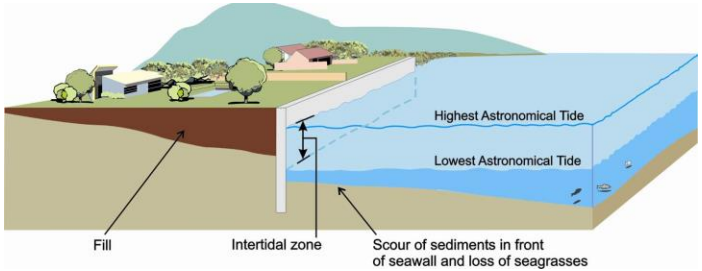
Focused Array Themes



HOW WILL WE REDUCE THE RISK?

Process for Developing Alternatives and Strategies

- Build upon community, City and Port priorities
- Understand existing and future conditions and characteristics
- Use repetition or multiple iterations to test out measures and strategies and obtain input
- Understand the above by ensuring everyone is at the table

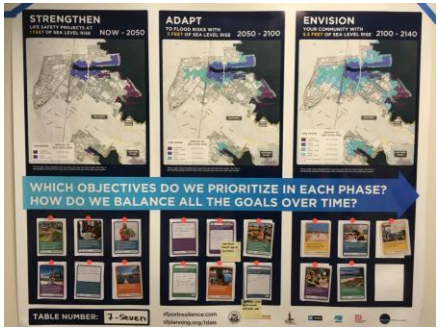


Stakeholder Engagement

What We've Heard from Islais Creek / Bayview

FEEDBACK ON GEOGRAPHIC PROGRAM GOALS

Islais Creek / Bayview Feedback



- Prioritize homes, including low-income housing
- Prioritize environmental concerns
- Ensure anti-displacement is centered in any work
- Broad support for the Embarcadero Seawall Program as addressing risk is important to the entire City, including the Bayview
- That said, prioritize resilience projects in the southern waterfront
- Continue engagement along the Port's entire 7.5 mile jurisdiction

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HOW THIS ENGAGEMENT EFFORT INFORMED THE WRP

Community Input Helped Refine WRP

1

Community feedback affirmed focus on **life safety & emergency response** and offered ideas for evolving how we understand "inspiring an adaptable waterfront":

- Connecting
- Accessible
- Supporting jobs, housing, seniors & youth

2

Community feedback affirmed the Port goals and encouraged:

- Transparency
- Accountability
- Engagement
- **Prioritize assets most loved by the community and most important to the city**
- Select projects that responsibly use tax dollars

3

Community feedback on evaluation criteria affirmed the Port's key focus on life safety and disaster response

- **"Put people first"**
- Assets and services most prioritized: housing, disaster recovery facilities, utilities, and businesses
- Key focus on transportation assets

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Next Steps

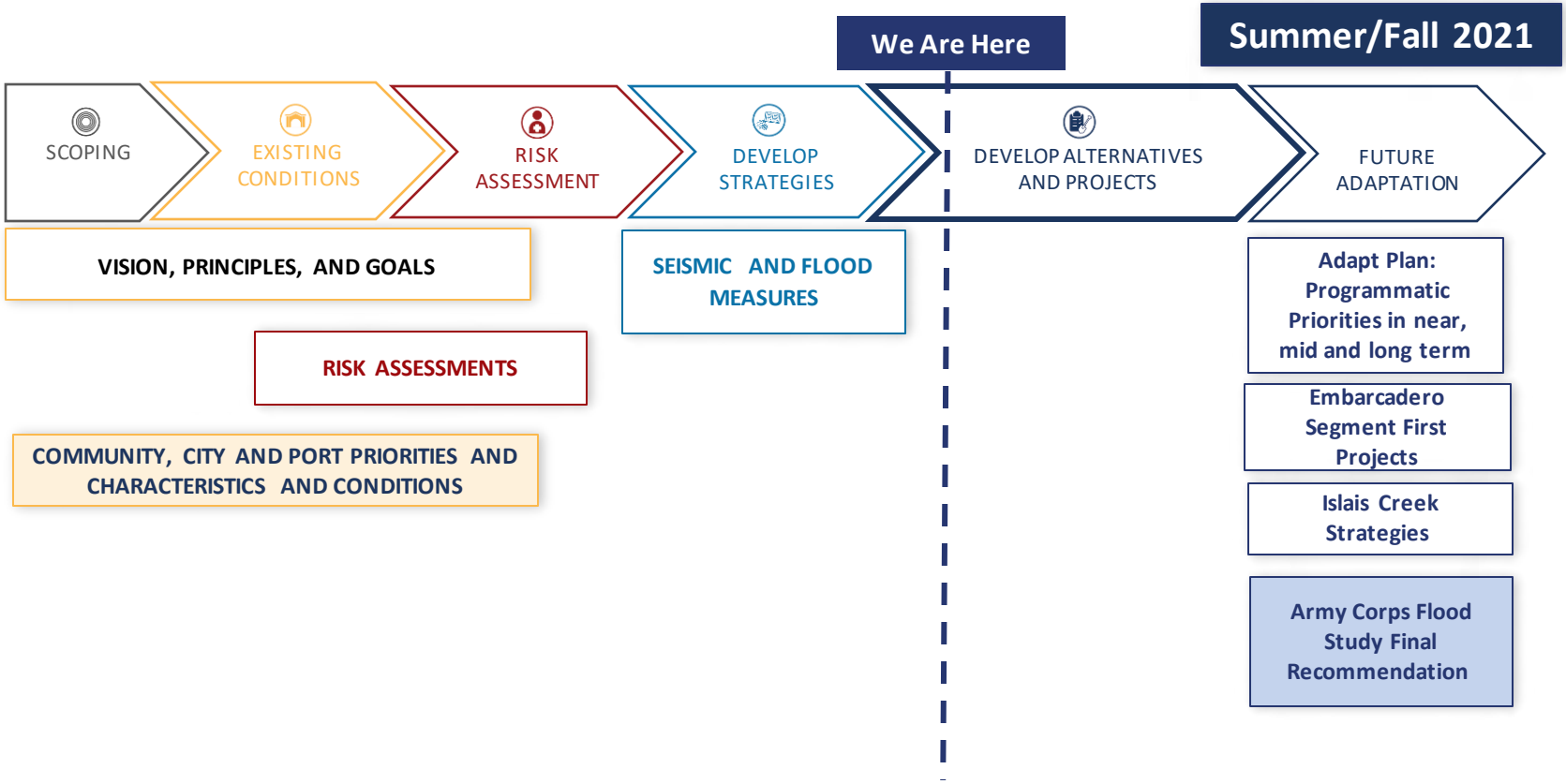
What's Next for the Waterfront Resilience Program?

EMBARCADERO SEAWALL PROGRAM

Program Overview

- **Project Area:** Fisherman's Wharf to Mission Creek
- **Timing:** 2017 to 2021 project planning followed by implementation / construction
- **Focus:** Seismic and flood risk associated with the Embarcadero Seawall
- **Funding:** $425 million General Obligation Bond passed in November 2018

WATERFRONT RESILIENCE PROGRAM STEPS



JOB AND CAREER OPPORTUNITIES

Coming Soon...

Job Opportunities May Include:

- Pile Drivers
- Welders
- Laborers
- Cement Masons
- Operating Engineers
- Carpenters
- Painters
- Office Engineers
- Schedulers and Document Controls
- Construction Administrative

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SMALL & LOCAL BUSINESS CONTRACT OPPORTUNITIES

Coming Soon...

Upcoming Contracts May Include:

Professional Services:

- Engineering
- Design
- Environmental
- Planning

Construction

- Demolition
- Excavation
- Pavement and sidewalk removal
- Electrical

UPCOMING COMMUNITY ENGAGEMENT

Engagement Planned for Early 2021

- Meetings co-hosted with community-based organizations in Islais Creek / Bayview and Mission Creek / Mission Bay
- Ongoing digital engagement, including feedback on waterfront-wide measures and Waterfront Resilience Story Maps
- Ongoing tenant engagement
- Youth engagement with youth-serving organizations that serve citywide youth

FLOOD STUDY FIRST DRAFT OF ALTERNATIVES

Physical Measures Applied to the Southern Waterfront

Mission Bay identified measures include:

- Levee with banks to reduce erosion
- Raised pathway / Raised features
- Native, Vegetated Terraces

Piers 80/94/96 identified measures include:

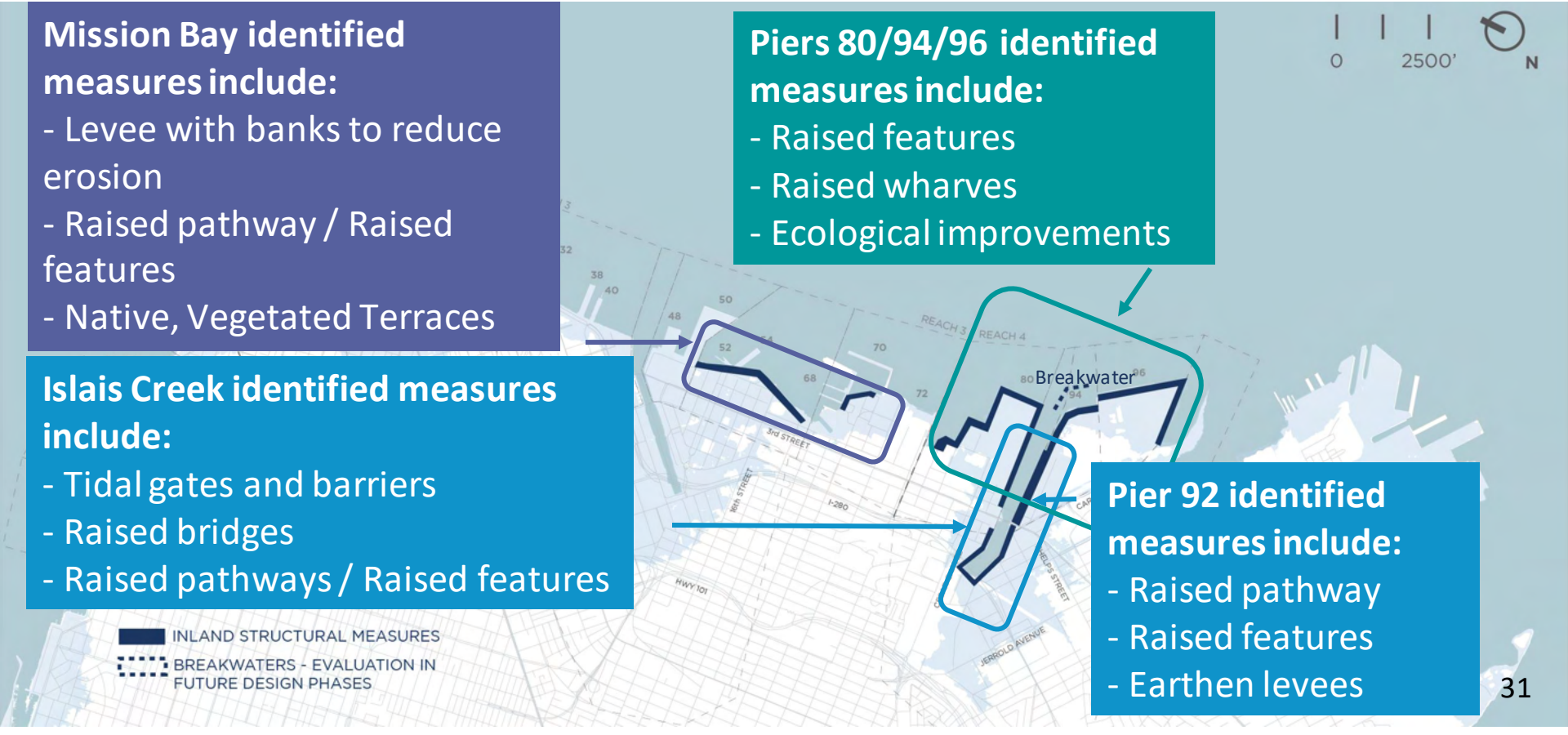
- Raised features
- Raised wharves
- Ecological improvements

Islais Creek identified measures include:

- Tidal gates and barriers
- Raised bridges
- Raised pathways / Raised features

Pier 92 identified measures include:

