



Tiburon General Plan Update

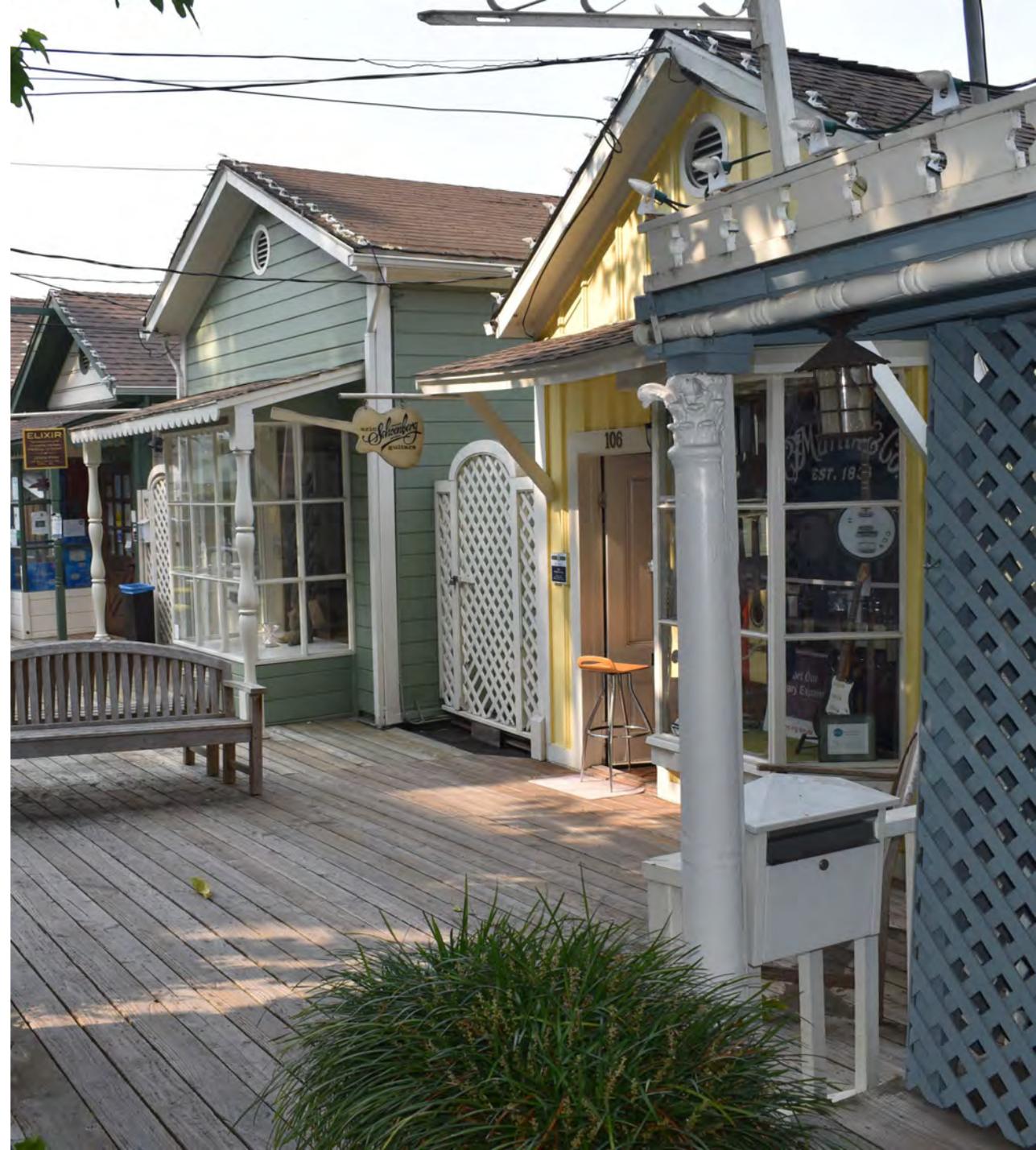
ADAPTING TO SEA LEVEL RISE

March 2021

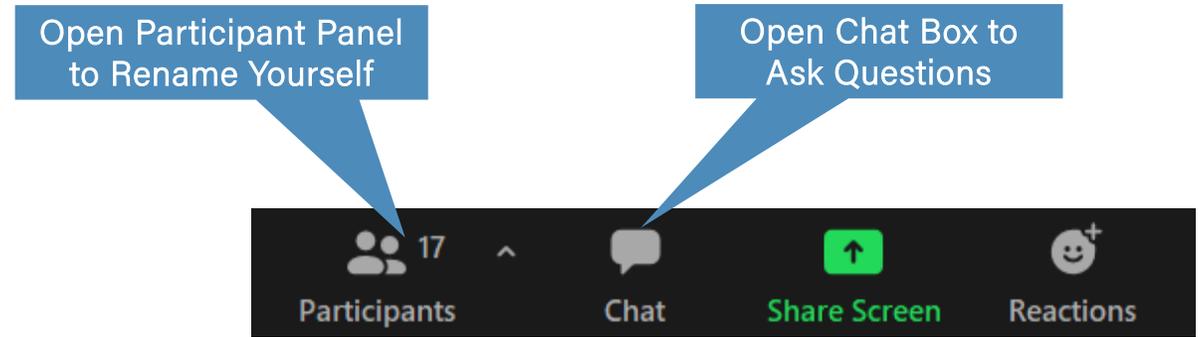
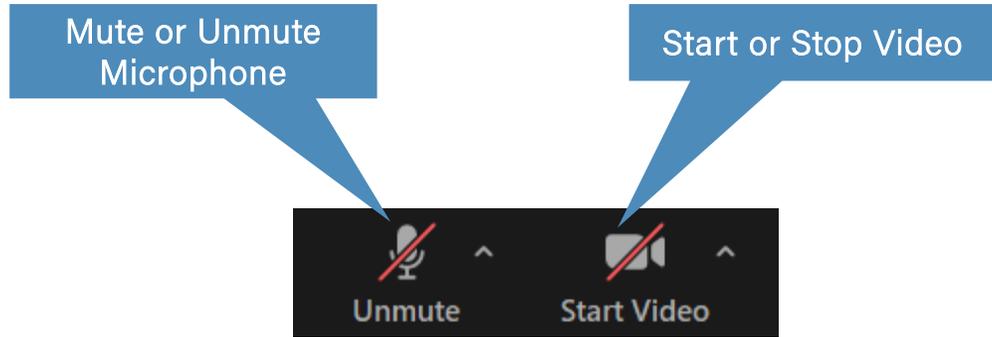


CONTENT

1. General Plan Update
2. Climate Change + Climate Adaptation
3. Understanding Sea Level Rise
4. What's Vulnerable in Tiburon?
5. Adaptation Choices
6. The "A" Game



ZOOM TOOLS



1. GENERAL PLAN 1. UPDATE

GENERAL PLAN UPDATE

- Overarching document that guides the future growth and development of the town
- Articulates a community's vision for the future
- Update to the 2005 Plan
- Will plan for next 20 years
- Contains goals, policies, and implementing programs
- Approvals of new development projects, public projects, and capital improvements require findings of consistency with the General Plan



GENERAL PLAN ELEMENTS

Required Elements:

- Land Use
- Mobility
- Housing
- Open Space
- Conservation
- Safety
- Noise

Additional Elements:

