DRAFT WATERFRONT ADAPTATION STRATEGIES

Mission Bay Citizens Advisory Committee Meeting

December 8, 2022

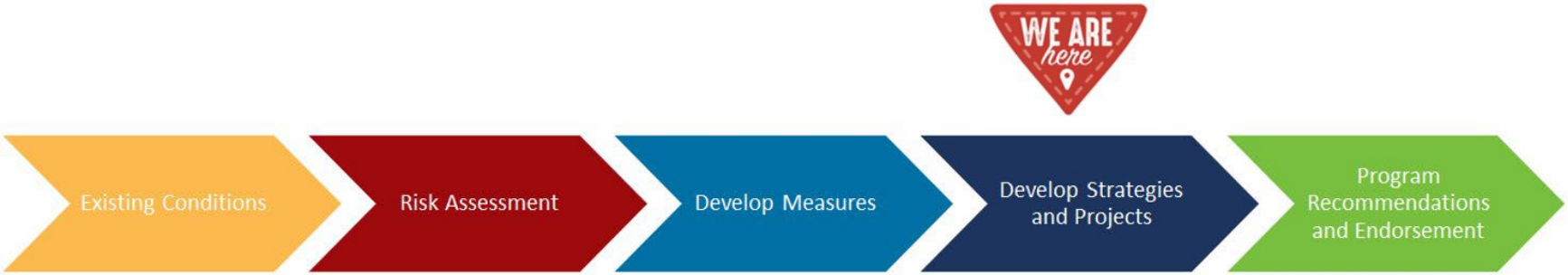
TODAY'S AGENDA

Presentation Overview

- Understanding the Risks
  - *What we're facing*
- Waterfront Resilience Program
  - *What we're doing*
- Community Priorities
  - *What we've heard*
- Range of Possibilities
  - *What we're considering*
- Draft Waterfront Adaptation Strategies in Mission Creek / Mission Bay
- Next Steps
- Q&A

DRAFT WATERFRONT ADAPTATION STRATEGIES

Presentation Overview



The Port of San Francisco has developed seven high-level Draft Waterfront Adaptation Strategies through a collaborative interagency process and over five years of public engagement.

The draft Strategies are ready for public feedback, with a goal of reaching a Draft Waterfront Adaptation Plan by Summer 2023.

DRAFT WATERFRONT ADAPTATION STRATEGIES

Port-led, City of San Francisco Agencies, and USACE Partnered in Development Process

Understanding the Risks

What We're Facing

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Waterfront Resilience Program

CLIMATE CHANGE HAS GLOBAL IMPACTS

Including Here In San Francisco


Puerto Rico, September 2022 / Alejandro Granadillo/AP


Alaska, September 2022 / adn.com


Florida, September 2022 / NYTimes.com


The New York Times

An Earthquake in Japan Speaks to a Sea Wall in San Francisco

The challenges of climate change are everywhere but maybe no more so than in coastal cities that face dual threats of seismic activity and rising seas.


San Francisco Chronicle

BAY AREA // SAN FRANCISCO

S.F.'s Embarcadero needs to be raised as much as 7 feet to prepare for sea level rise, city says

RISING TO THE CHALLENGE

San Francisco Faces Urgent Seismic, Coastal, and Inland Flood Risks Today

SEISMIC RISKS

San Francisco, 1906

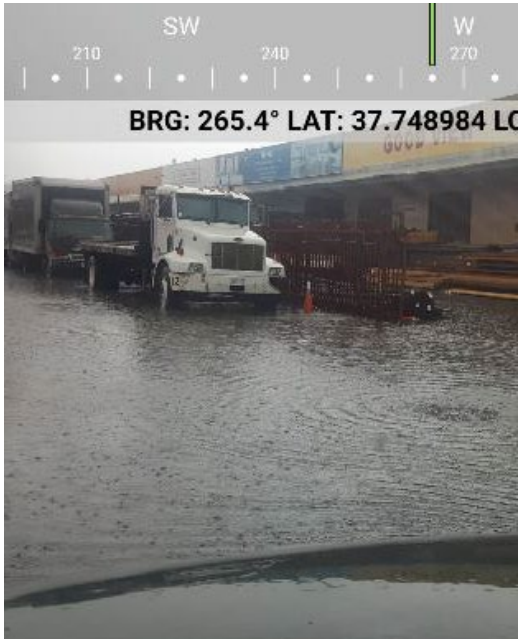
Marina, 1989

COASTAL FLOODING

Recology

The Embarcadero

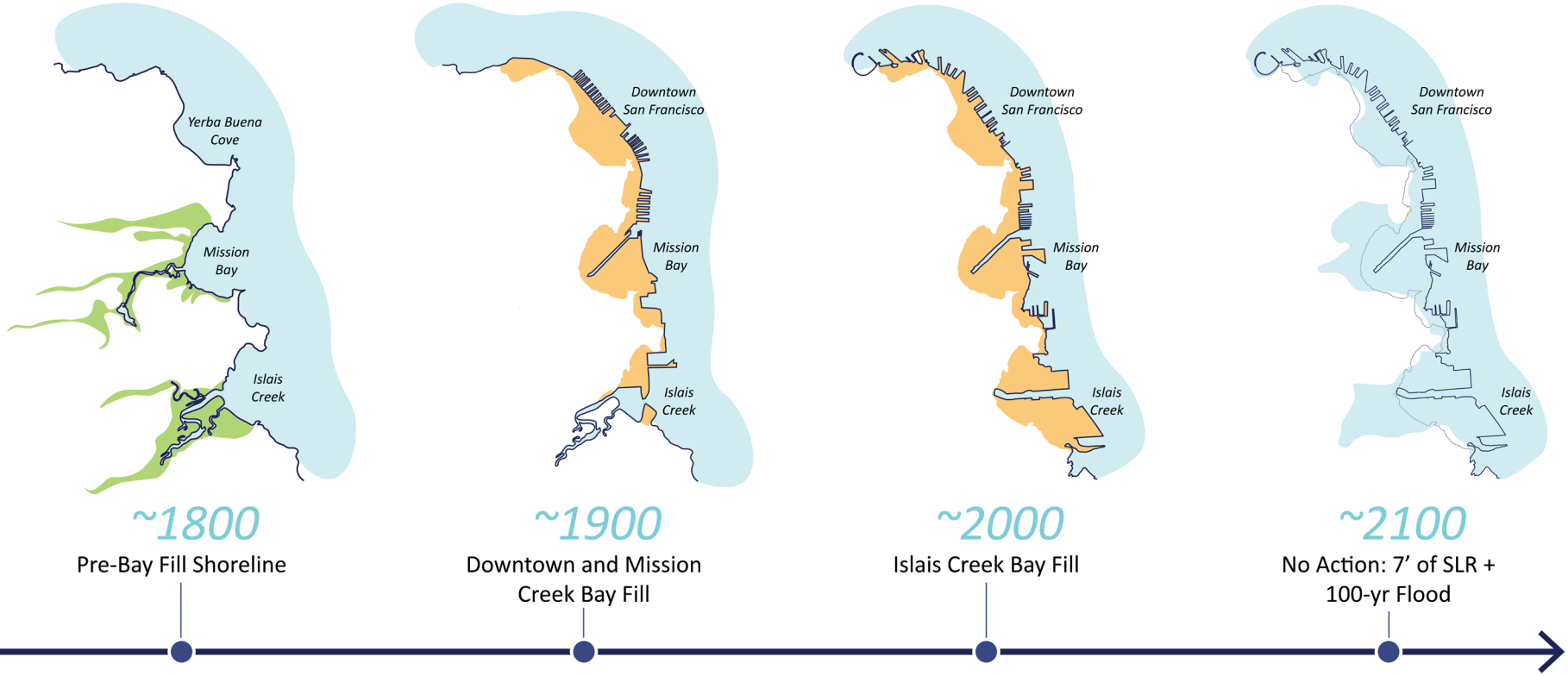
INLAND FLOODING



Islais Creek outfall and Marin St.