- Raised pathway
- Raised features
- Earthen levees

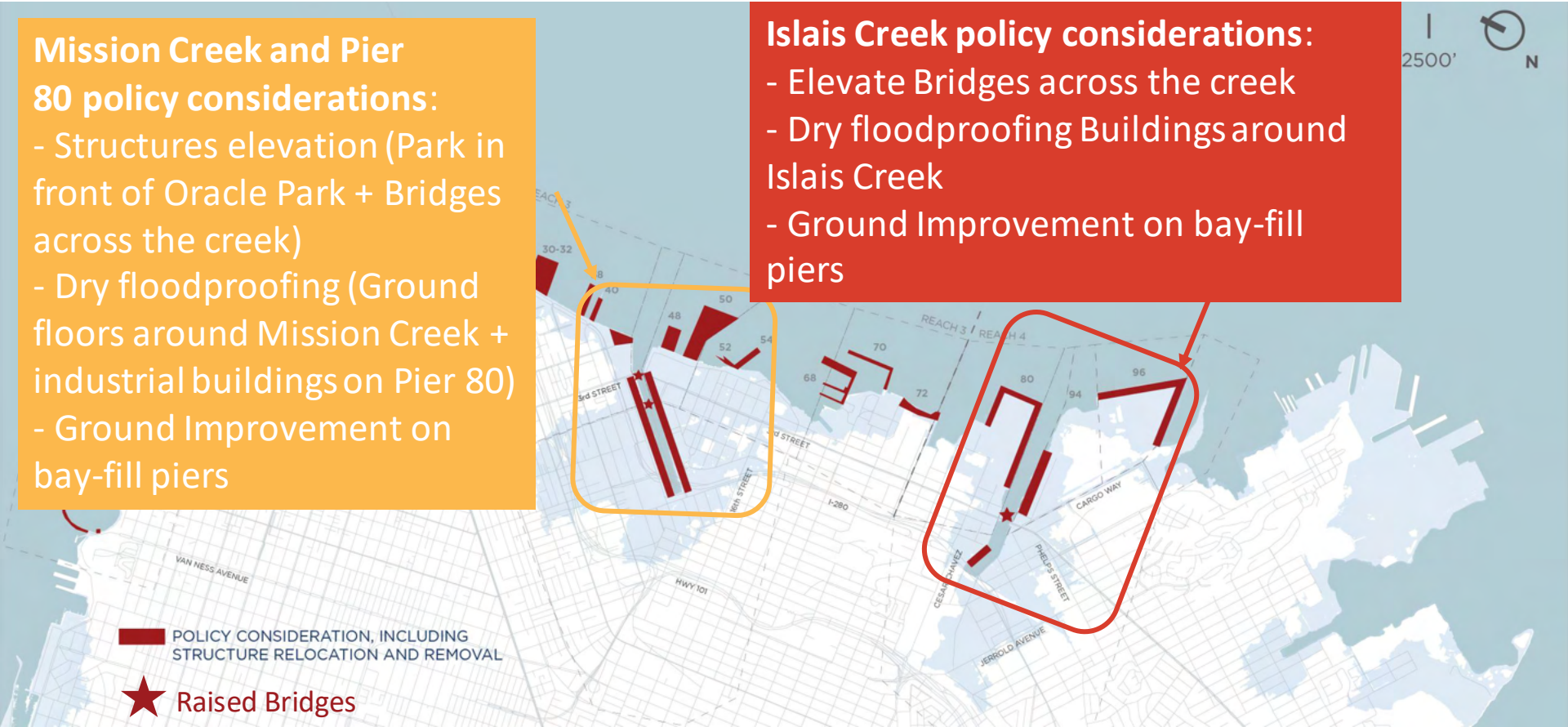


FLOOD STUDY FIRST DRAFT OF ALTERNATIVES

Non-Structural Measures Applied to the Southern Waterfront

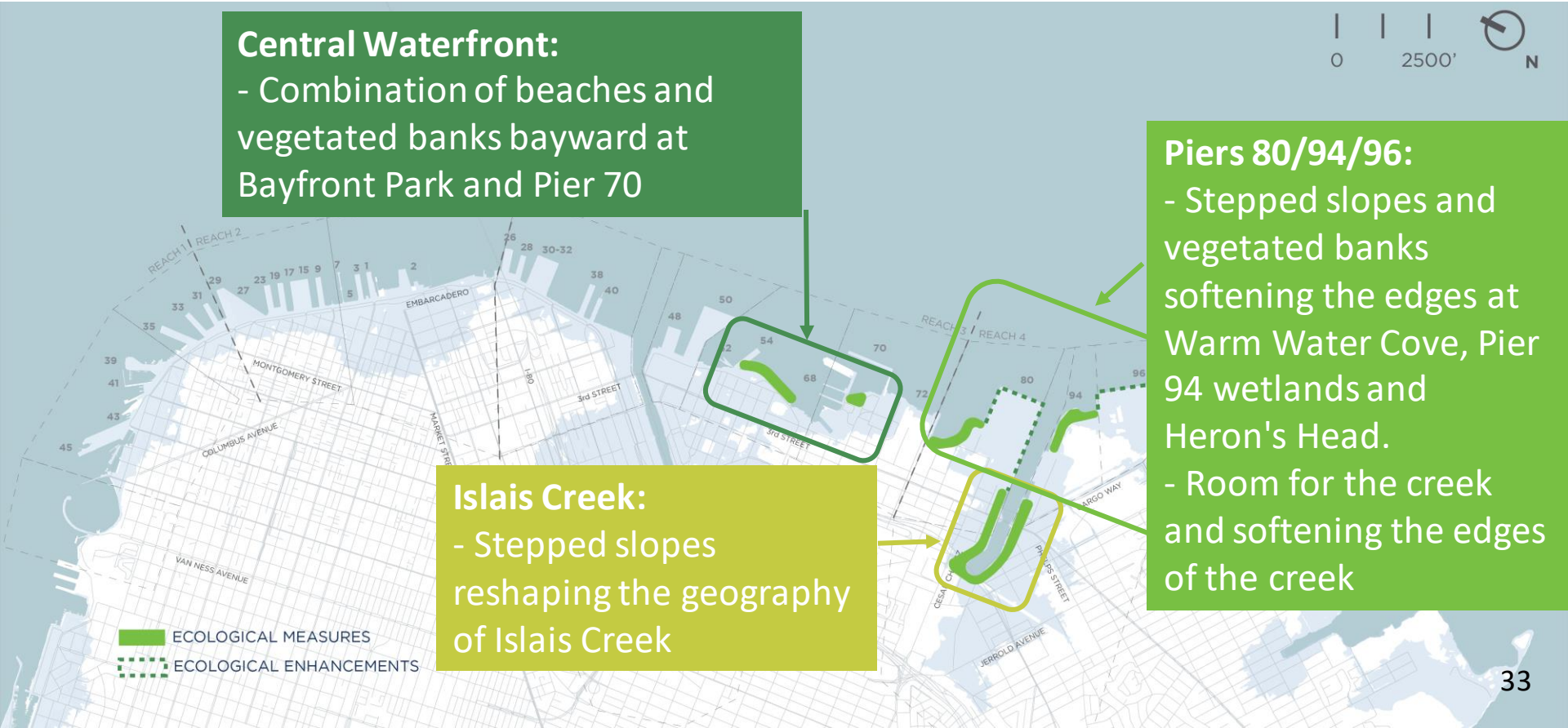
Mission Creek and Pier 80 policy considerations:
- Structures elevation (Park in front of Oracle Park + Bridges across the creek)
- Dry floodproofing (Ground floors around Mission Creek + industrial buildings on Pier 80)
- Ground Improvement on bay-fill piers

Islais Creek policy considerations:
- Elevate Bridges across the creek
- Dry floodproofing Buildings around Islais Creek
- Ground Improvement on bay-fill piers



FLOOD STUDY FIRST DRAFT OF ALTERNATIVES

Nature Based Measures Applied to the Southern Waterfront



Central Waterfront:
- Combination of beaches and vegetated banks bayward at Bayfront Park and Pier 70

Piers 80/94/96:
- Stepped slopes and vegetated banks softening the edges at Warm Water Cove, Pier 94 wetlands and Heron's Head.
- Room for the creek and softening the edges of the creek

Islais Creek:
- Stepped slopes reshaping the geography of Islais Creek

Thank You!

Lindy Lowe, Port of San Francisco
lindy.lowe@sfport.com

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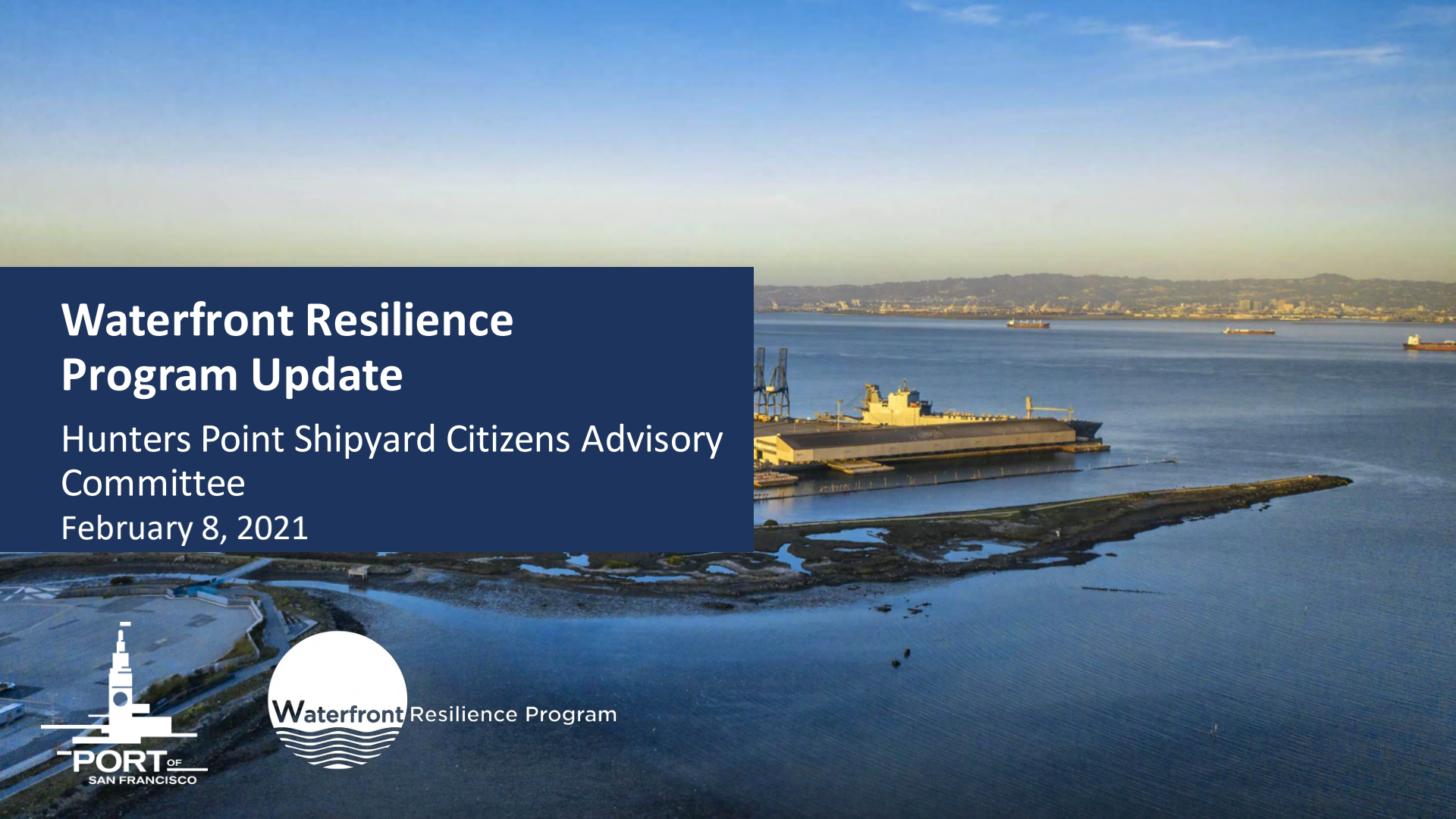
Waterfront Resilience Program

Waterfront Resilience Program Update

Hunters Point Shipyard Citizens Advisory Committee

February 8, 2021



Waterfront Resilience Program

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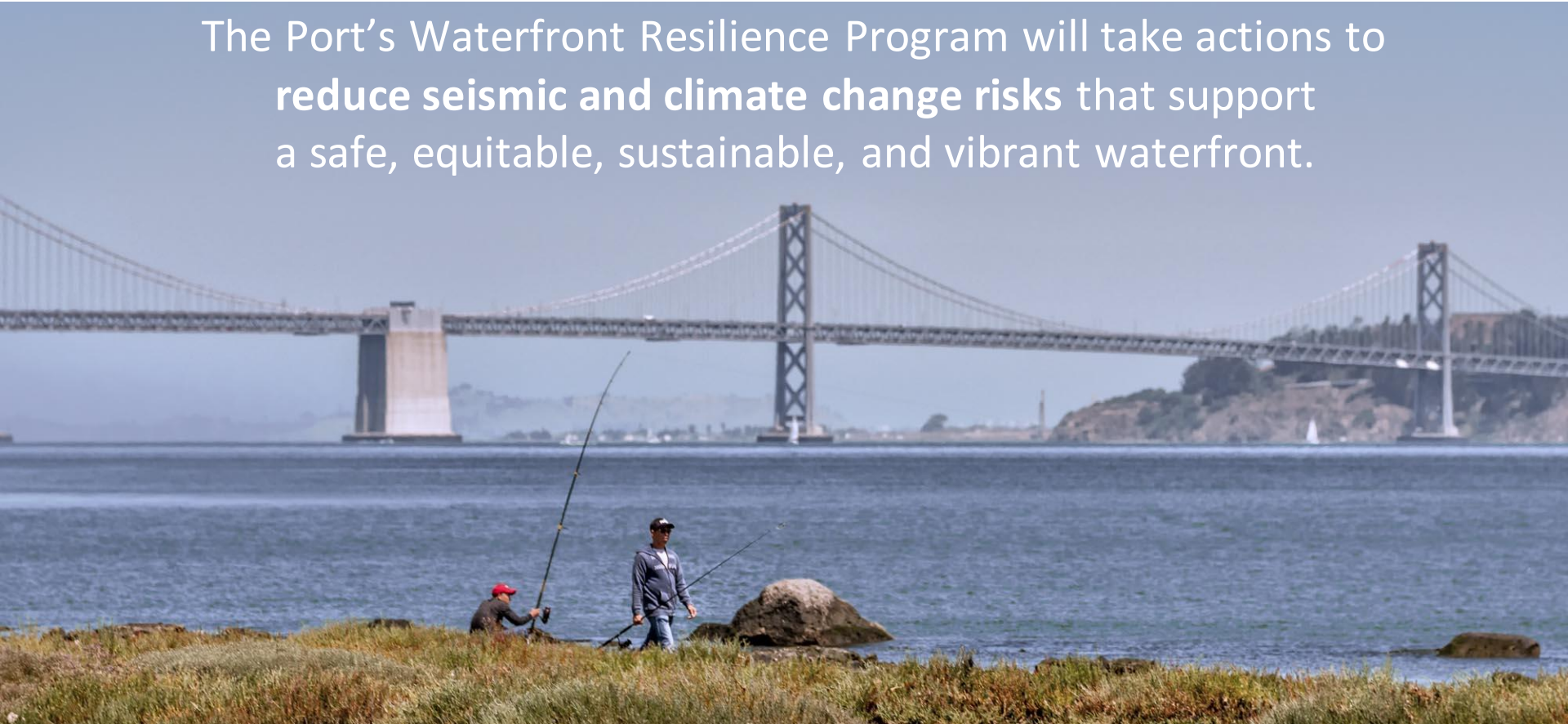

WATERFRONT RESILIENCE PROGRAM DRAFT PRINCIPLES

Affirmed through Robust Community Engagement

- **Prioritize** life safety and emergency response
- **Advance** equity throughout the Waterfront Resilience Program, including through community and stakeholder engagement, planning, contracting, jobs and decision making
- **Enhance** and sustain economic and ecological opportunities

PORT OF SAN FRANCISCO

WATERFRONT RESILIENCE PROGRAM DRAFT PRINCIPLES CONT.

Affirmed through Robust Community Engagement

- **Inspire** an adaptable waterfront that:
  - Improves the health of the Bay
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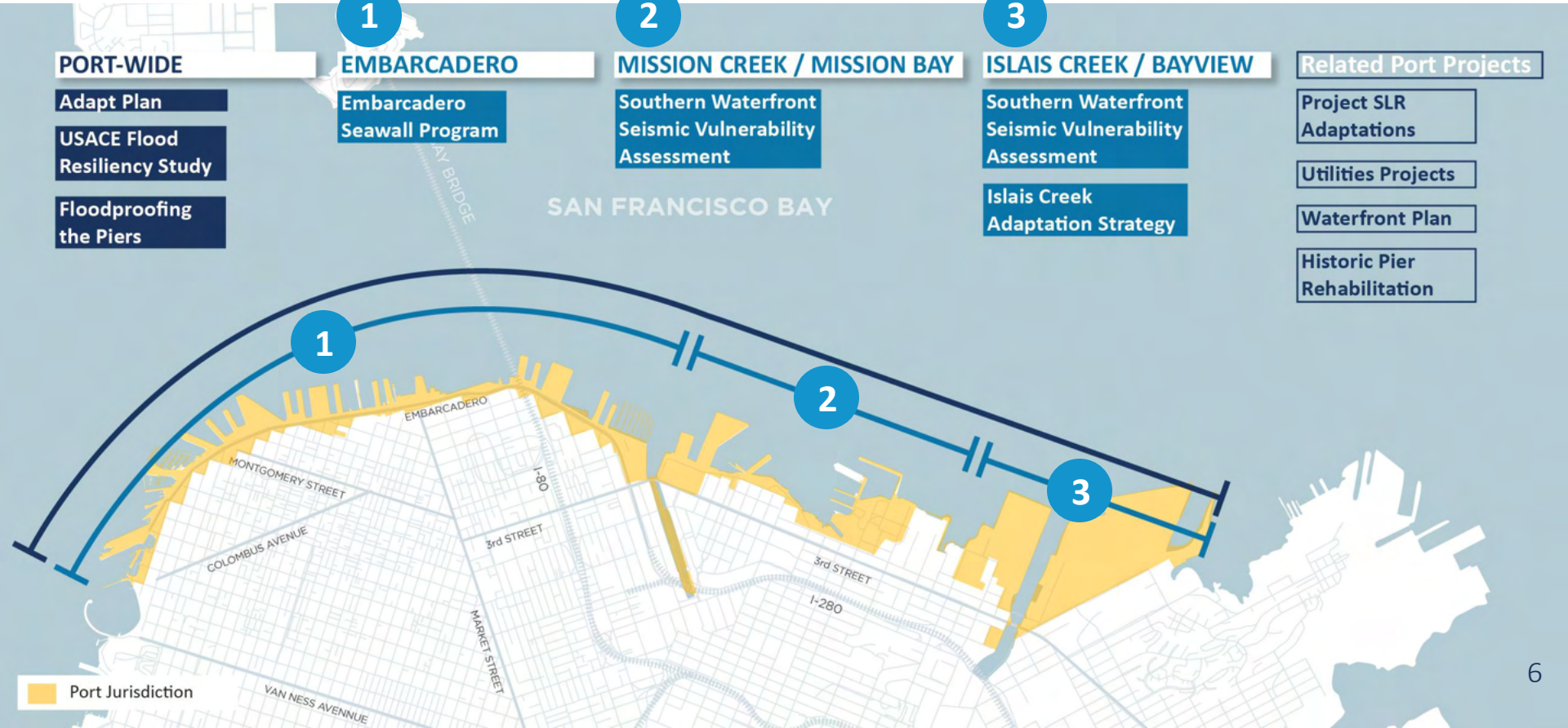
WATERFRONT RESILIENCE PROGRAM EFFORTS