- Downtown
- Parks and Recreation



2. CLIMATE CHANGE + CLIMATE ADAPTATION

IMPACTS OF CLIMATE CHANGE

Losses to Sierra snowpack and water supply

Early melting creates risk of floods and water shortages

Wildfires

Drier forests; more and more intense fires

Agriculture

Saltwater contamination, flooding, pests

Public health

Vulnerable populations exposed to more extreme heat events

Habitat and ecosystems

Threat to biological diversity and endangered species

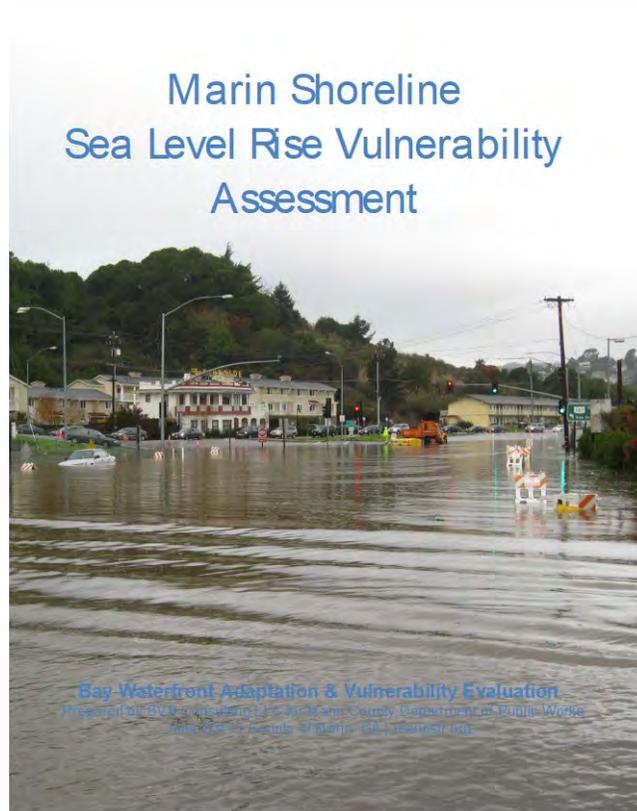
Sea level rise, coastal flooding and coastal erosion

Sea level projected to rise by 40 to 122 inches by 2100

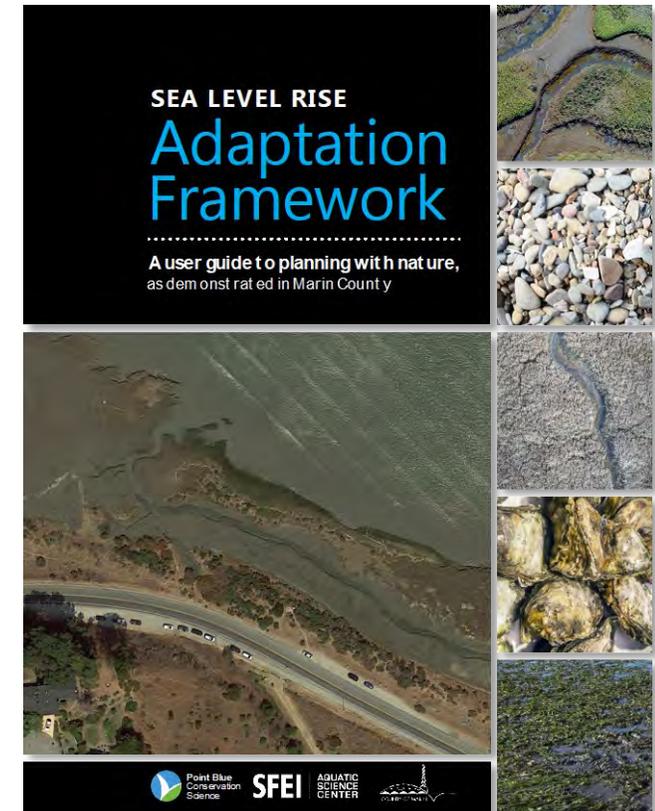
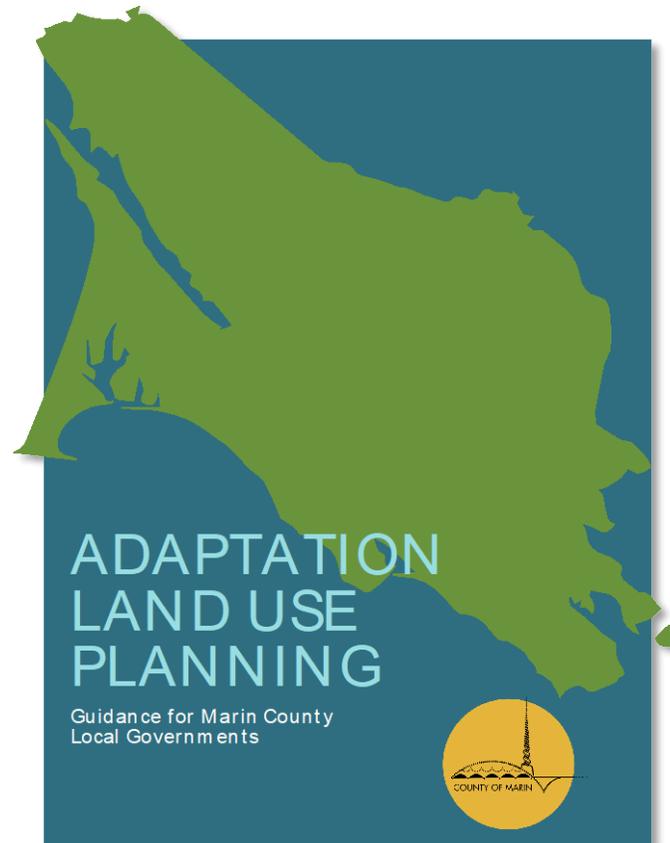