HISTORIC SHORELINE + BAY FILL

From the 1800s



~1800
Pre-Bay Fill Shoreline

~1900
Downtown and Mission Creek Bay Fill

~2000
Islais Creek Bay Fill

~2100
No Action: 7’ of SLR + 100-yr Flood

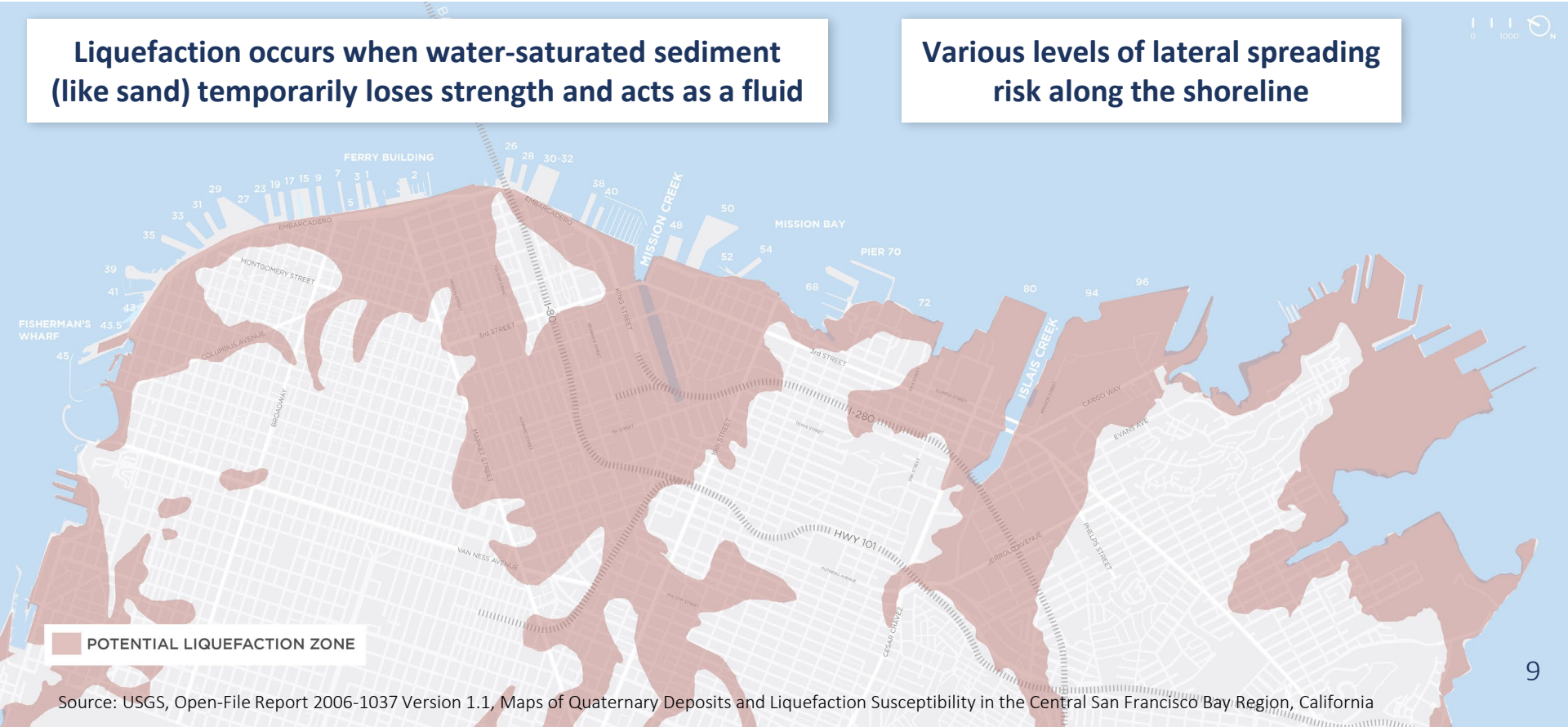
Marsh **Bay Fill**

WATERFRONT WIDE EARTHQUAKE HAZARDS

Very High Earthquake “Liquefaction” Risk

Liquefaction occurs when water-saturated sediment (like sand) temporarily loses strength and acts as a fluid

Various levels of lateral spreading risk along the shoreline

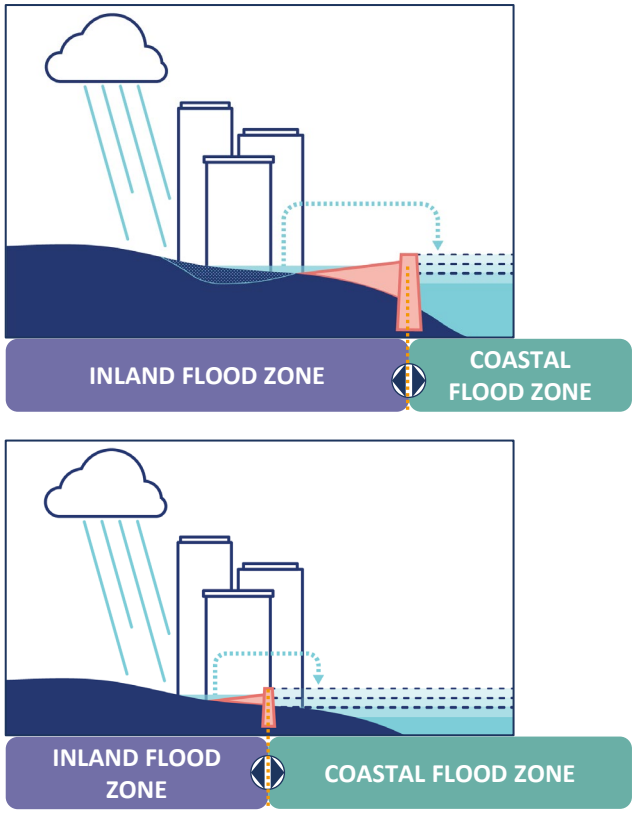


Source: USGS, Open-File Report 2006-1037 Version 1.1, Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California

COASTAL AND INLAND FLOOD RISK

Different Geographic Impacts

COASTAL AND INLAND FLOOD RISK



Two related forms of flooding

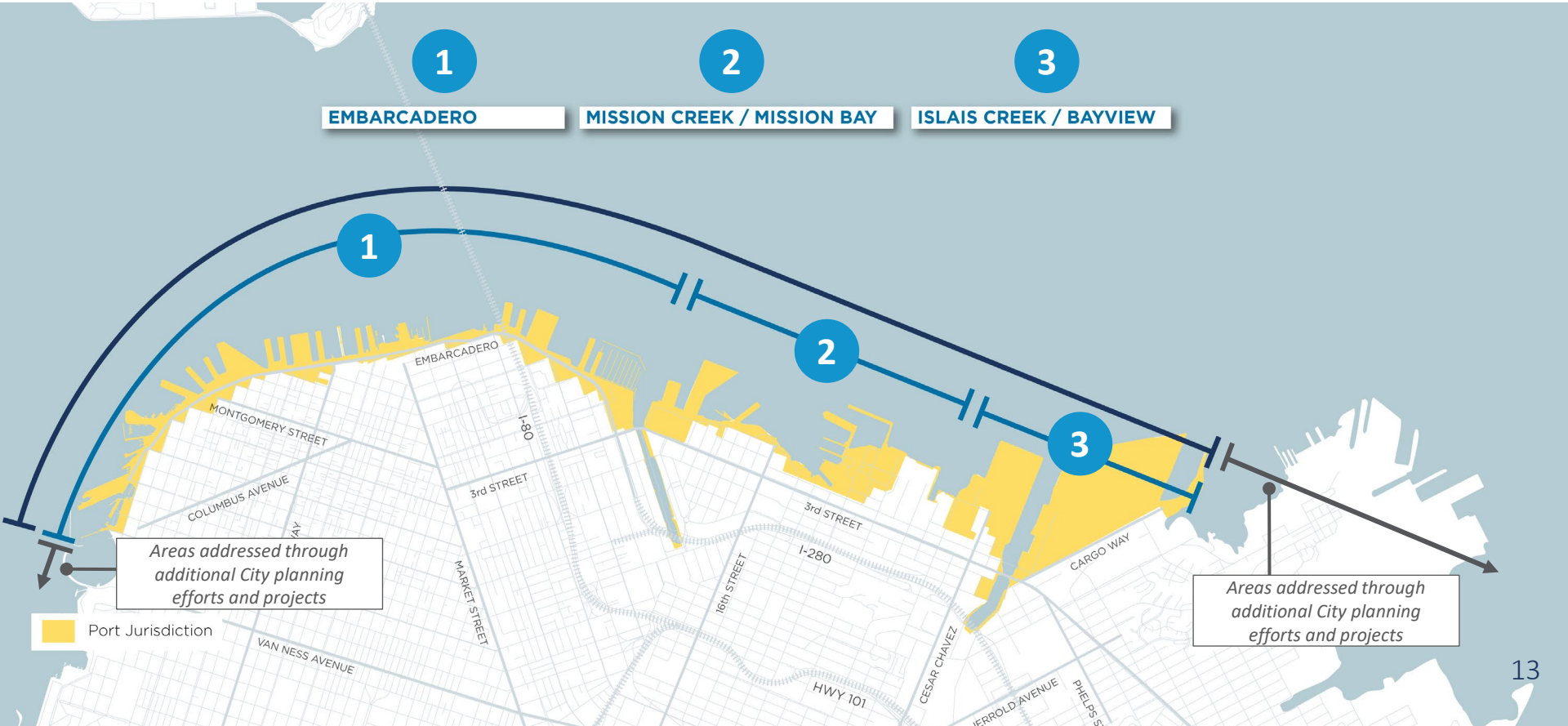
Any solution endorsed by the City of San Francisco will aim to address **all three risks:** seismic risks, coastal flooding and inland flooding.

Waterfront Resilience Program

What We're Doing

PROGRAM AREA

Focus is Conceptual-Level Strategies Within the Port's Jurisdiction



Community Priorities

What We've Heard

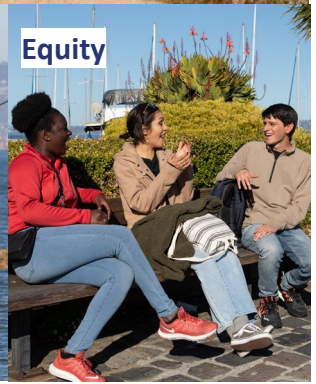
DRAFT WATERFRONT ADAPTATION STRATEGIES

Community Input Helped Define the WRP

1. **Focus on life safety & emergency response**

2. **Prioritize assets most loved by the community and most important to the city**

3. **Put people first**
   Assets and services most prioritized: housing, disaster recovery facilities, utilities, transportation and businesses



WHAT WE HEARD

Spotlight on the Mission Creek / Mission Bay Waterfront

- Key community-prioritized assets include: the Giants ballpark, water and public space access, the environment
- We heard the importance of prioritizing homes, including low-income housing
- Environmental issues were highlighted, including Mission Creek as an ecological and open space asset
- We also heard how it vital it is to reach youth via our public engagement effort

Range of Possible Solutions

What We're Considering

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Waterfront Resilience Program

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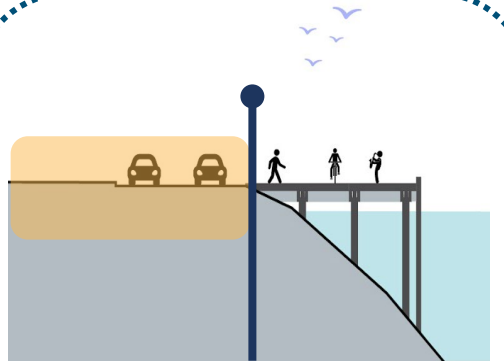
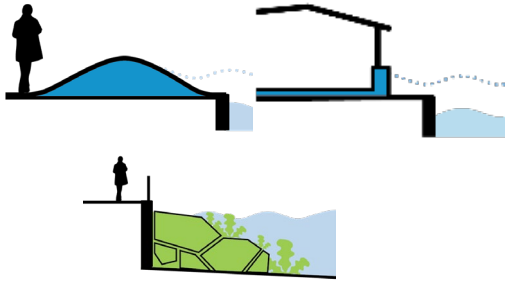
Key Components