Program and City Resilience Projects and Efforts



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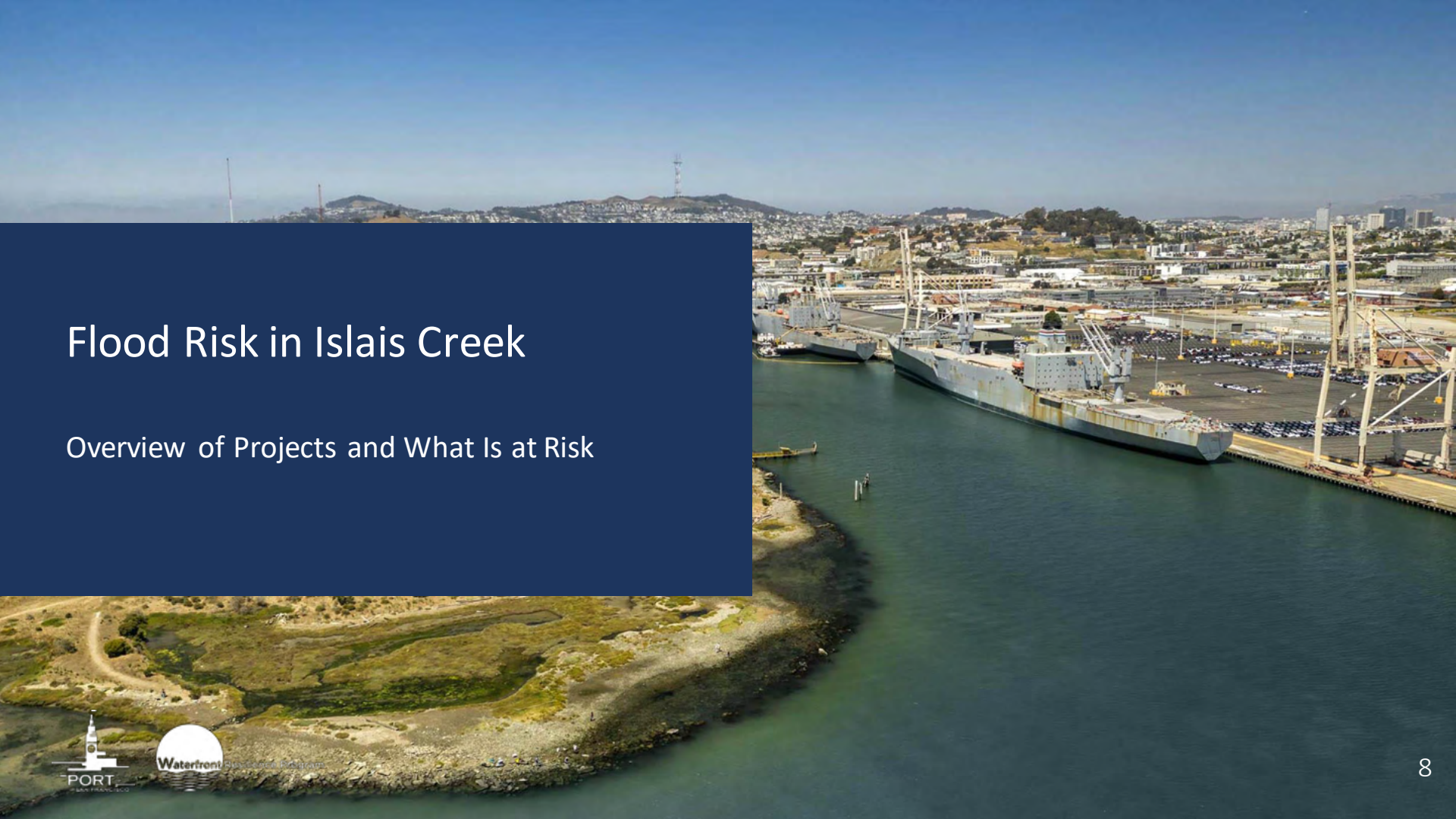

Flood Risk in Islais Creek

Overview of Projects and What Is at Risk

U.S. ARMY CORPS OF ENGINEERS (USACE) FLOOD RESILIENCY STUDY

Overview and Key Highlights

- Port is local sponsor of 5- to 7-year study
- Flood risk assessment to identify near- mid- and long-term strategies to address shoreline and creek flooding and sea level rise
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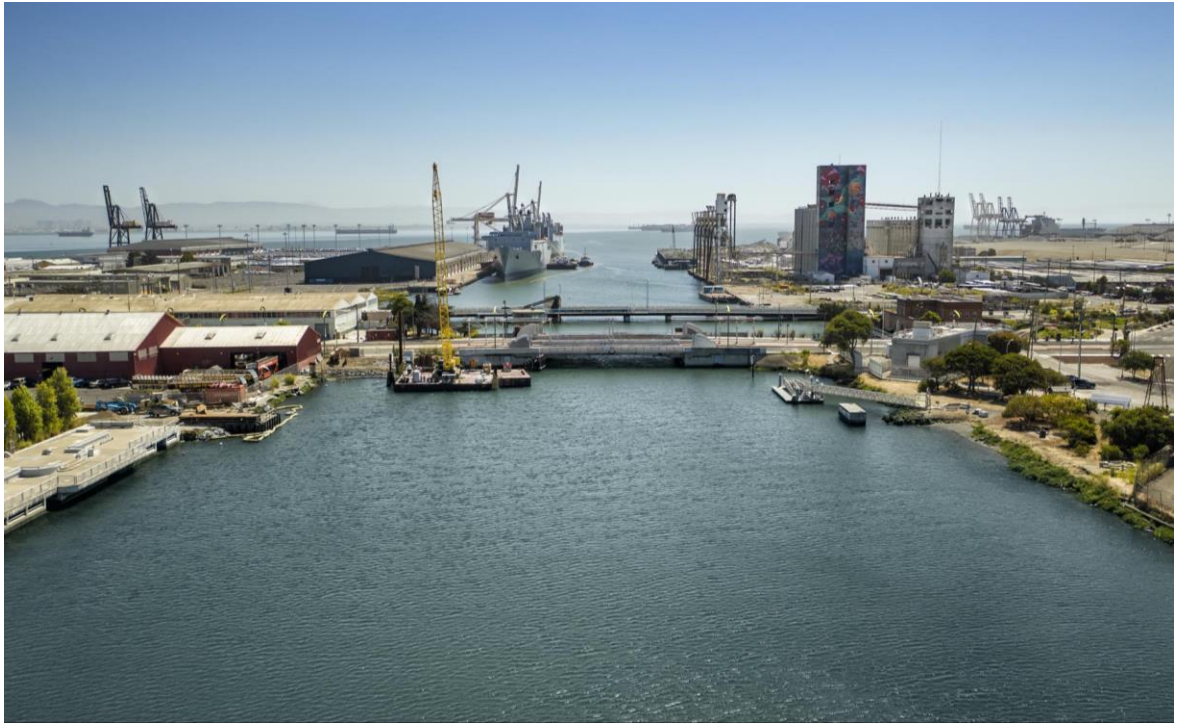

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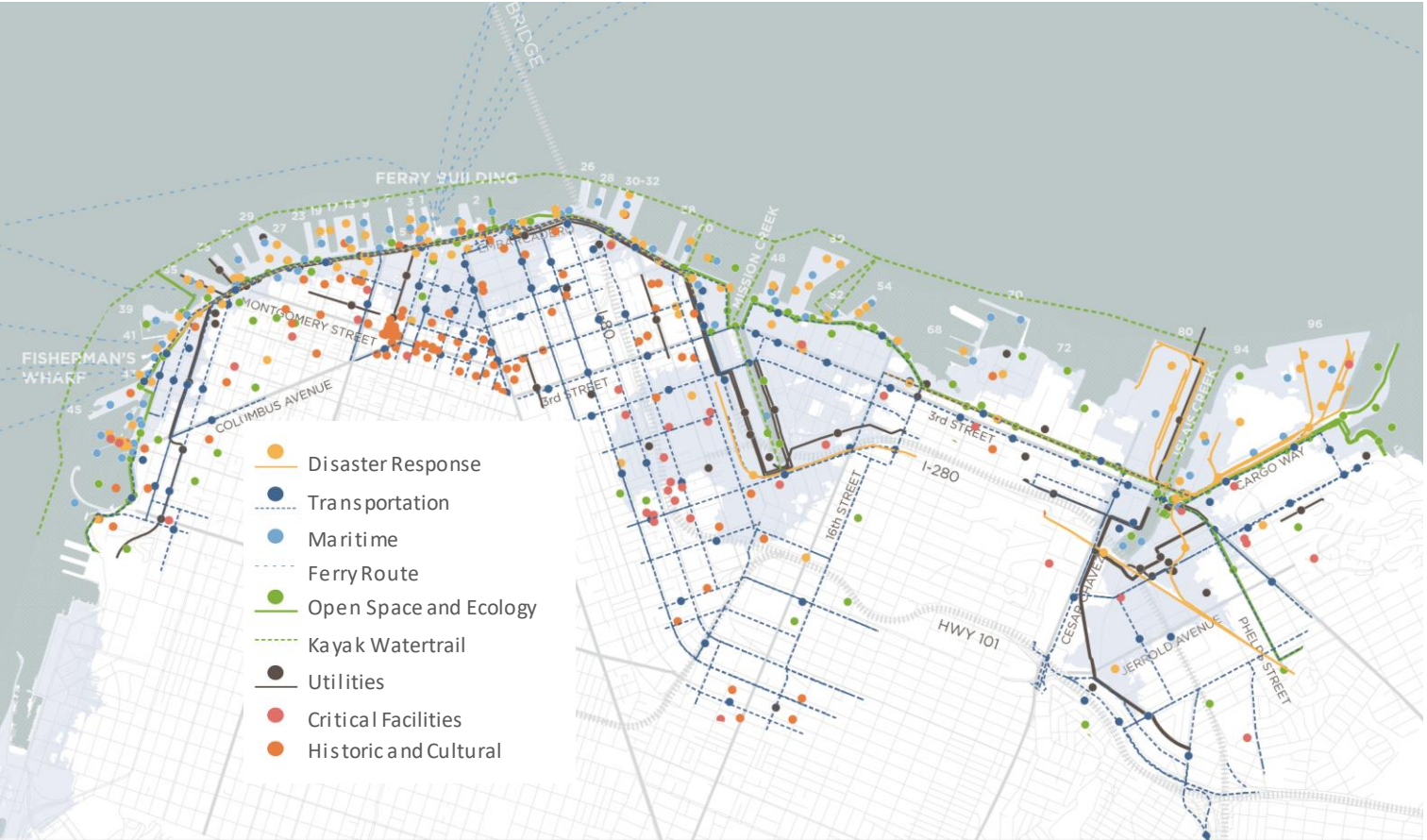
Study Wide Assets at Risk

U.S. Army Corps of Engineers Flood Resiliency Study



At Risk:

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- 11,000 jobs
- 13,500 residents, 58% people of color
- Wastewater functions for 580,000 residents

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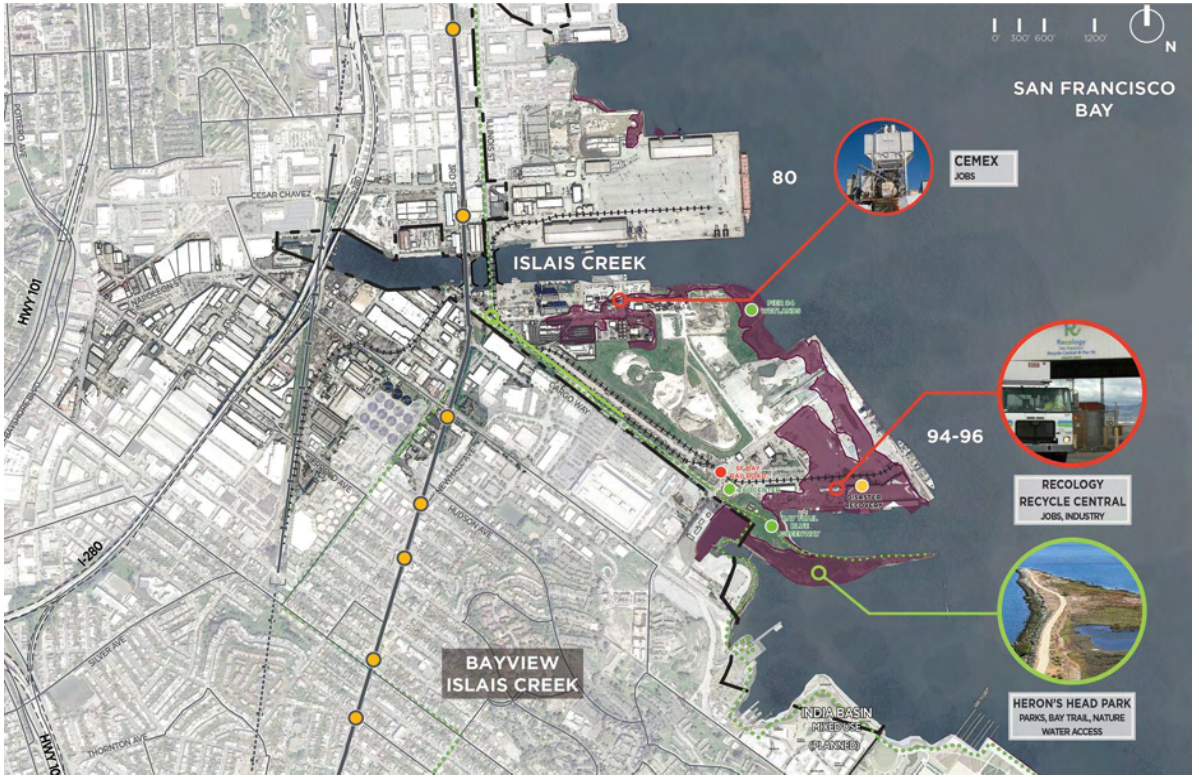