ADAPTATION PLANNING IN MARIN COUNTY

Adaptation refers to strategies that help communities and ecosystems respond to climate change



Bay Waterfront Adaptation & Vulnerability Evaluation



ADAPTATION PLANNING IN MARIN COUNTY

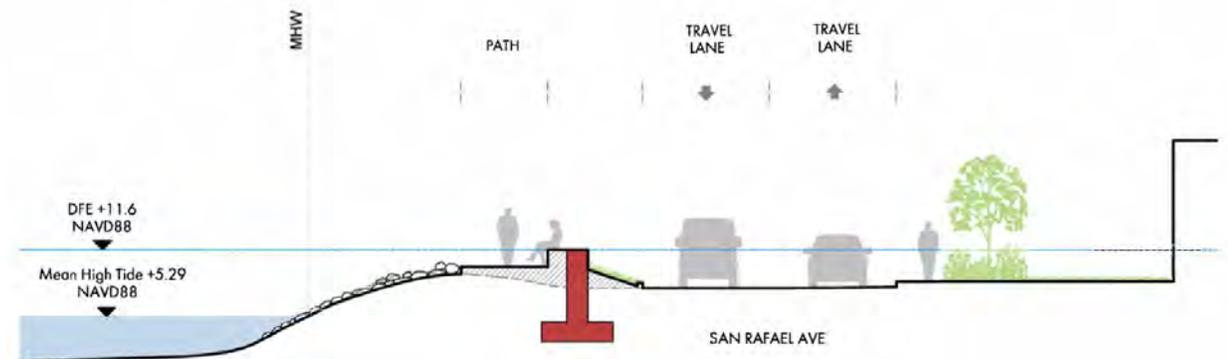
Proposed Belvedere Seawall along San Rafael Avenue



Overall Concept - Aerial View

Proposed raised vertical seawall

Walking path and park features that transition from landward to bayward side



ADAPTATION PLANNING IN MARIN COUNTY

Blackie's Pasture Area



Image: Roger Leventhal, Marin County DPW



Proposed gravel beach or replenished mixed sand-gravel beach (two design approaches under consideration)

ADAPTATION PLANNING + THE TIBURON GENERAL PLAN

California requires local jurisdictions to include adaptation strategies in their **general plans**

LAND USE



Accounting for SLR vulnerability in locating development

OPEN SPACE + CONSERVATION



Multiple benefits of open space along vulnerable shorelines

SAFETY



Protecting people and property from flood hazards

CIRCULATION



Ensuring transportation links are maintained

PUBLIC FACILITIES + SERVICES



Adapting critical infrastructure

3 UNDERSTANDING SEA LEVEL RISE

FLOODING TODAY

- FEMA Flood Hazard Zones are a good indicator of flood hazard areas today
- Sea level rise will likely impact the extent and base flood elevations of these zones in the future.



IMAGE CREDIT: Elliot Karlan photo / For The Ark



IMAGE CREDIT: FEMA Webapp (<https://hazards-fema.maps.arcgis.com/>)