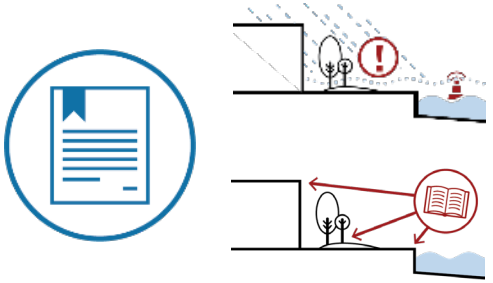
Coastal Flood Defense Location + Height

And area of elevation change



Physical Changes

Such as earthquake-resilient berms, floodproofing, and nature-based features



Policy Changes

Such as resilient codes, warning systems, and land use changes

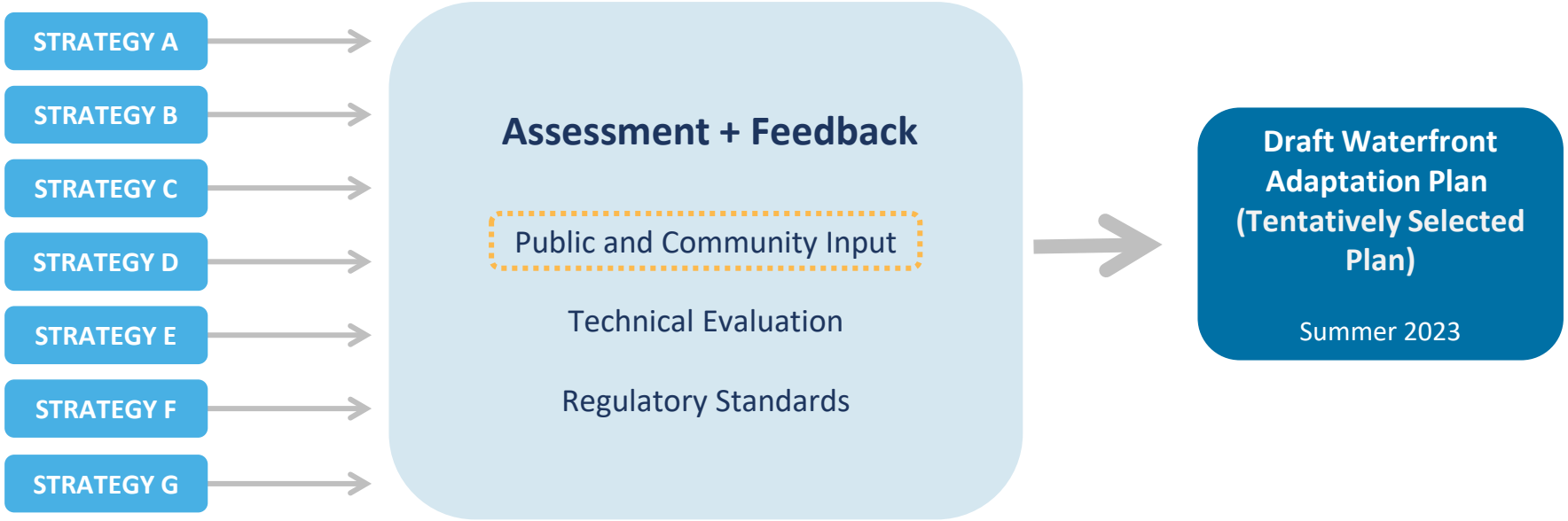
USACE SAN FRANCSICO WATERFRONT COASTAL FLOOD STUDY

Draft Waterfront Adaptation Strategies

What if...	***What if...***	***What if...***	***What if...***
we **did not adapt** to mitigate the risks?	we adapted by **floodproofing** and **moving** buildings and assets, *without* coastal flood structures?	we address flooding at **a lower rate** of sea level rise?	we address flooding **at a higher rate** of sea level rise, as recommended by **CA and SF guidance**?
STRATEGY A	**STRATEGY B**	**STRATEGY C** **STRATEGY D**	**STRATEGY E** **STRATEGY F** **STRATEGY G**