100 years flood event

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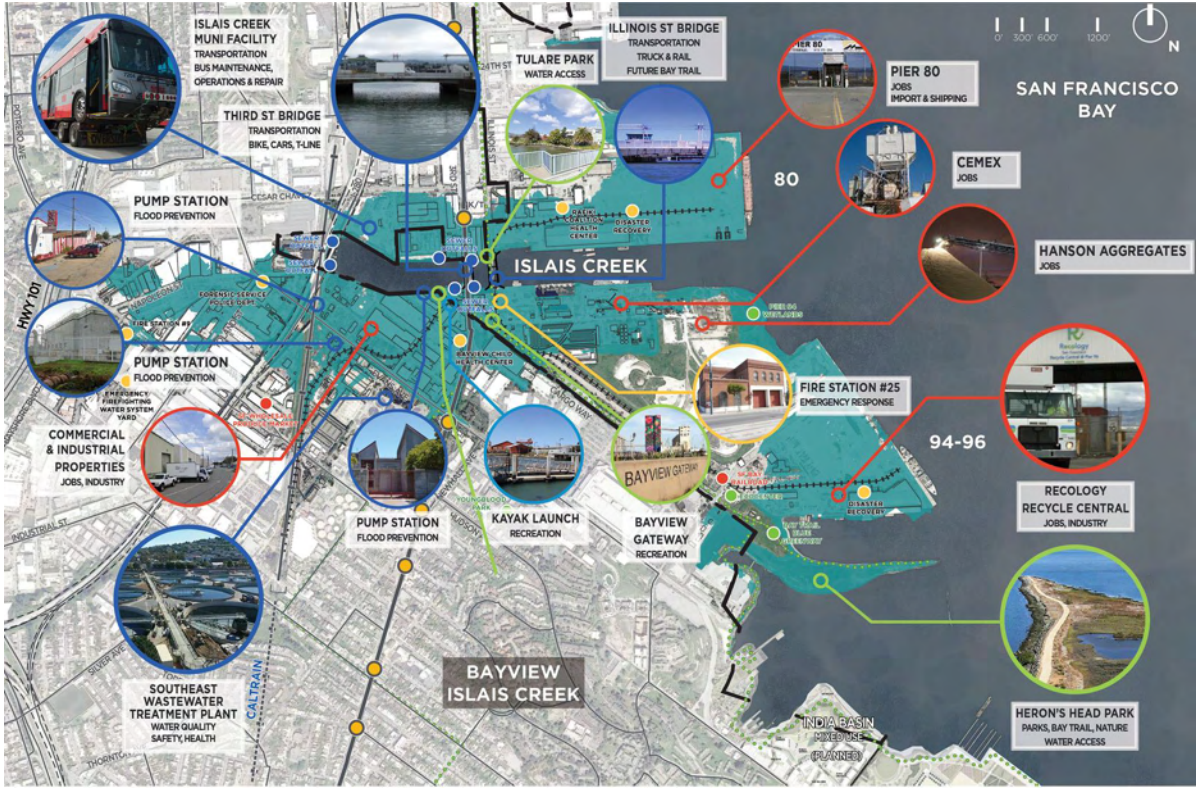

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- Housing
- Wastewater/ Sewage
- Third Street Bridge
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- Critical Facilities
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- Commercial Corridors and Local Industry

Assets important to the City

- Emergency Response
- Transportation
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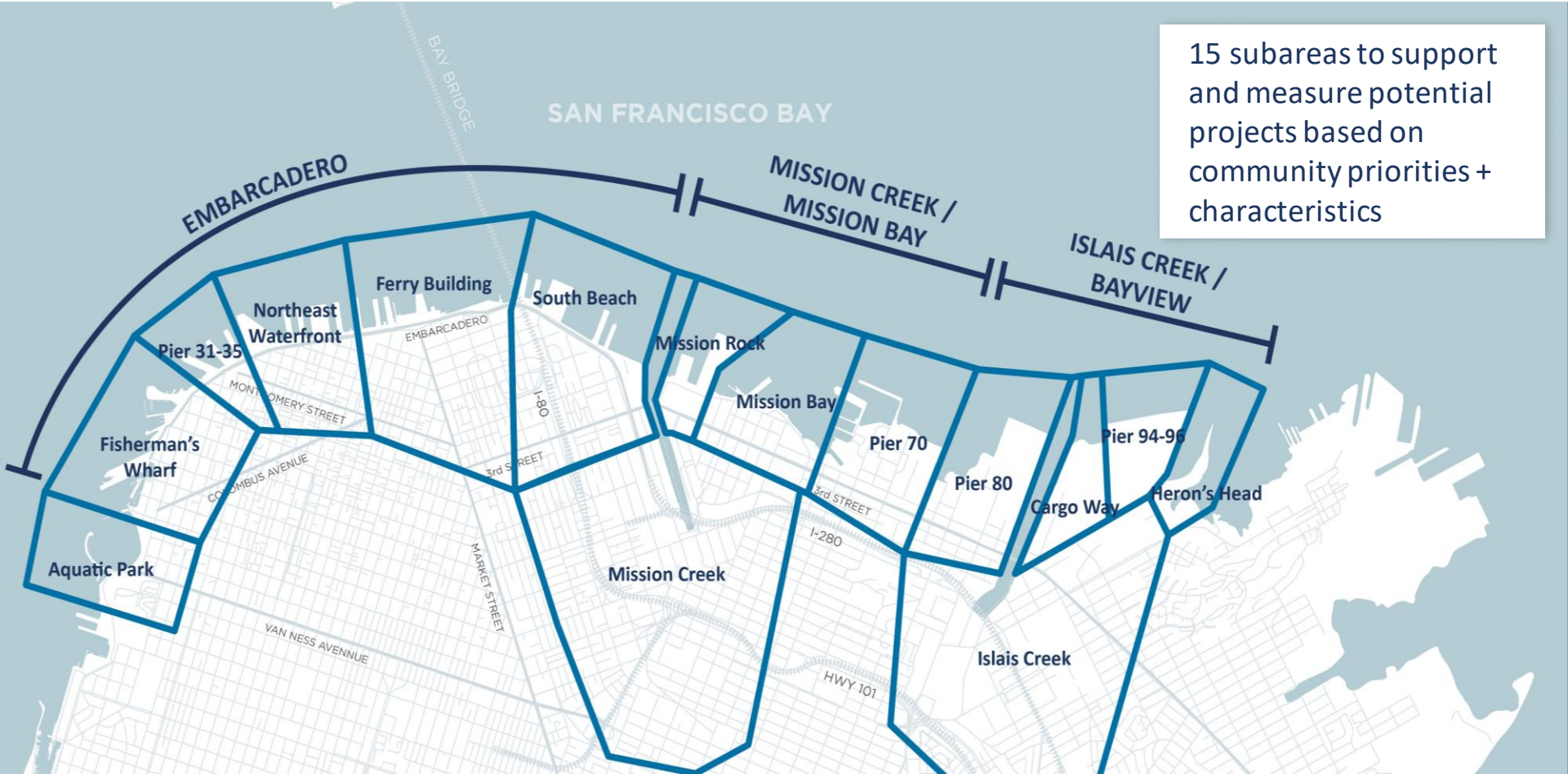
Concerns during a disaster

How Can We Reduce the Risk?

Waterfront "measures" to reduce risk

U.S. ARMY CORPS OF ENGINEERS FLOOD RESILIENCY STUDY AREA

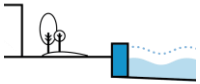


HOW CAN WE REDUCE FLOOD RISK?

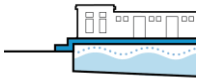
Measures to Reduce Flood Risk

Physical and Policy

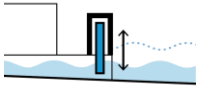
Levees



Seawalls



Raised Marine Structures



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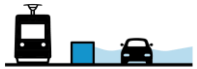

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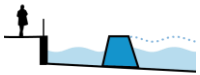
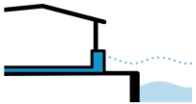
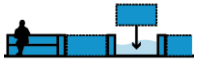


Breakwaters



Building Adaptations



Deployables

Ecological

Ecological Marine Structures

Ecological Features

Aquatic Habitat

Ecological Shorelines

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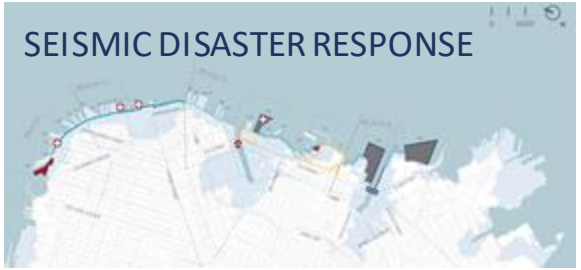
HOW WILL WE DECIDE HOW TO REDUCE THE RISK?

For Each of the 15 Subareas We Have Identified:

- Community, City, and Port priorities and characteristics
- Critical assets and facilities
- Shoreline conditions and character
- Feasible ways to reduce seismic and current and future flood risk

HOW WILL WE DECIDE HOW TO REDUCE THE RISK?

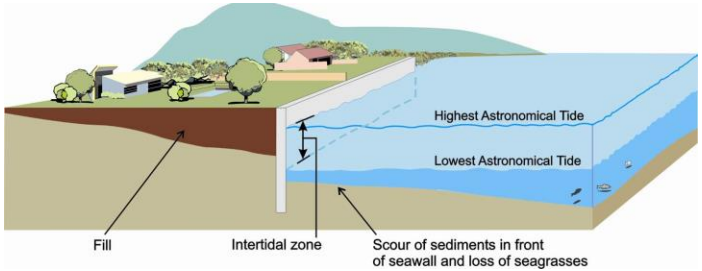
Focused Array Themes



HOW WILL WE REDUCE THE RISK?

Process for Developing Alternatives and Strategies

- Build upon community, City and Port priorities
- Understand existing and future conditions and characteristics
- Use repetition or multiple iterations to test out measures and strategies and obtain input
- Understand the above by ensuring everyone is at the table

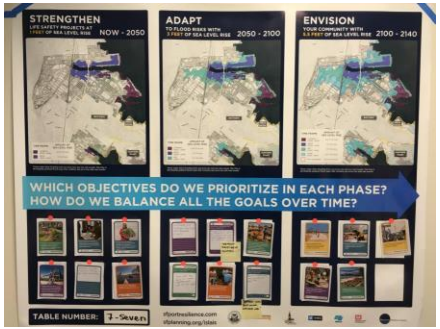


Stakeholder Engagement

What We've Heard from Islais Creek / Bayview

FEEDBACK ON GEOGRAPHIC PROGRAM GOALS

Islais Creek / Bayview Feedback



- Prioritize homes, including low-income housing
- Prioritize environmental concerns
- Ensure anti-displacement is centered in any work
- Broad support for the Embarcadero Seawall Program as addressing risk is important to the entire City, including the Bayview
- That said, prioritize resilience projects in the Southern waterfront
- Continue engagement along the Port's entire 7.5 mile jurisdiction

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HOW THIS ENGAGEMENT EFFORT INFORMED THE WRP

Community Input Helped Refine WRP

1

Community feedback affirmed focus on **life safety & emergency response** and offered ideas for evolving how we understand "inspiring an adaptable waterfront":

- Connecting
- Accessible
- Supporting jobs, housing, seniors & youth

2

Community feedback affirmed the Port goals and encouraged:

- Transparency
- Accountability
- Engagement
- **Prioritize assets most loved by the community and most important to the city**
- Select projects that responsibly use tax dollars

3

Community feedback on evaluation criteria affirmed the Port's key focus on life safety and disaster response

- **"Put people first"**
- Assets and services most prioritized: housing, disaster recovery facilities, utilities, and businesses
- Key focus on transportation assets

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Next Steps

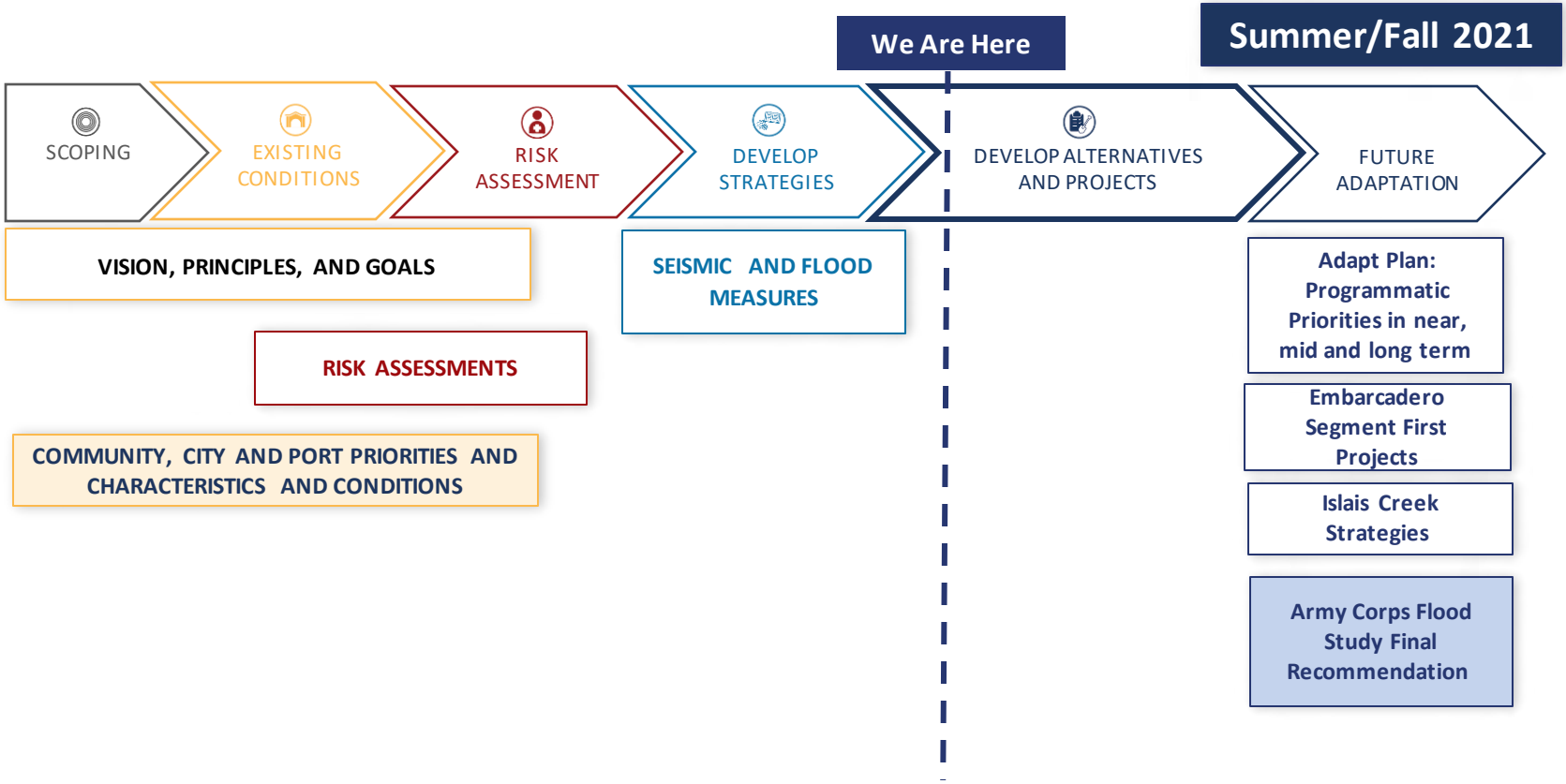
What's Next for the Waterfront Resilience Program?

EMBARCADERO SEAWALL PROGRAM

Program Overview

- **Project Area:** Fisherman's Wharf to Mission Creek
- **Timing:** 2017 to 2021 project planning followed by implementation / construction
- **Focus:** Seismic and flood risk associated with the Embarcadero Seawall
- **Funding:** $425 million General Obligation Bond passed in November 2018

WATERFRONT RESILIENCE PROGRAM STEPS



JOB AND CAREER OPPORTUNITIES

Coming Soon...

Job Opportunities May Include:

- Pile Drivers
- Welders
- Laborers
- Cement Masons
- Operating Engineers
- Carpenters
- Painters
- Office Engineers
- Schedulers and Document Controls
- Construction Administrative

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SMALL & LOCAL BUSINESS CONTRACT OPPORTUNITIES

Coming Soon...