BayWAVE SEA LEVEL RISE PROJECTIONS & STATE GUIDANCE

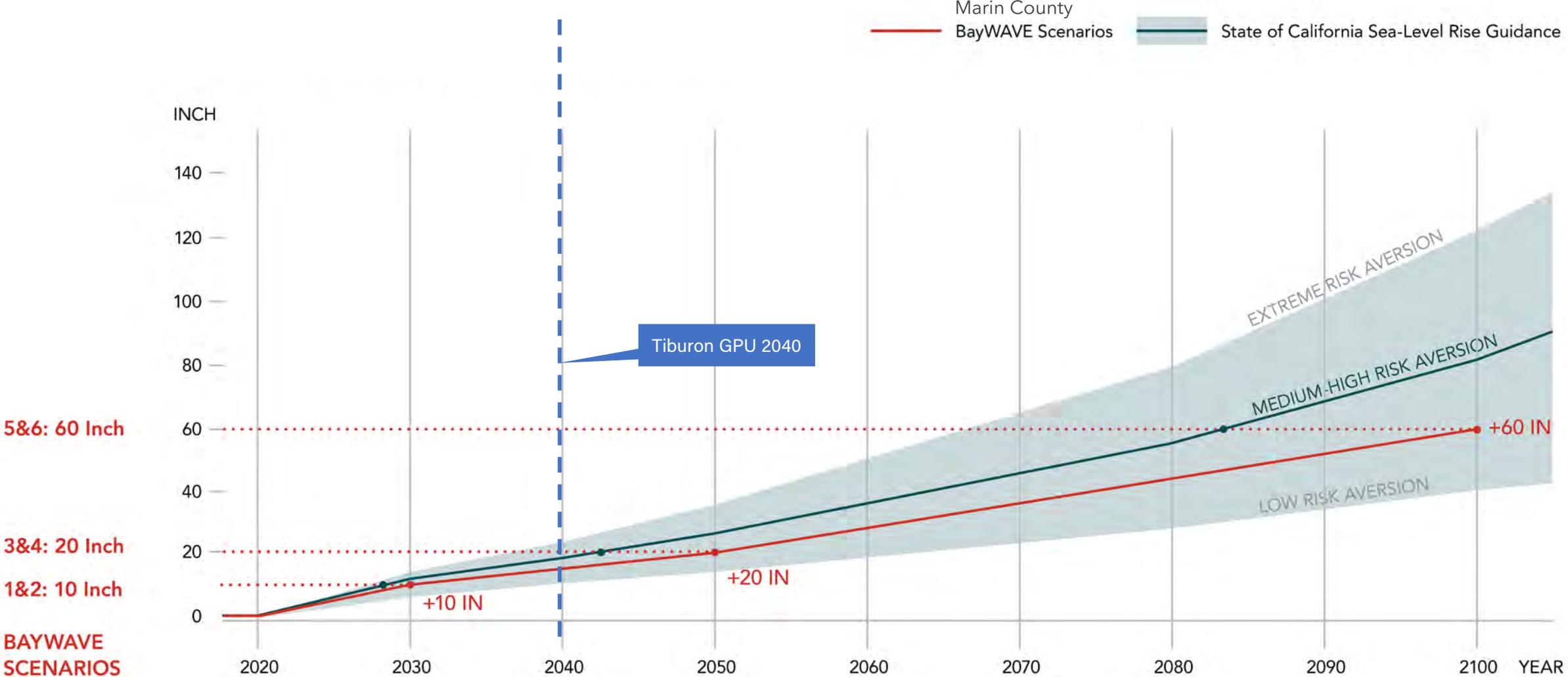
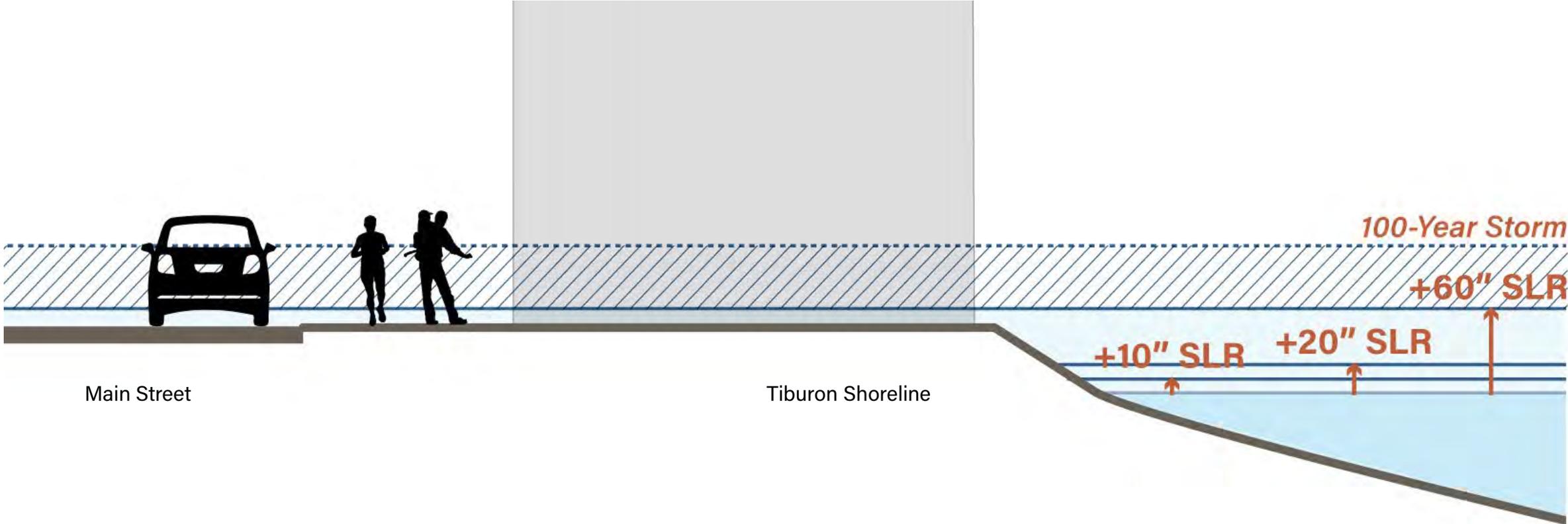