THE ROLE OF COMMUNITY FEEDBACK

Pathway to the Draft Waterfront Adaptation Plan



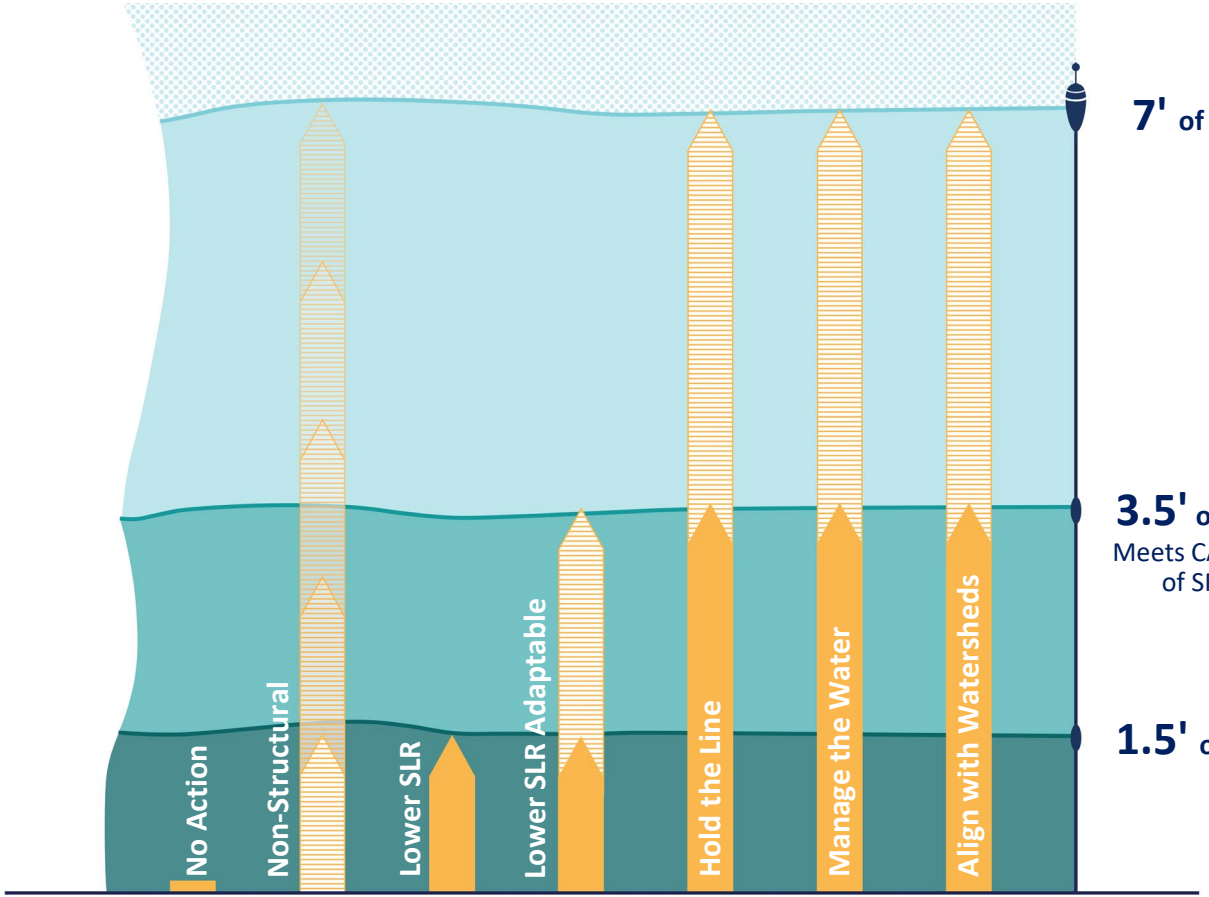
Draft Waterfront Adaptation Strategies

SEA LEVEL RISE

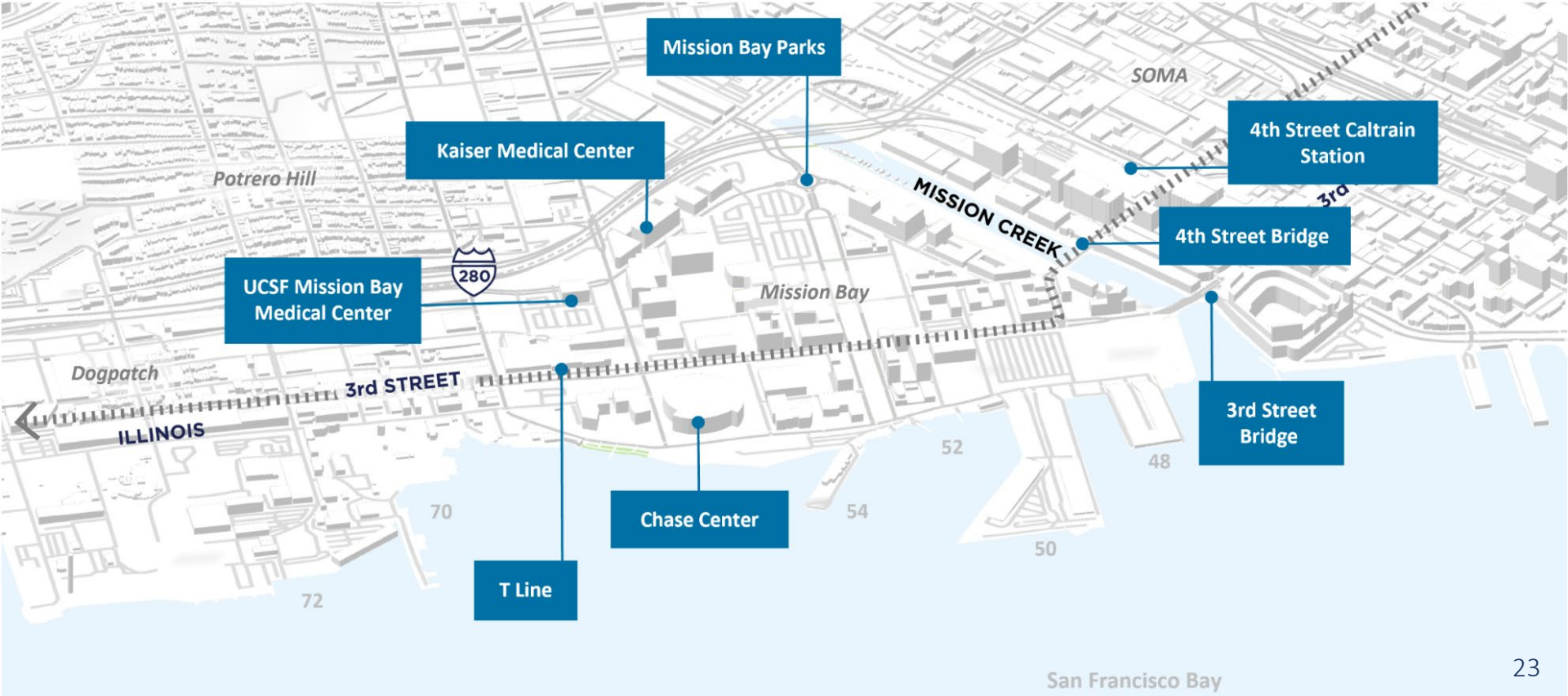
2090
Long Term Adaptation

2040
Mid Term Adaptation

TODAY
Early Projects



MISSION CREEK / MISSION BAY



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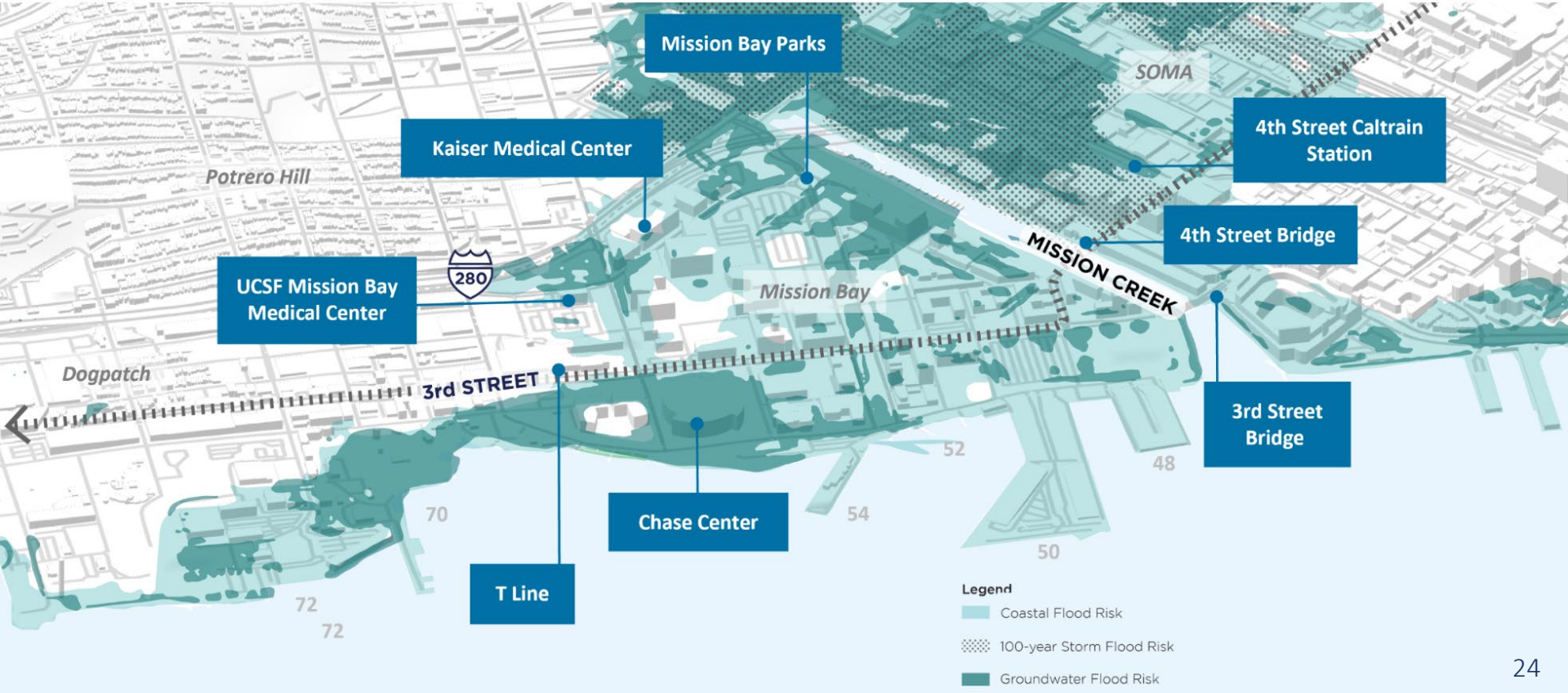
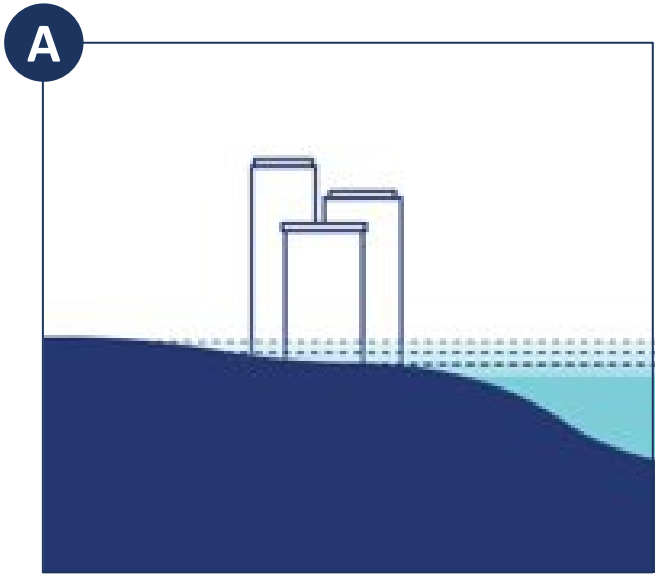
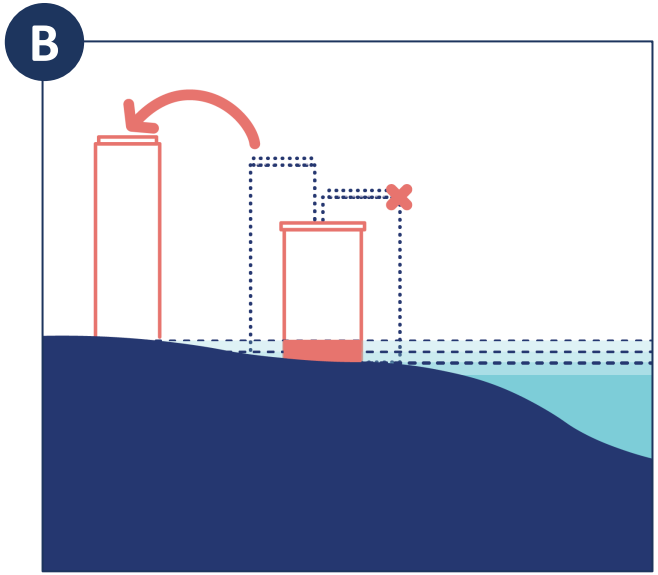


STRATEGY A – NO ACTION



This strategy takes no actions to reduce flood risks beyond projects that are already approved

STRATEGY B – NONSTRUCTURAL OPTION



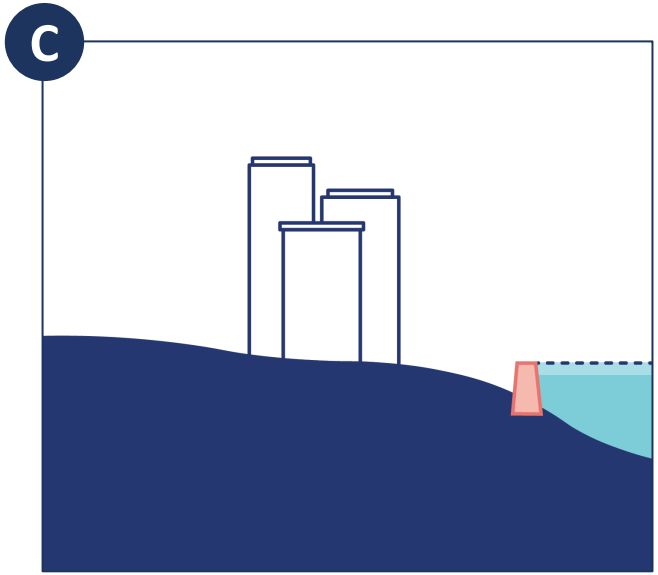
Moves people and assets away from the risk, uses nonstructural measures (such as floodproofing) to reduce risks, and allows water to go where it wants rather than constructing traditional structural solutions