Upcoming Contracts May Include:

Professional Services:

- Engineering
- Design
- Environmental
- Planning

Construction

- Demolition
- Excavation
- Pavement and sidewalk removal
- Electrical

UPCOMING COMMUNITY ENGAGEMENT

Join Us for Virtual Office Hours

Tuesday, February 9, 12:00 – 1:00 PM

Wednesday, February 24, 5:00-6:00 PM

UPCOMING COMMUNITY ENGAGEMENT

Engagement Planned for Early 2021

- Meetings co-hosted with community-based organizations in Islais Creek / Bayview and Mission Creek / Mission Bay
- Ongoing digital engagement, including feedback on waterfront-wide measures and Waterfront Resilience Story Maps
- Ongoing tenant engagement
- Youth engagement with youth-serving organizations that serve citywide youth

FLOOD STUDY FIRST DRAFT OF ALTERNATIVES

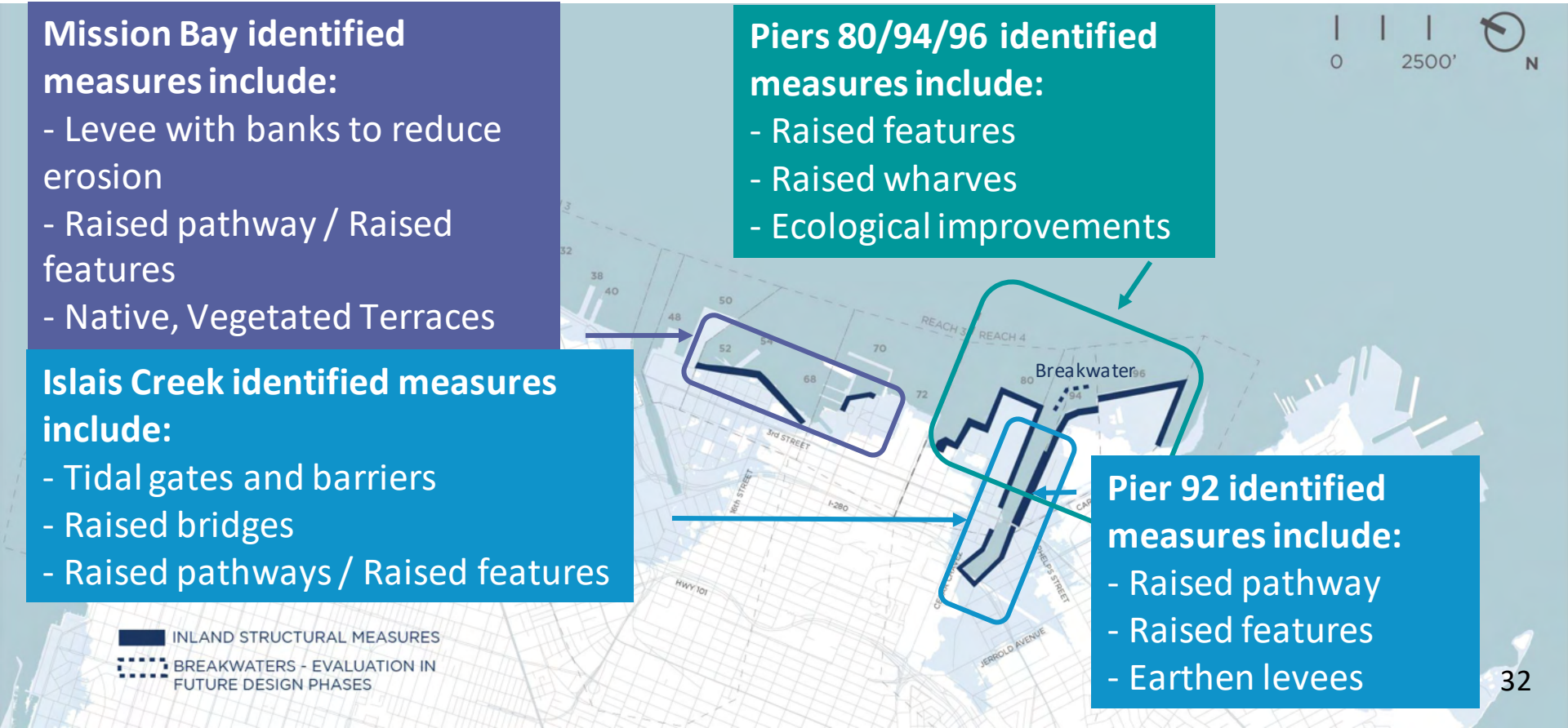
Physical Measures Applied to the Southern Waterfront

Mission Bay identified measures include:
- Levee with banks to reduce erosion
- Raised pathway / Raised features
- Native, Vegetated Terraces

Islais Creek identified measures include:
- Tidal gates and barriers
- Raised bridges
- Raised pathways / Raised features

Piers 80/94/96 identified measures include:
- Raised features
- Raised wharves
- Ecological improvements

Pier 92 identified measures include:
- Raised pathway
- Raised features
- Earthen levees

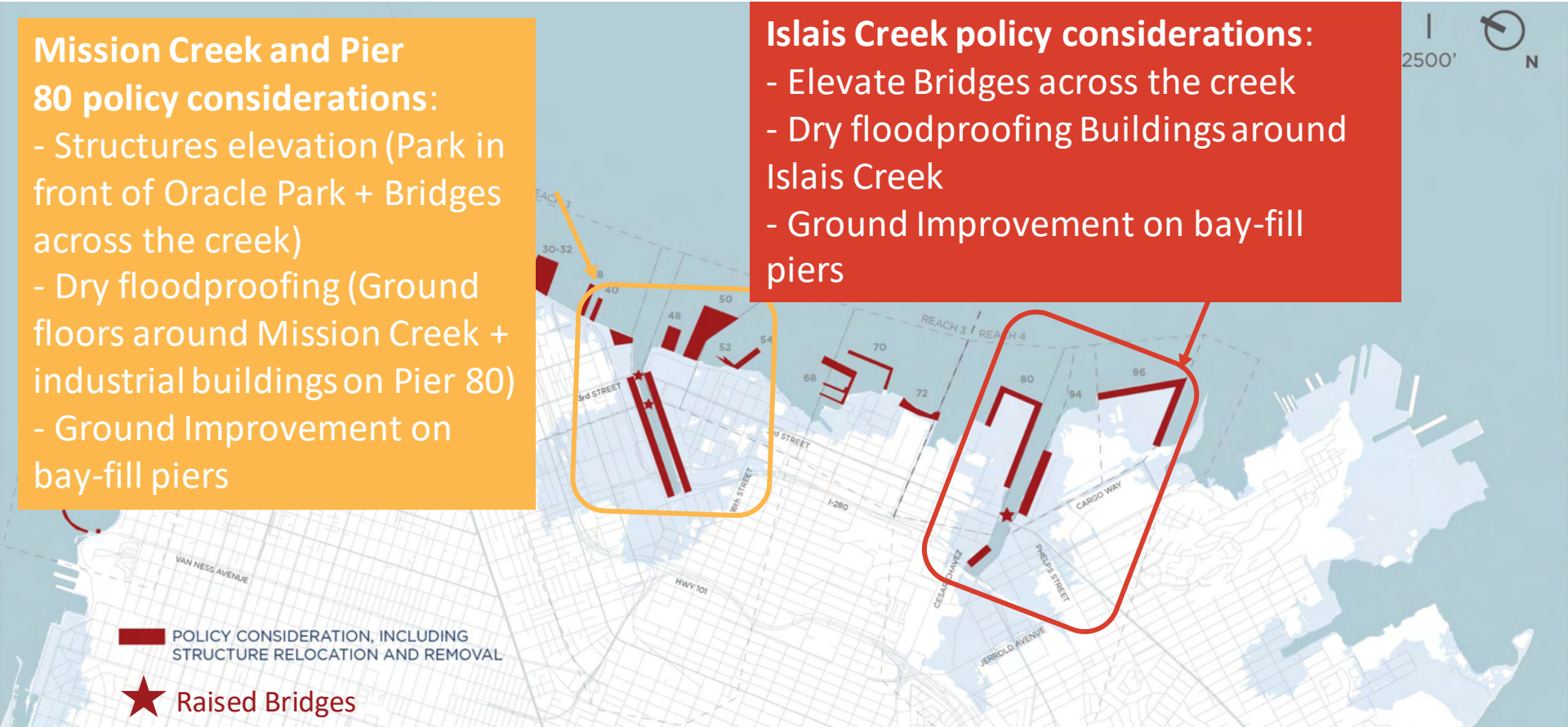


FLOOD STUDY FIRST DRAFT OF ALTERNATIVES

Non-Structural Measures Applied to the Southern Waterfront

Mission Creek and Pier 80 policy considerations:
- Structures elevation (Park in front of Oracle Park + Bridges across the creek)
- Dry floodproofing (Ground floors around Mission Creek + industrial buildings on Pier 80)
- Ground Improvement on bay-fill piers

Islais Creek policy considerations:
- Elevate Bridges across the creek
- Dry floodproofing Buildings around Islais Creek
- Ground Improvement on bay-fill piers



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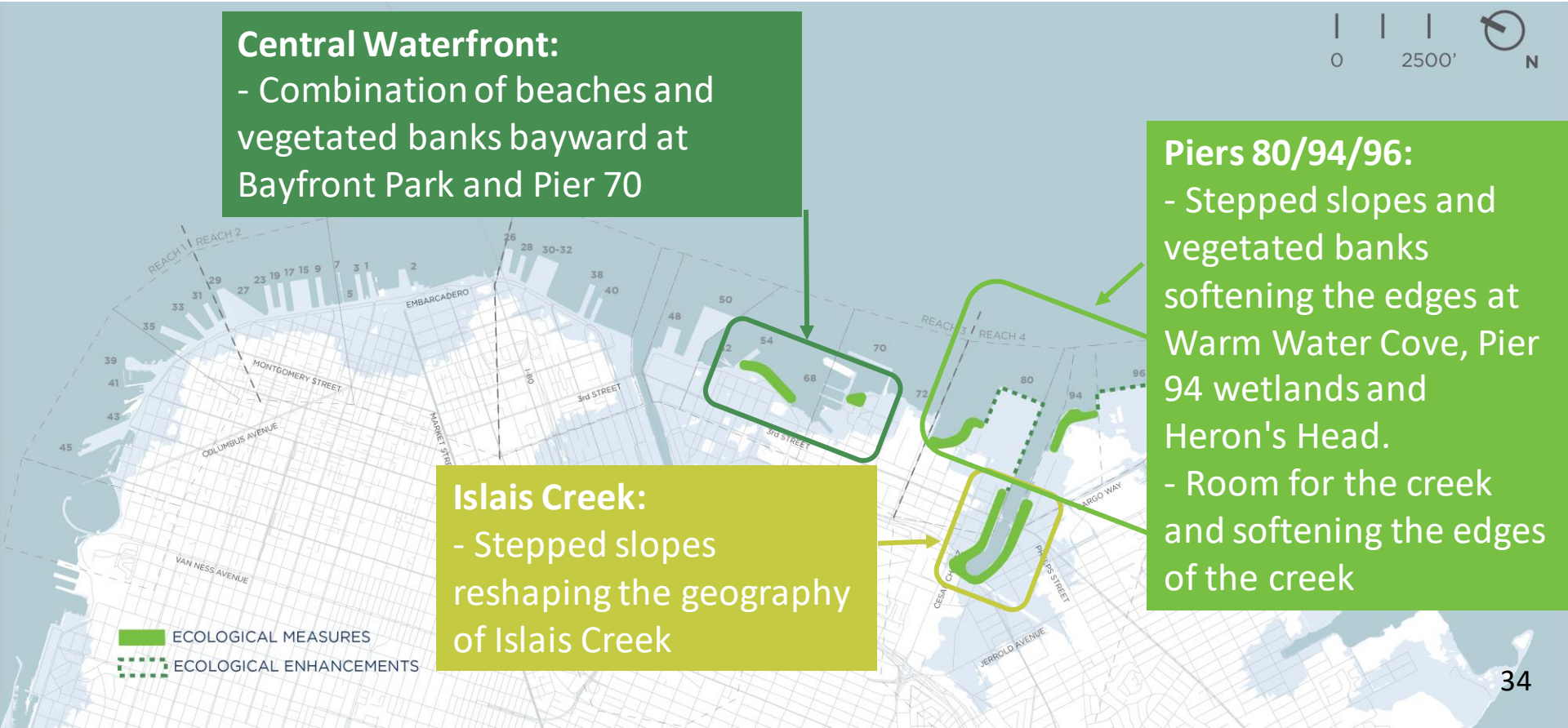
Nature Based Measures Applied to the Southern Waterfront



Thank You!

David Beaupre, Port of San Francisco
david.beaupre@sfport.com

Brad Benson, Port of San Francisco
brad.benson@sfport.com

PORT OF SAN FRANCISCO

Waterfront Resilience Program

Waterfront Resilience Program Update

Southeast Community Facility Commission: Facility & Design Advisory Committee

February 11, 2021

PORT OF SAN FRANCISCO

Waterfront Resilience Program

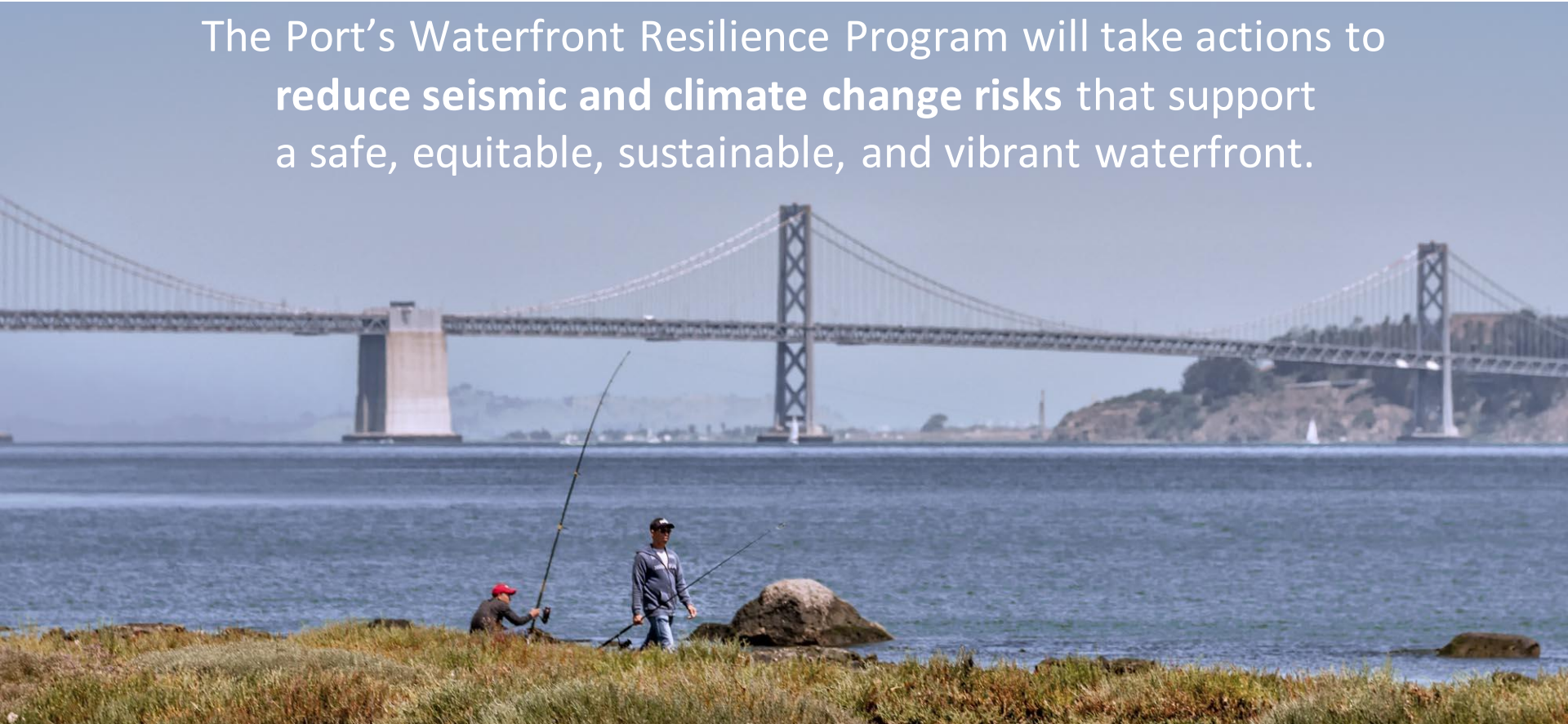
Waterfront Resilience Program

Overview

WATERFRONT RESILIENCE PROGRAM

Goal Statement

The Port's Waterfront Resilience Program will take actions to **reduce seismic and climate change risks** that support a safe, equitable, sustainable, and vibrant waterfront.