IMAGE CREDIT: WRT, adapted from OPC State Guidance 2018 (<https://www.opc.ca.gov/updates-californias-sea-level-rise-guidance/>)

SEA LEVEL RISE IN TIBURON



SEA LEVEL RISE & OTHER FACTORS

Rising Groundwater

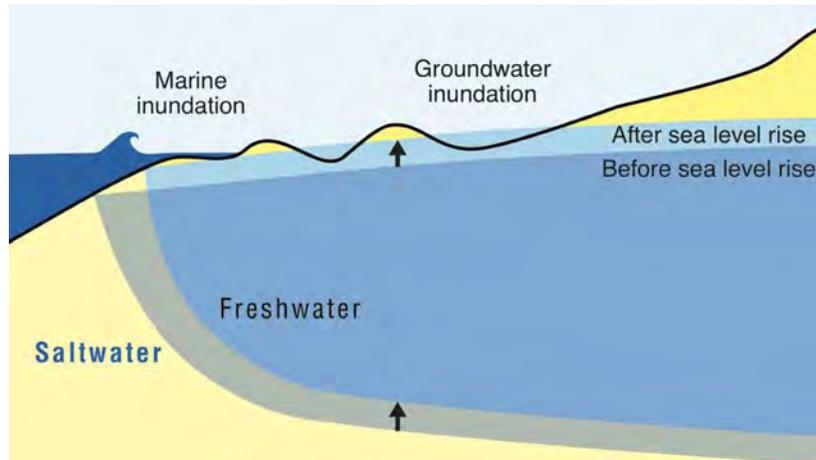


Image: UHM Coastal Geology Group

Erosion



Image: The Mercury News

Fluvial Flooding



Image: Elliot Karlan photo/For The Ark

Liquefaction



Image: USGS Publications Repository

KEY TAKEAWAYS

- Downtown Tiburon floods even now, and will only get worse without action.
- SLR will impact us in many different ways, from downtown vitality to housing to ecological health.
- Sea level rise models vary, but we're looking at between 10 and 25 inches by 2040 in Tiburon.
- Sea level rise also interacts with other conditions: groundwater, stormwater, liquefaction – and it is important we consider all of them when planning our adaptation strategy.

“

..cities will have to continually make decisions about where and how much to invest in the face of a great deal of uncertainty. No one knows exactly how much time Waikiki has left. Honolulu officials will have to monitor how new erosion-control measures hold up, and continue to assess how long they're likely to remain effective based on the latest science about sea level rise.