STRATEGY B – NONSTRUCTURAL OPTION

Examples

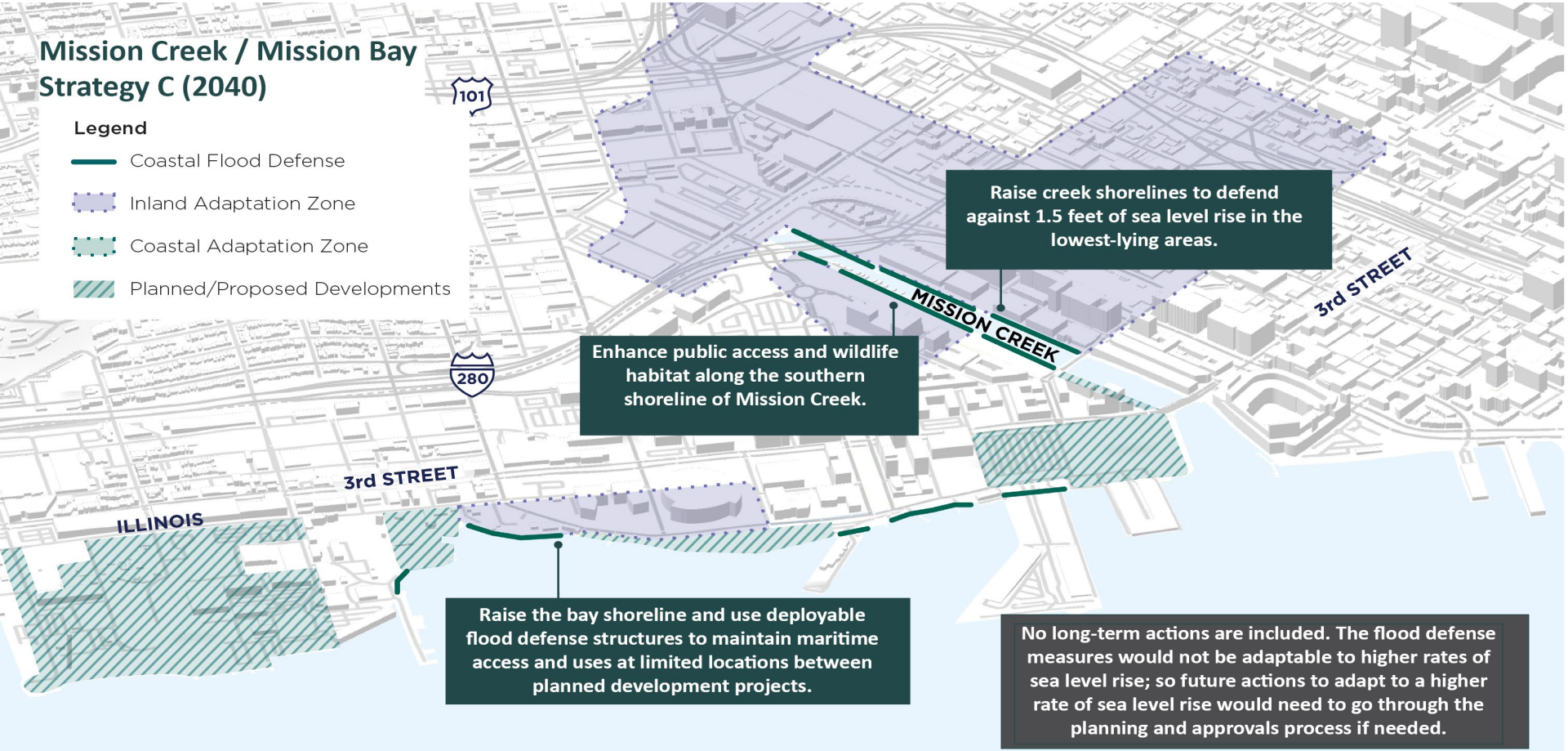
- **Floodproofing**
- **Raising structure in place**
- **Floodable spaces**
- **Buyouts**
- **Warning systems**

STRATEGY C – LOWER SEA LEVEL RISE



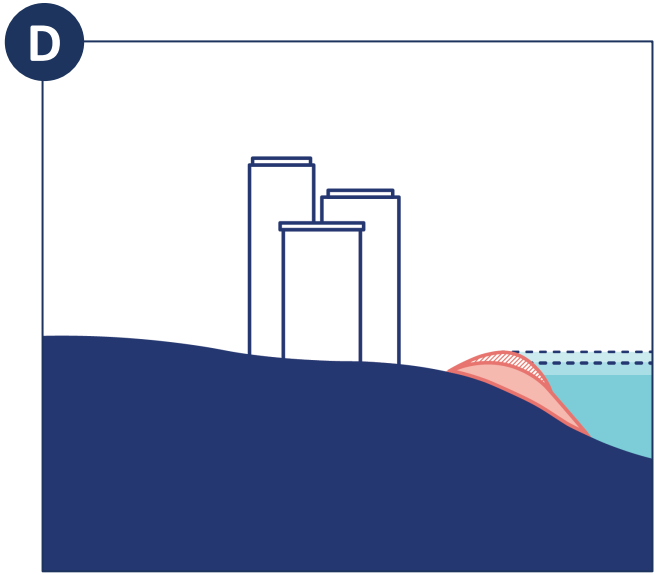
Adapts the shoreline to withstand 1.5’ of sea level rise by 2040 using a combination of structural and nonstructural measures

STRATEGY C – LOWER SEA LEVEL RISE



NOTE: ALL DRAWINGS FOR FEASIBILITY STUDY ONLY. NOT A PROPOSED DESIGN.

STRATEGY D – LOWER SEA LEVEL RISE – ADAPTABLE



Adapts the shoreline to withstand 1.5’ of sea level rise by 2040, with the possibility of building higher by 2090

STRATEGY D – LOWER SEA LEVEL RISE – ADAPTABLE

USACE SAN FRANCSICO WATERFRONT COASTAL FLOOD STUDY

Focused on Strategies E, F, and G

What if...
we **did not adapt** to mitigate the risks?

STRATEGY A

What if...
we adapted by **floodproofing** and **moving** buildings and assets, *without* coastal flood structures?

STRATEGY B

What if...
we address flooding at **a lower rate** of sea level rise?

STRATEGY C

STRATEGY D

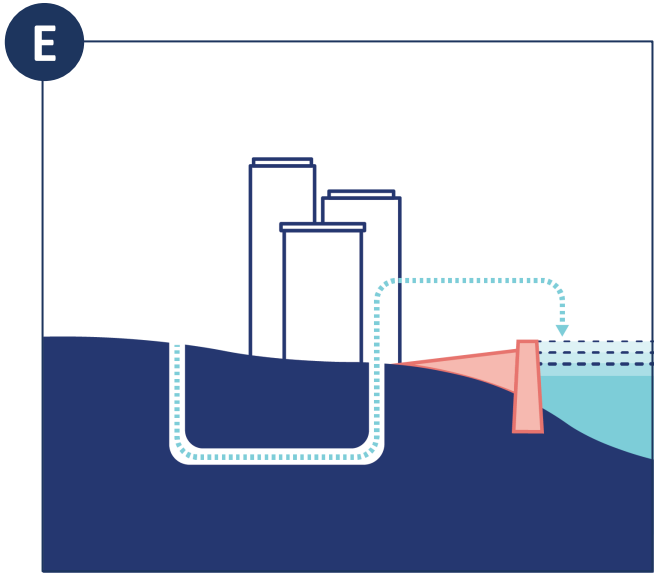
What if...
we address flooding **at a higher rate** of sea level rise, as recommended by **CA and SF guidance**?

STRATEGY E

STRATEGY F

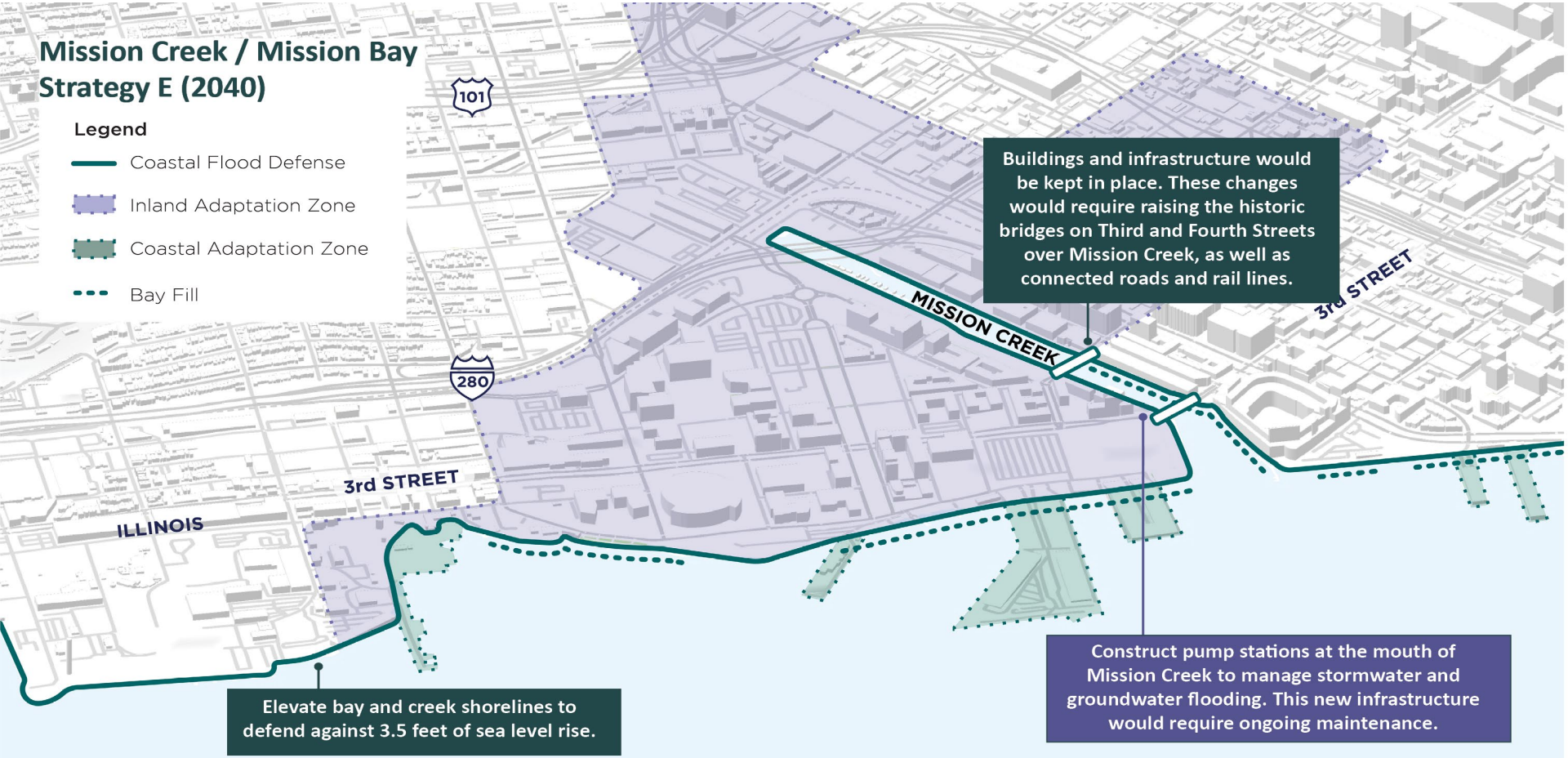
STRATEGY G

STRATEGY E – HIGHER SEA LEVEL RISE – HOLD THE LINE



Preserves a waterfront that looks and functions much as it does today by adapting the shoreline