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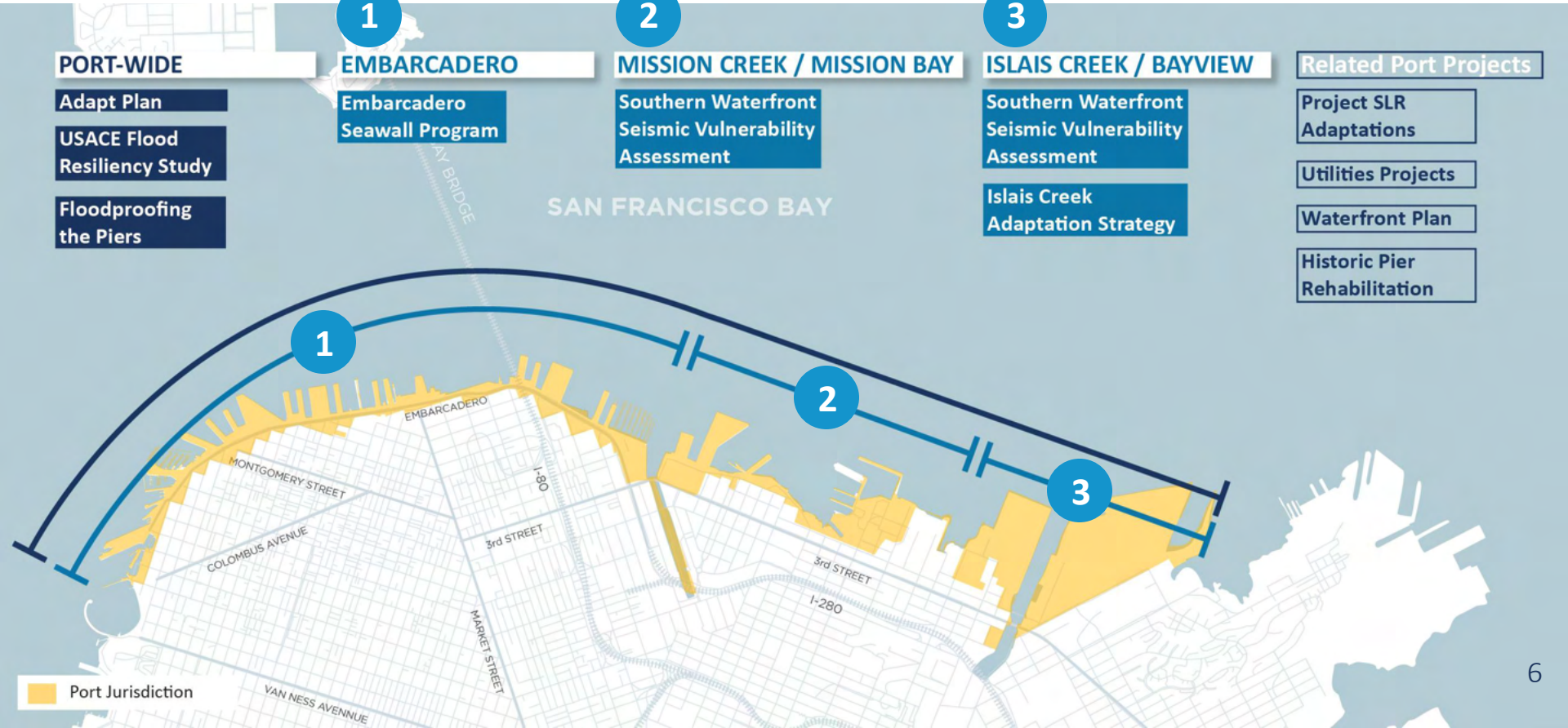

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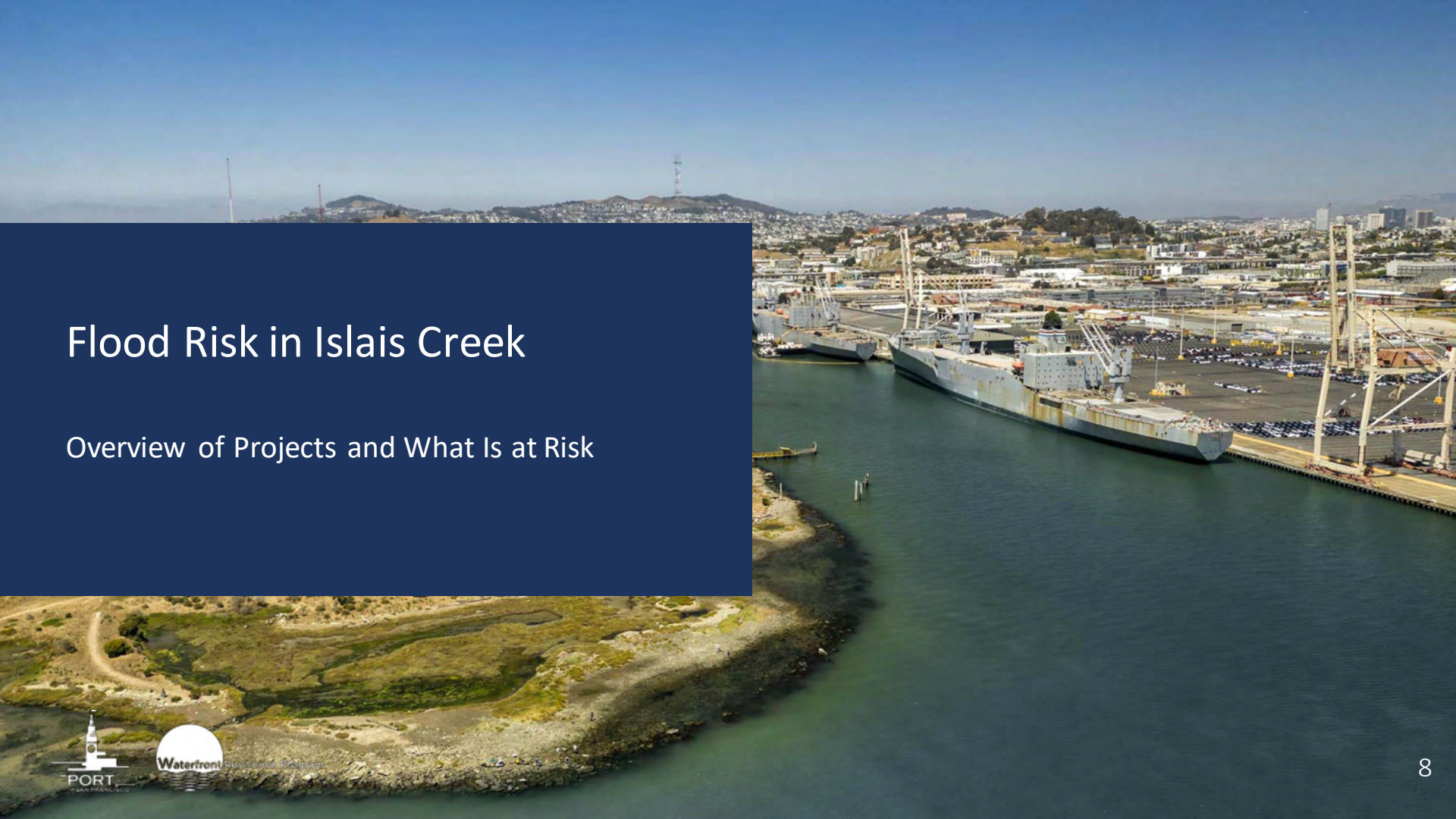

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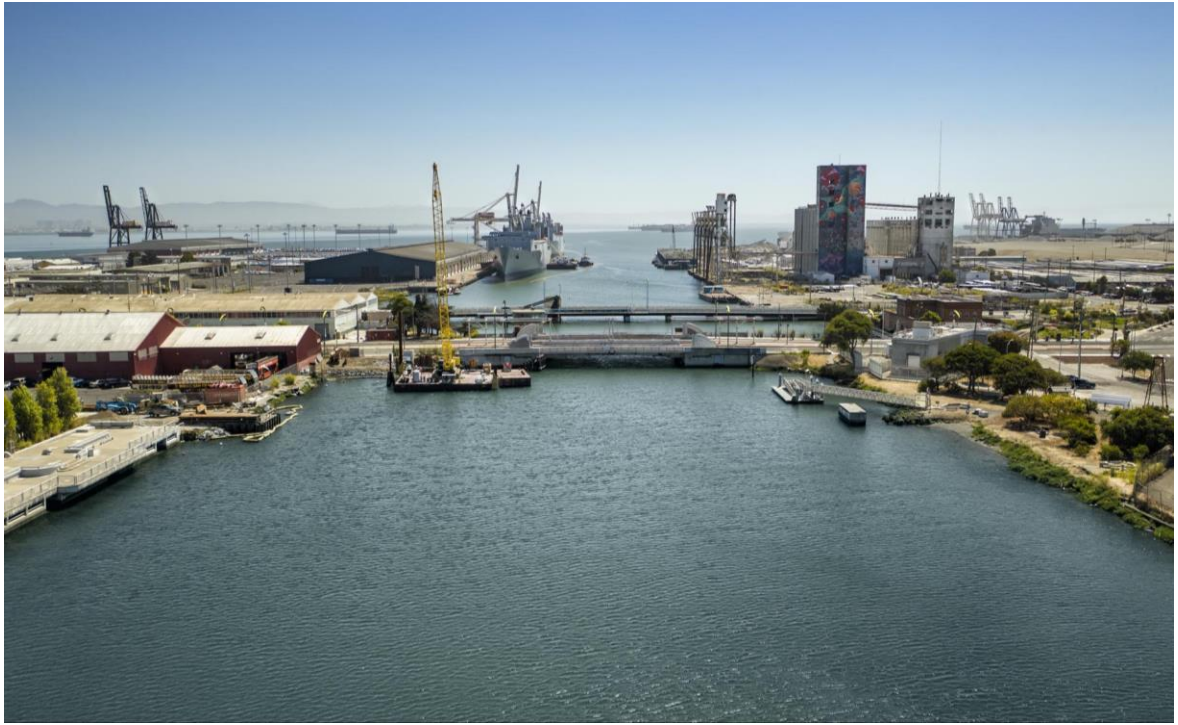

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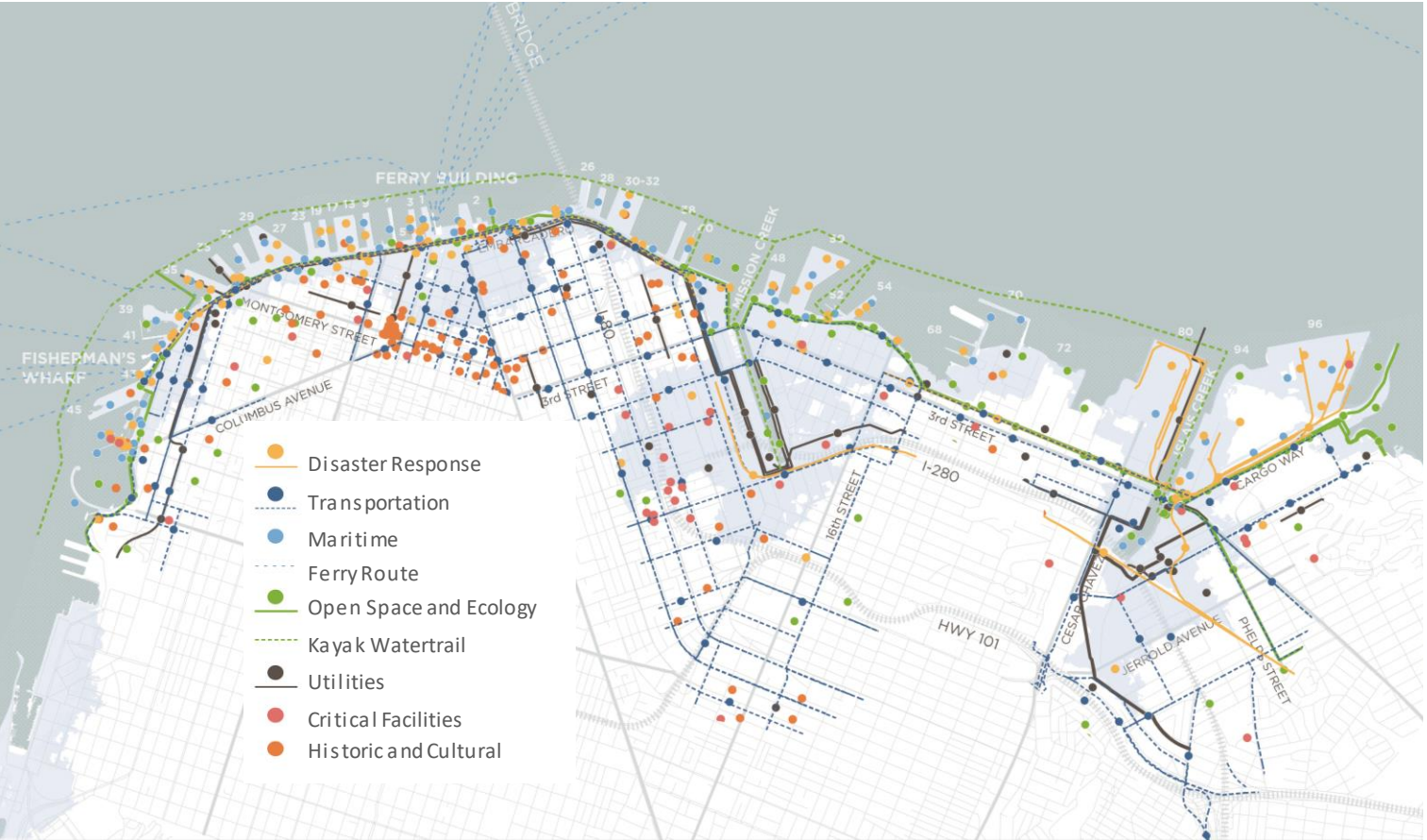

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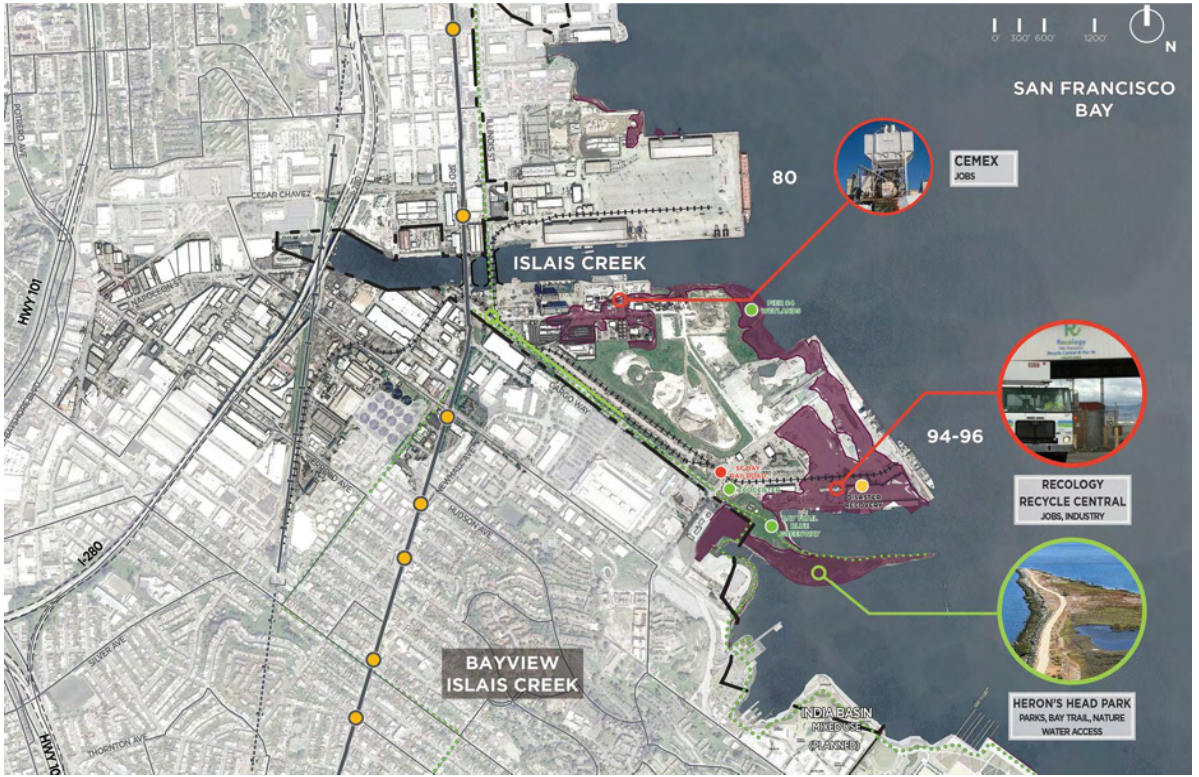

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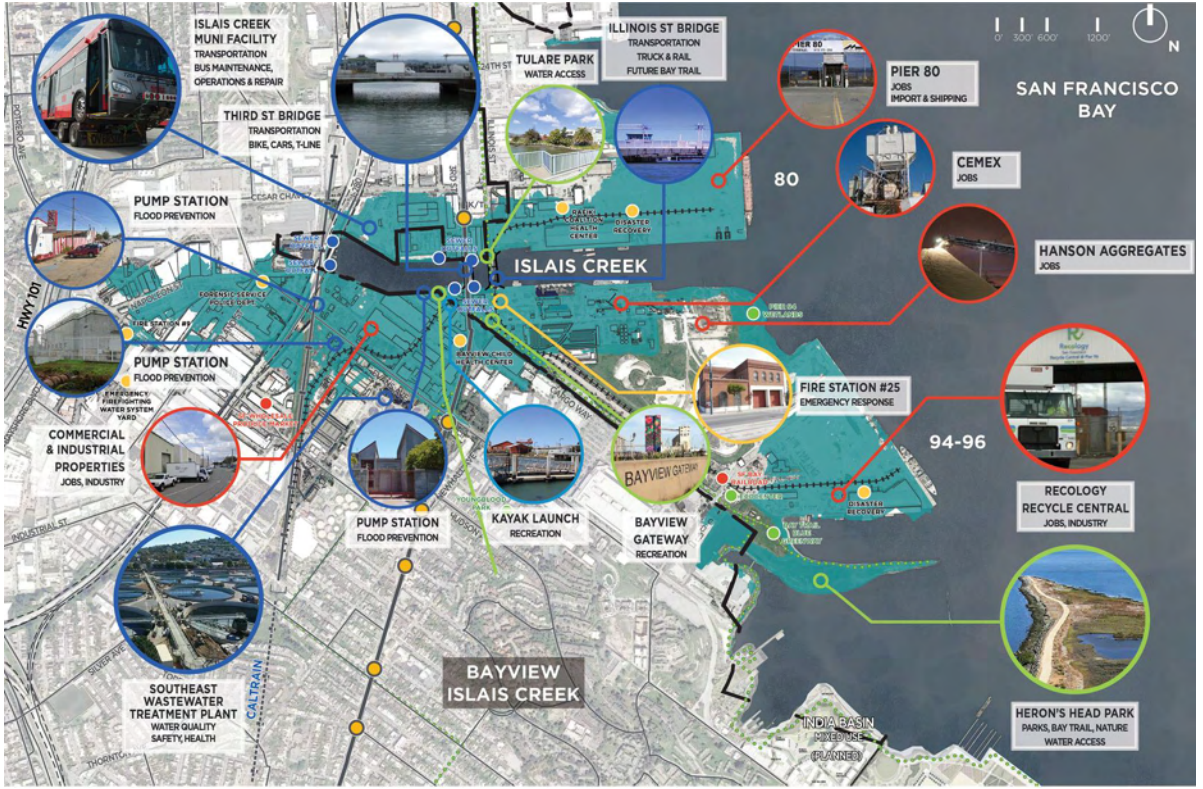

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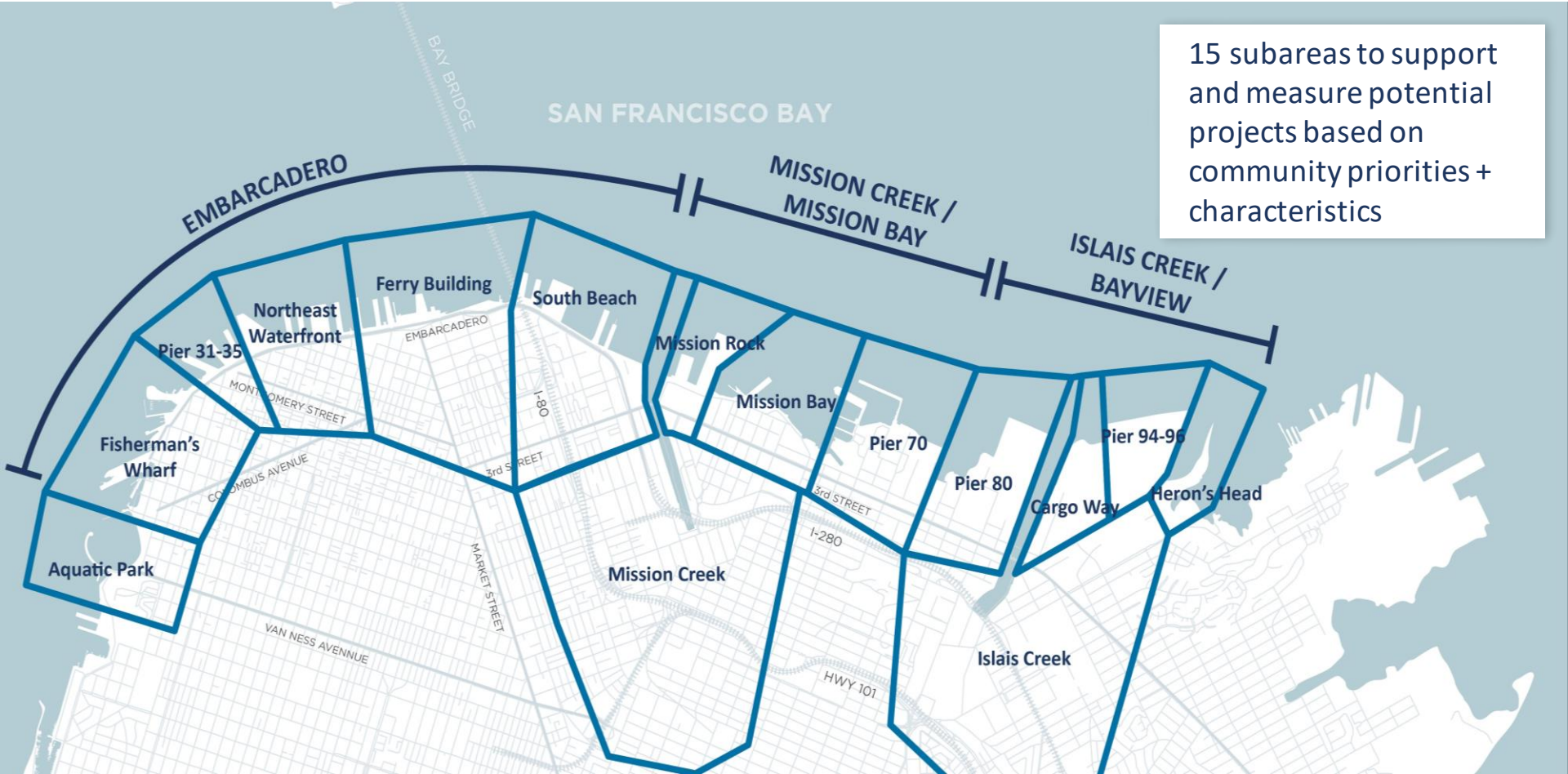

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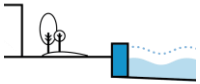
Measures to Reduce Flood Risk

Physical and Policy

Levees



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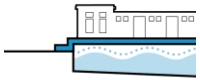

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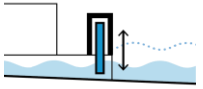

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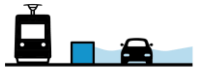
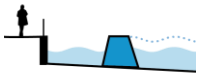
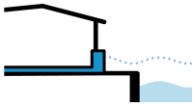


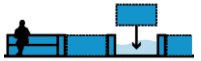
Floodwalls



Breakwaters



Building Adaptations



Deployables

Ecological

Ecological Marine Structures

Ecological Features

Aquatic Habitat

Ecological Shorelines

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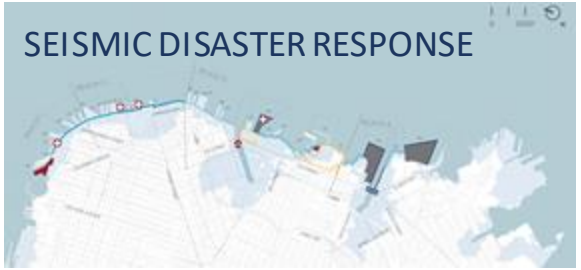
HOW WILL WE DECIDE HOW TO REDUCE THE RISK?

For Each of the 15 Subareas We Have Identified:

- Community, City, and Port priorities and characteristics
- Critical assets and facilities
- Shoreline conditions and character
- Feasible ways to reduce seismic and current and future flood risk

HOW WILL WE DECIDE HOW TO REDUCE THE RISK?

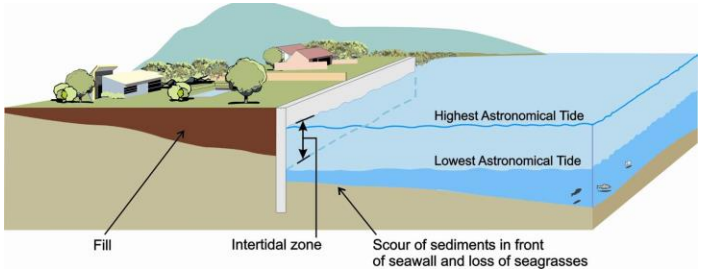
Focused Array Themes



HOW WILL WE REDUCE THE RISK?

Process for Developing Alternatives and Strategies

- Build upon community, City and Port priorities
- Understand existing and future conditions and characteristics
- Use repetition or multiple iterations to test out measures and strategies and obtain input
- Understand the above by ensuring everyone is at the table

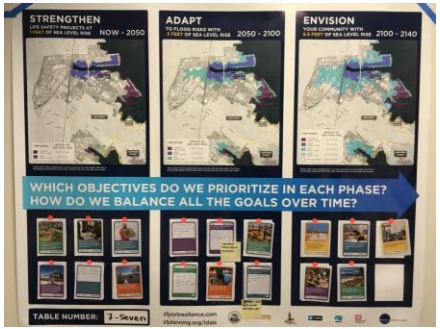


Stakeholder Engagement

What We've Heard from Islais Creek / Bayview

FEEDBACK ON GEOGRAPHIC PROGRAM GOALS

Islais Creek / Bayview Feedback



- Prioritize homes, including low-income housing
- Prioritize environmental concerns
- Ensure anti-displacement is centered in any work
- Broad support for the Embarcadero Seawall Program as addressing risk is important to the entire City, including the Bayview
- That said, prioritize resilience projects in the Southern waterfront
- Continue engagement along the Port's entire 7.5 mile jurisdiction

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HOW THIS ENGAGEMENT EFFORT INFORMED THE WRP

Community Input Helped Refine WRP

1

Community feedback affirmed focus on **life safety & emergency response** and offered ideas for evolving how we understand "inspiring an adaptable waterfront":

- Connecting
- Accessible
- Supporting jobs, housing, seniors & youth

2

Community feedback affirmed the Port goals and encouraged:

- Transparency
- Accountability
- Engagement
- **Prioritize assets most loved by the community and most important to the city**
- Select projects that responsibly use tax dollars

3

Community feedback on evaluation criteria affirmed the Port's key focus on life safety and disaster response

- **"Put people first"**
- Assets and services most prioritized: housing, disaster recovery facilities, utilities, and businesses
- Key focus on transportation assets

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Next Steps

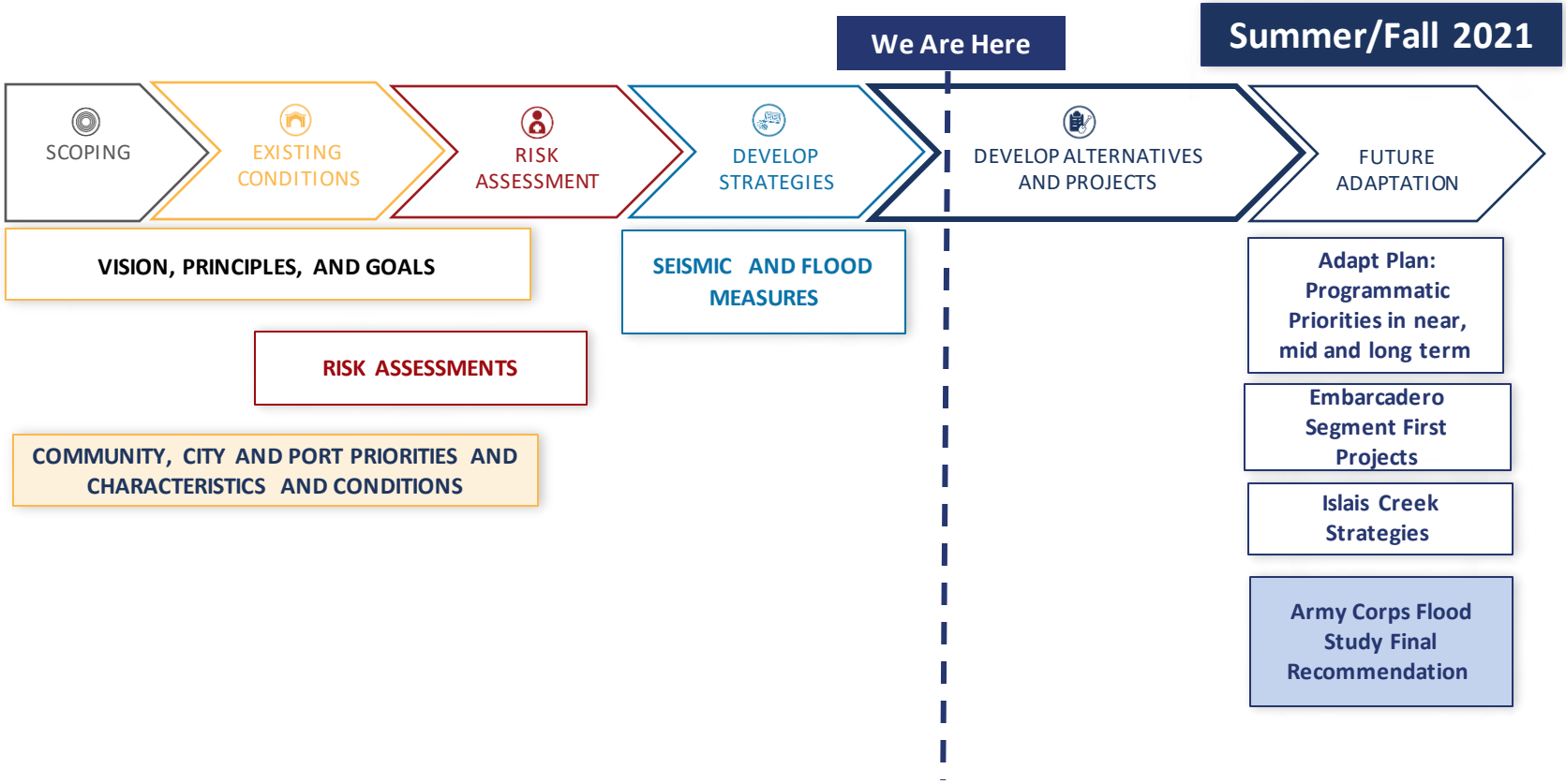
What's Next for the Waterfront Resilience Program?