STRATEGY E – HIGHER SEA LEVEL RISE – HOLD THE LINE



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STRATEGY E – HIGHER SEA LEVEL RISE – HOLD THE LINE

Buildings and infrastructure would be kept in place. These changes

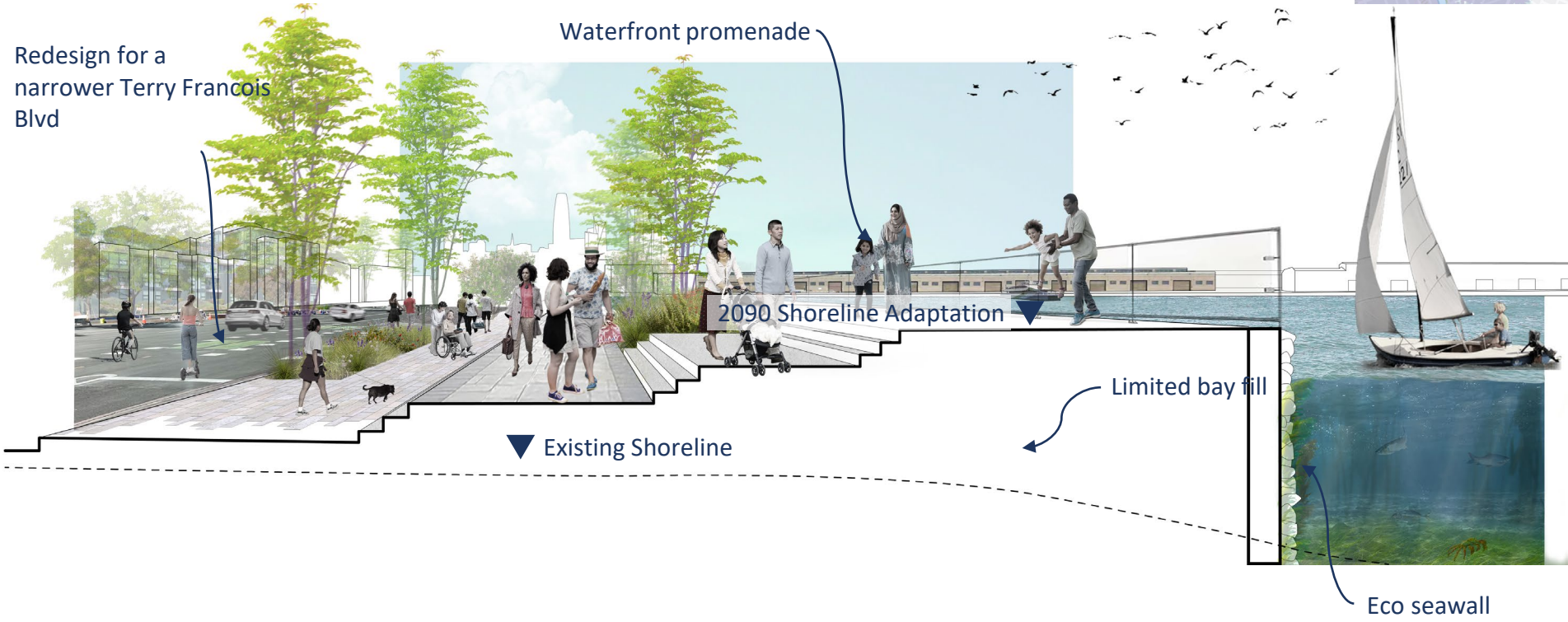
A pumping station is a facility, usually housed in a small building, that uses powerful pumps to move water over an elevated shoreline. Pump stations exist in the city today, but this strategy would require building new pump stations, requiring funding and land.

NOTE: ALL DRAWINGS FOR FEASIBILITY STUDY ONLY. NOT A PROPOSED DESIGN.

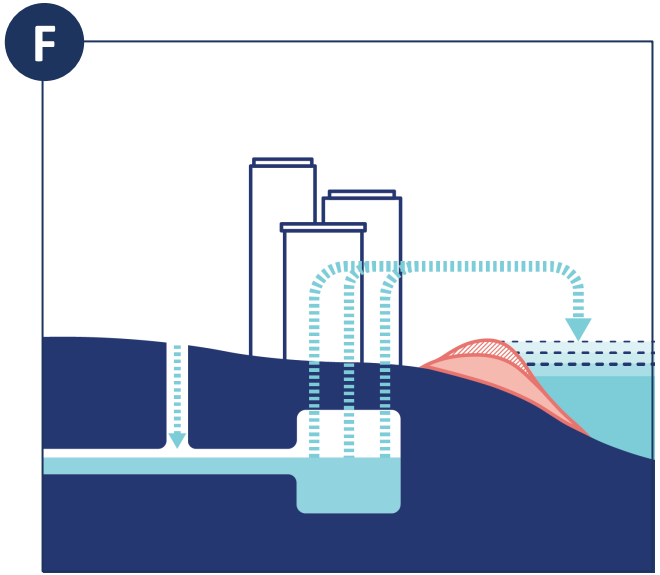
STRATEGY E – HIGHER SEA LEVEL RISE – HOLD THE LINE

STRATEGY E – HIGHER SEA LEVEL RISE – HOLD THE LINE

Mission Creek / Mission Bay in 2090

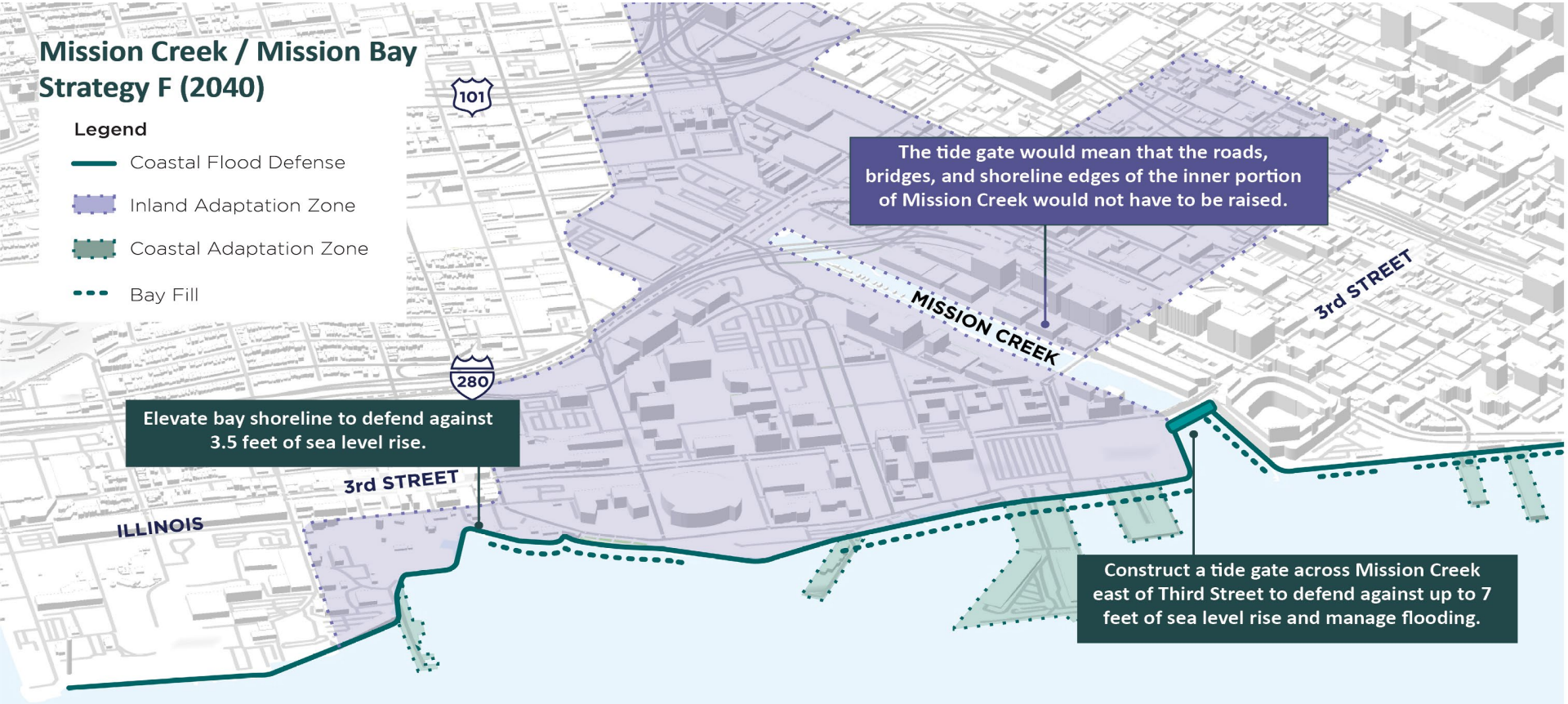


STRATEGY F – HIGHER SEA LEVEL RISE – MANAGE THE WATER



Creates an active system for managing flooding by heavily relying on machinery

STRATEGY F – HIGHER SEA LEVEL RISE – MANAGE THE WATER



STRATEGY F – HIGHER SEA LEVEL RISE – MANAGE THE WATER

A tide gate is a structure across a waterway that can be closed to reduce flood risk during storm events or extreme high tides.