EMBARCADERO SEAWALL PROGRAM

Program Overview

- **Project Area:** Fisherman's Wharf to Mission Creek
- **Timing:** 2017 to 2021 project planning followed by implementation / construction
- **Focus:** Seismic and flood risk associated with the Embarcadero Seawall
- **Funding:** $425 million General Obligation Bond passed in November 2018

WATERFRONT RESILIENCE PROGRAM STEPS



JOB AND CAREER OPPORTUNITIES

Coming Soon...

Job Opportunities May Include:

- Pile Drivers
- Welders
- Laborers
- Cement Masons
- Operating Engineers
- Carpenters
- Painters
- Office Engineers
- Schedulers and Document Controls
- Construction Administrative

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SMALL & LOCAL BUSINESS CONTRACT OPPORTUNITIES

Coming Soon...

Upcoming Contracts May Include:

Professional Services:

- Engineering
- Design
- Environmental
- Planning

Construction

- Demolition
- Excavation
- Pavement and sidewalk removal
- Electrical

UPCOMING COMMUNITY ENGAGEMENT

Join Us for Virtual Office Hours

Wednesday, February 24, 5:00-6:00 PM

UPCOMING COMMUNITY ENGAGEMENT

Engagement Planned for Early 2021

- Meetings co-hosted with community-based organizations in Islais Creek / Bayview and Mission Creek / Mission Bay
- Ongoing digital engagement, including feedback on waterfront-wide measures and Waterfront Resilience Story Maps
- Ongoing tenant engagement
- Youth engagement with youth-serving organizations that serve citywide youth

FLOOD STUDY FIRST DRAFT OF ALTERNATIVES

Physical Measures Applied to the Southern Waterfront

Mission Bay identified measures include:

- Levee with banks to reduce erosion
- Raised pathway / Raised features
- Native, Vegetated Terraces

Islais Creek identified measures include:

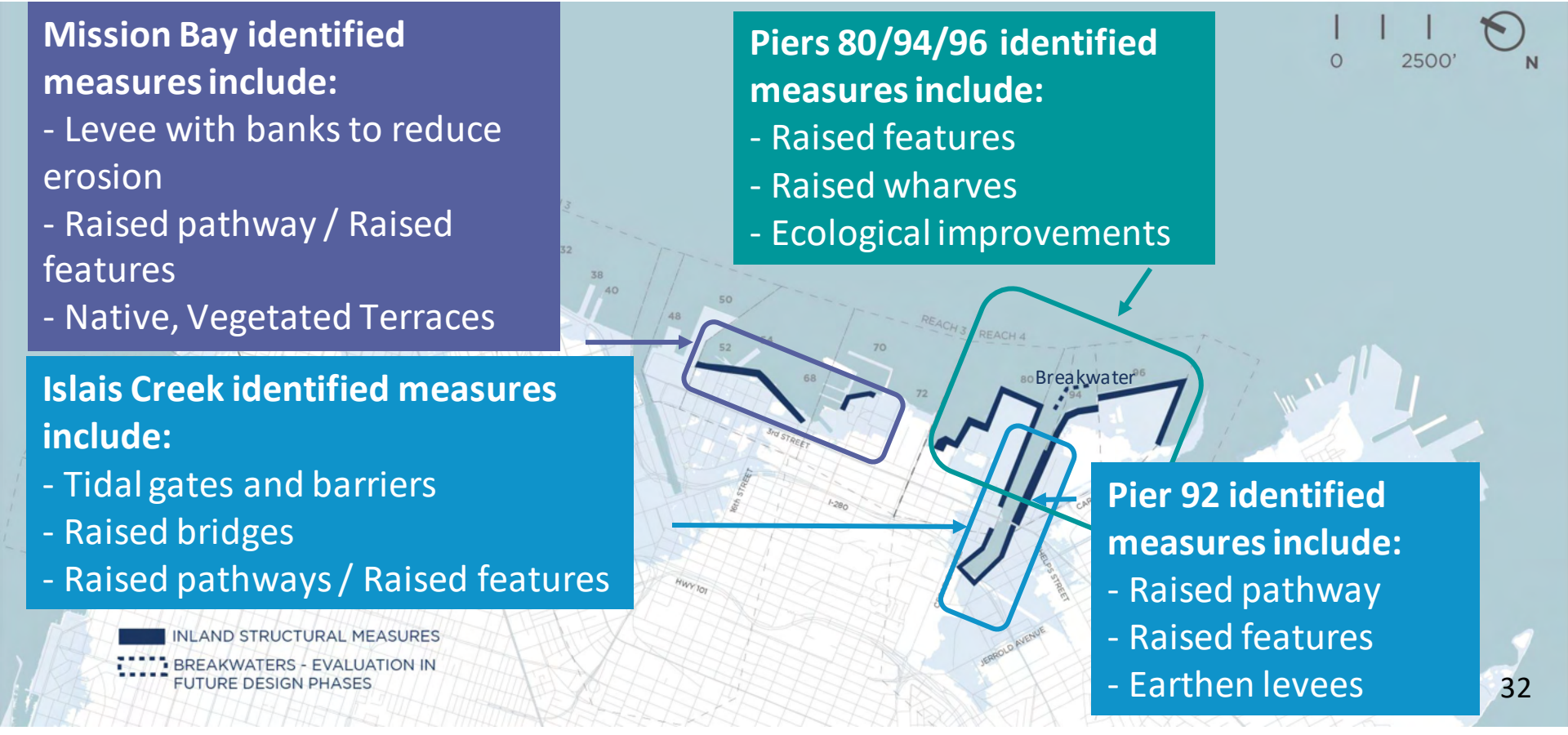
- Tidal gates and barriers
- Raised bridges
- Raised pathways / Raised features

Piers 80/94/96 identified measures include:

- Raised features
- Raised wharves
- Ecological improvements

Pier 92 identified measures include:

- Raised pathway
- Raised features
- Earthen levees

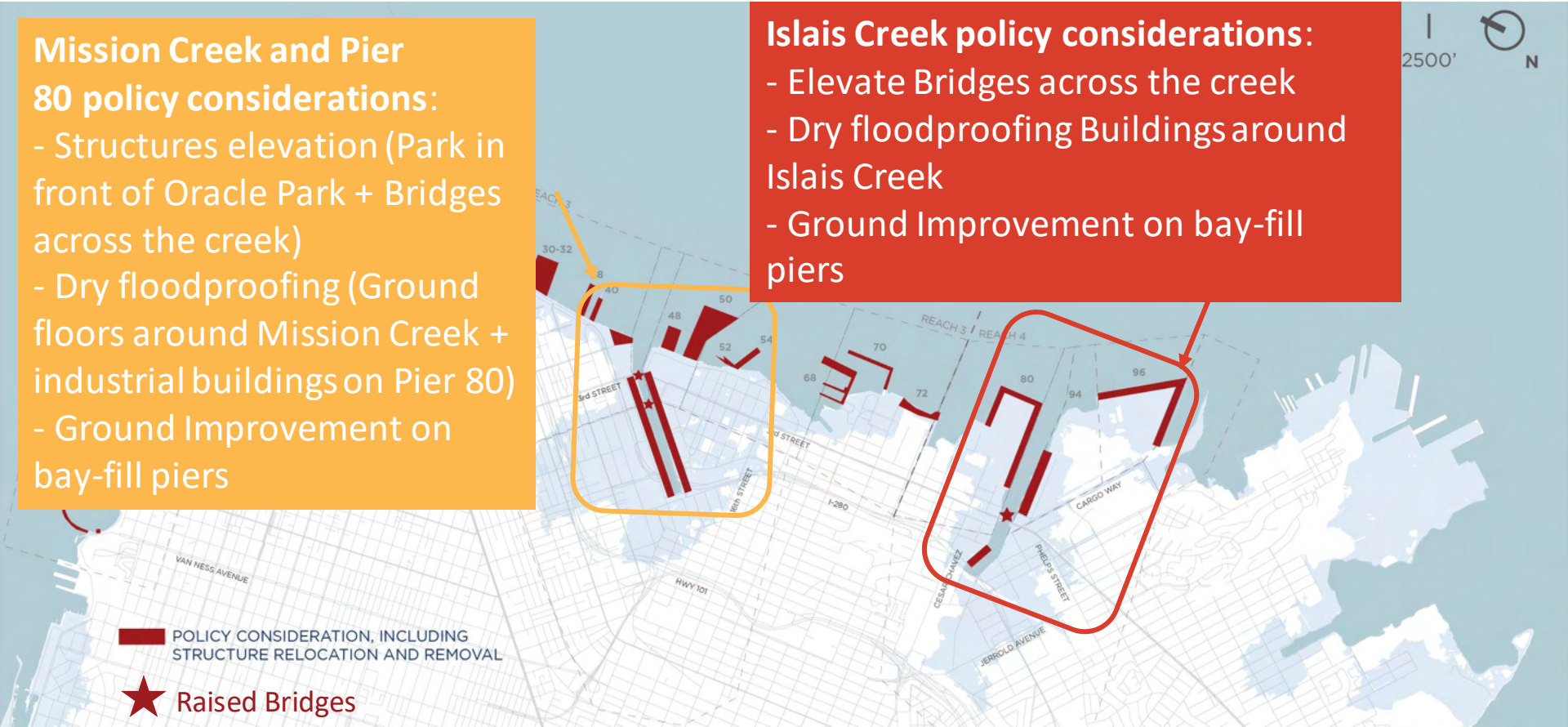


FLOOD STUDY FIRST DRAFT OF ALTERNATIVES

Non-Structural Measures Applied to the Southern Waterfront

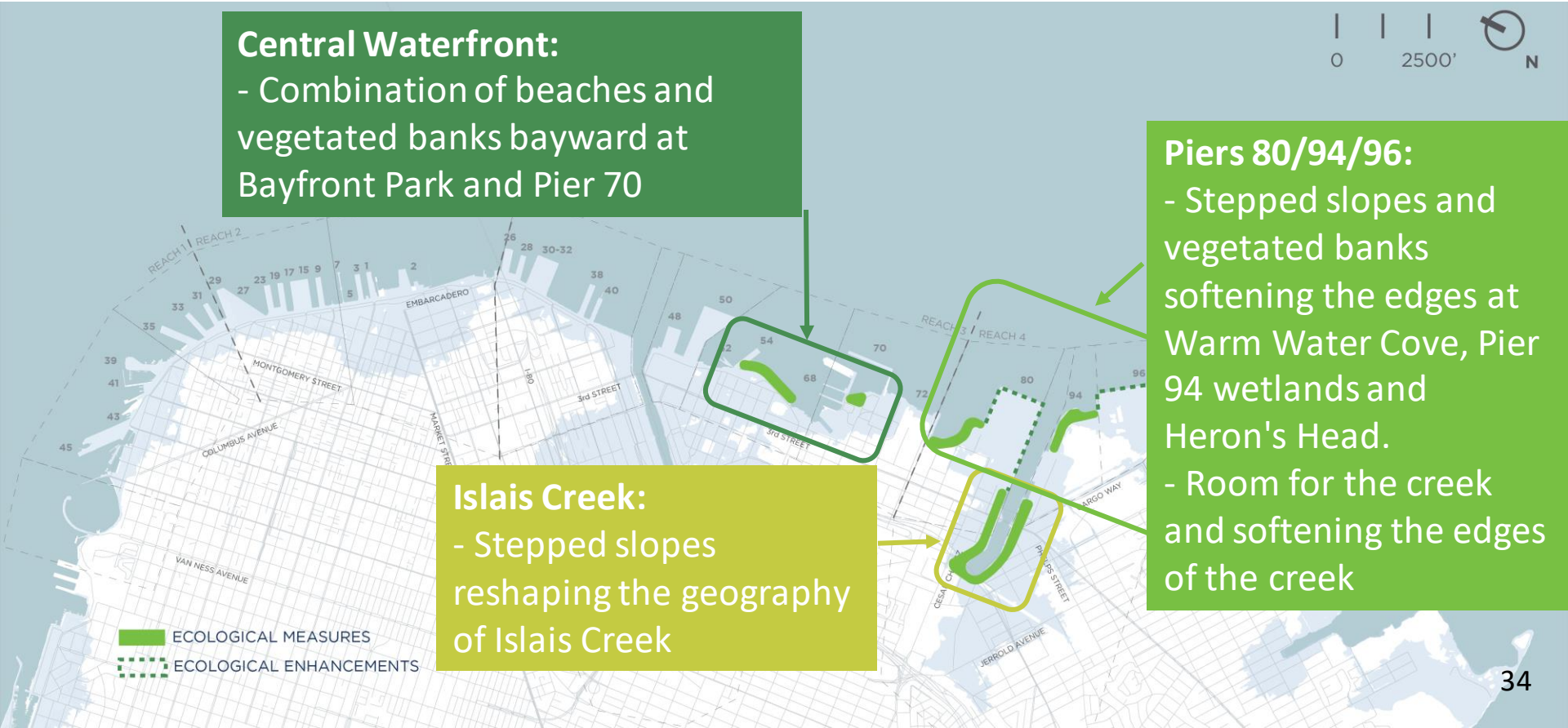
Mission Creek and Pier 80 policy considerations:
- Structures elevation (Park in front of Oracle Park + Bridges across the creek)
- Dry floodproofing (Ground floors around Mission Creek + industrial buildings on Pier 80)
- Ground Improvement on bay-fill piers

Islais Creek policy considerations:
- Elevate Bridges across the creek
- Dry floodproofing Buildings around Islais Creek
- Ground Improvement on bay-fill piers



FLOOD STUDY FIRST DRAFT OF ALTERNATIVES

Nature Based Measures Applied to the Southern Waterfront



Central Waterfront:
- Combination of beaches and vegetated banks bayward at Bayfront Park and Pier 70

Islais Creek:
- Stepped slopes reshaping the geography of Islais Creek

Piers 80/94/96:
- Stepped slopes and vegetated banks softening the edges at Warm Water Cove, Pier 94 wetlands and Heron's Head.
- Room for the creek and softening the edges of the creek

Thank You!

Brad Benson, Port of San Francisco
brad.benson@sfport.com

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Waterfront Resilience Program