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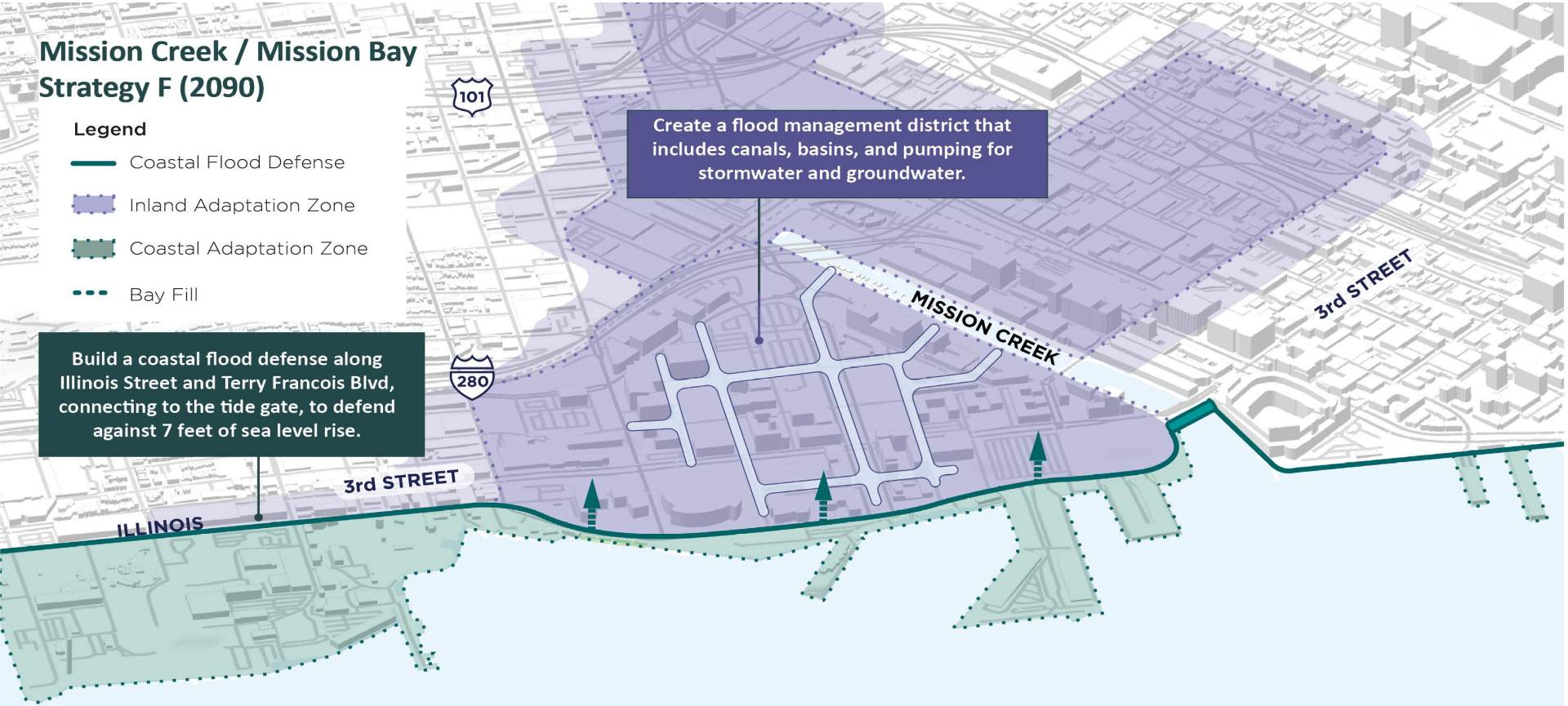
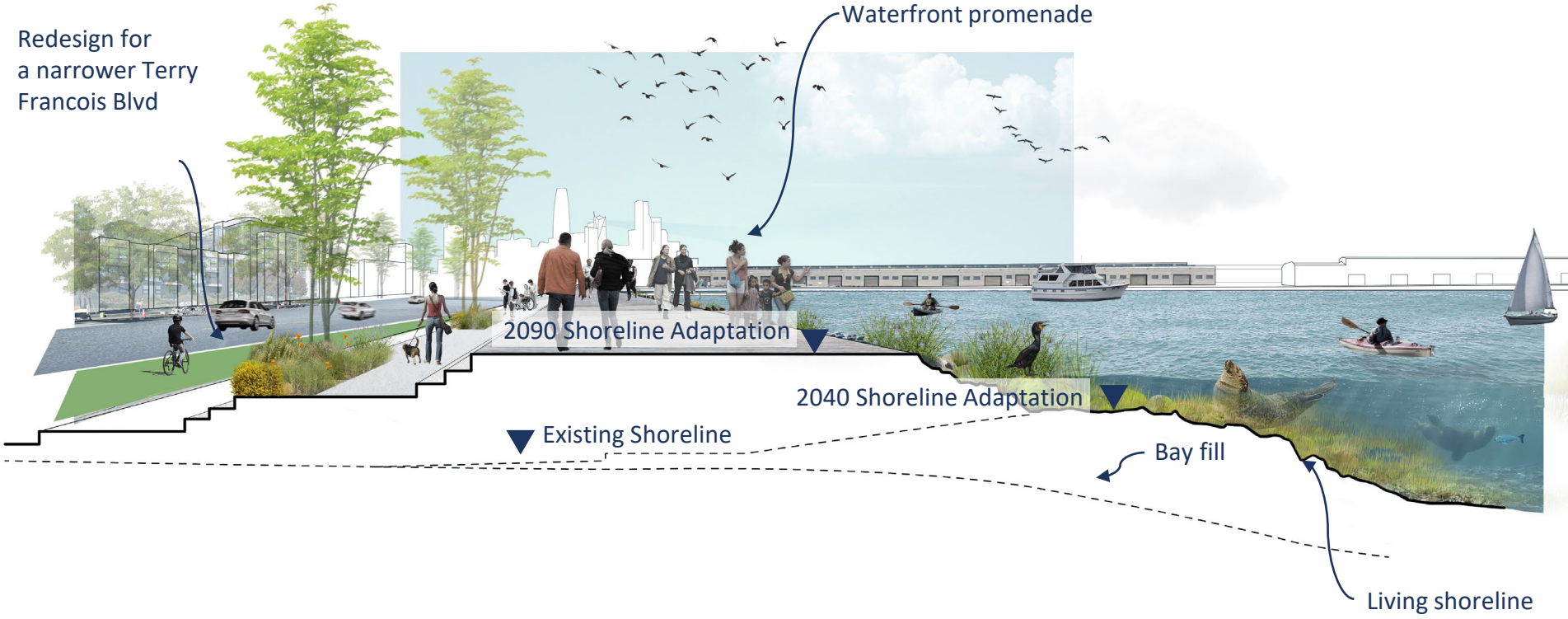
STRATEGY F – HIGHER SEA LEVEL RISE – MANAGE THE WATER

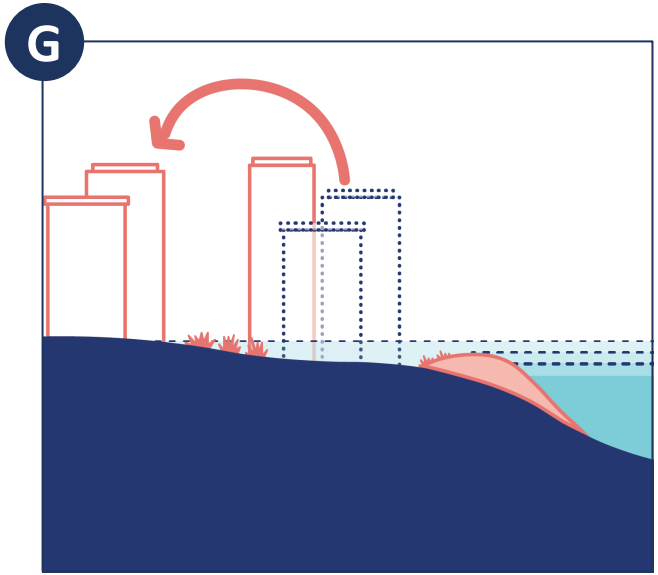


STRATEGY F – HIGHER SEA LEVEL RISE – MANAGE THE WATER

Mission Creek / Mission Bay in 2090



STRATEGY G – HIGHER SEA LEVEL RISE – ALIGN WITH WATERSHEDS



Advances shoreline adaptation while working with natural inland flooding patterns to floodproof some buildings and infrastructure and move others away from the highest risk areas

STRATEGY G – HIGHER SEA LEVEL RISE – ALIGN WITH WATERSHEDS

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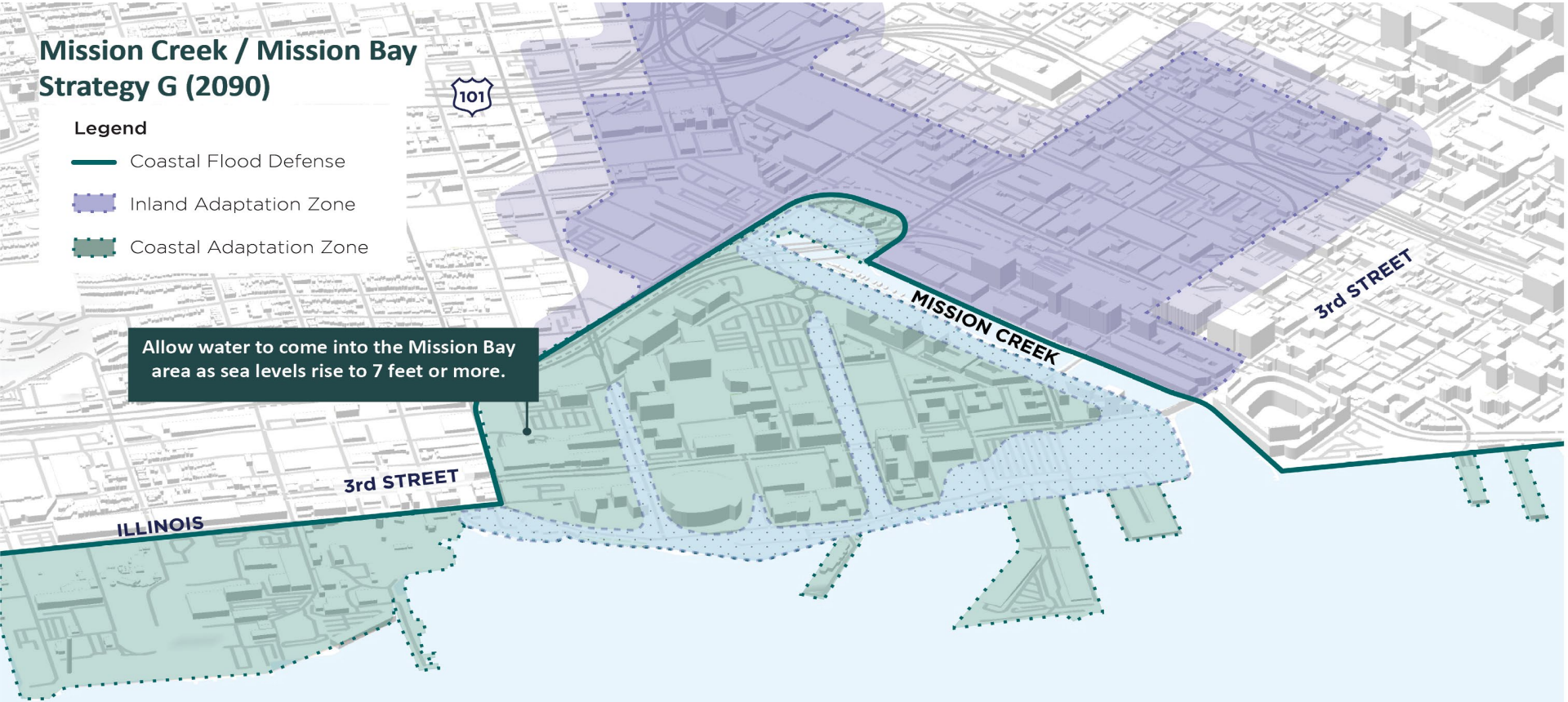

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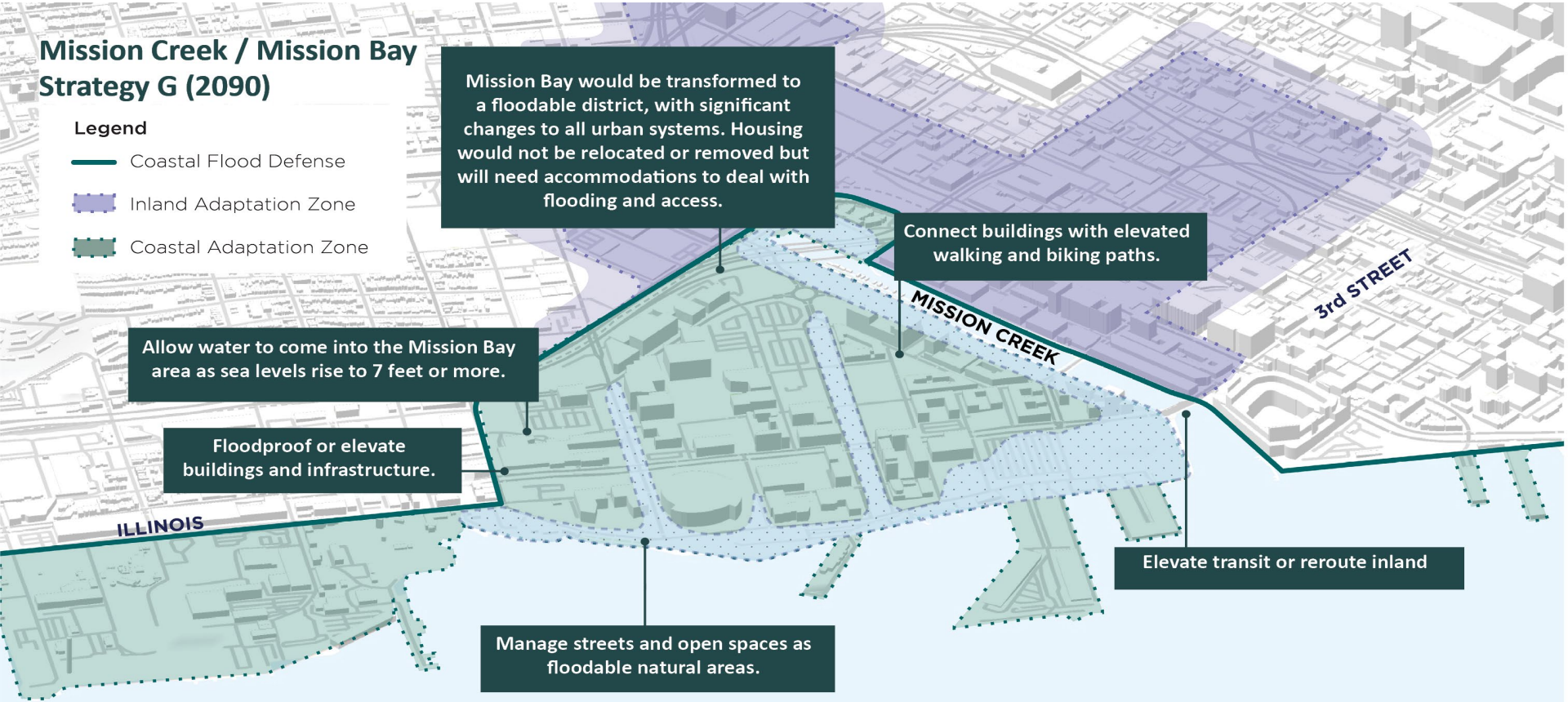
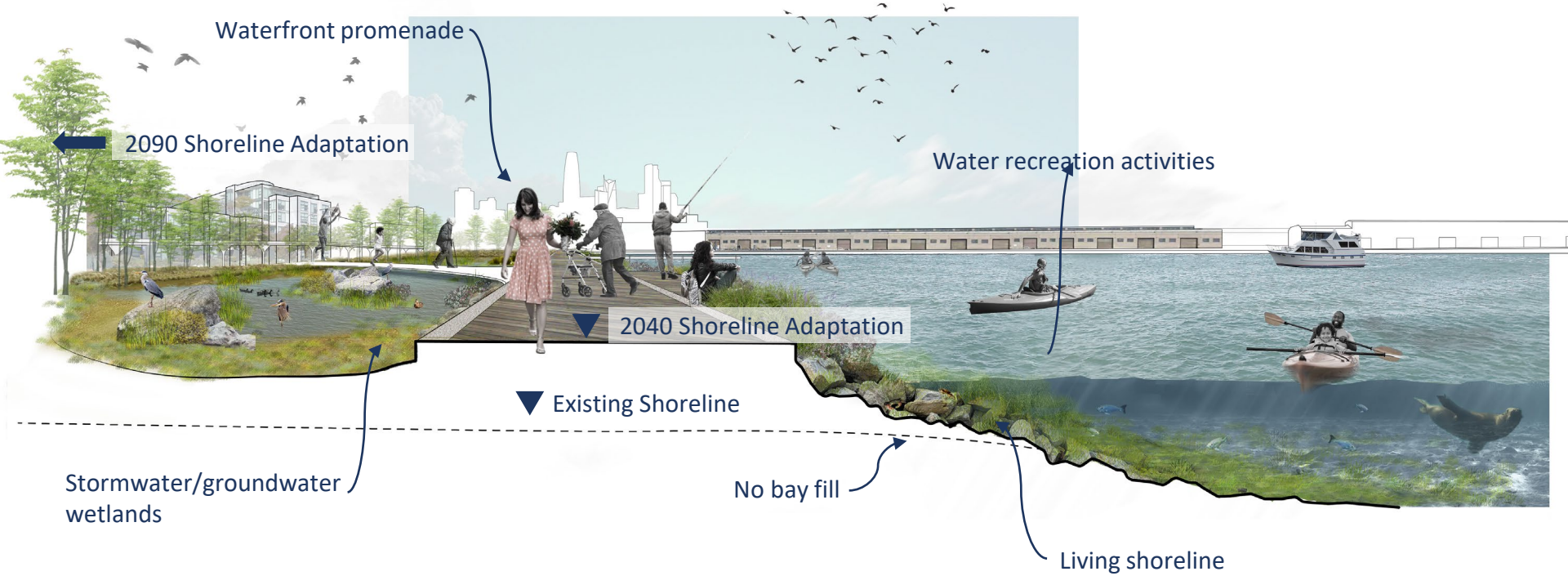


STRATEGY G – HIGHER SEA LEVEL RISE – ALIGN WITH WATERSHEDS

Mission Creek / Mission Bay in 2090



Next Steps

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DRAFT WATERFRONT ADAPTATION STRATEGIES DEVELOPMENT SCHEDULE

WHAT WE'VE HEARD SO FAR

- Summer Survey of over 1000 respondents
- Openness to exploring many kinds of adaptation approaches (including more transformative options)
- Desire to preserve and expand connections between the city and the waterfront
- Curiosity about feasibility, cost, and disruption impacts

Thank You

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