This points to an unsatisfying but important truth:

**Adaptation is a process,
not an outcome.”**

- Jainey K Bavishi
All We Can Save
Director, New York City Mayor's
Office of Resiliency

4. WHAT'S VULNERABLE IN TIBURON?

IMPACTS TO TIBURON AT A GLANCE

341 living units

8,500+ people

135 acres exposed

2.4 miles of roads

36 commercial parcels

Storm and tidal impacts already occur

Over \$400 million in assessed value; nearly \$600 million in single-family market family¹⁸⁶

**Town of Tiburon
Property Owners
Caltrans
Marin DPW
Ferry Services**

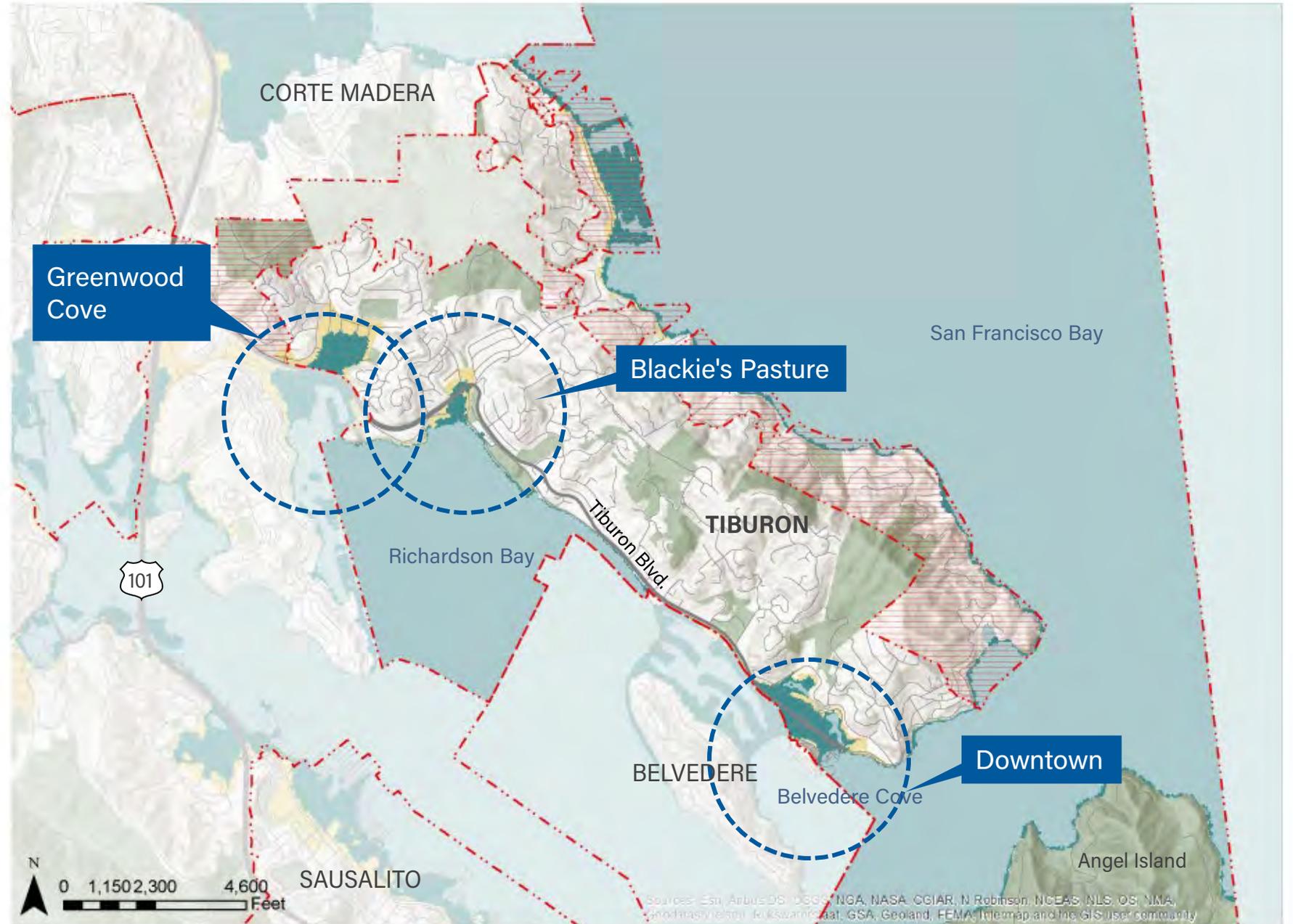
Source: BayWAVE maps and quantifies vulnerable assets in each Marin County community, including Tiburon

SEA LEVEL RISE IN TIBURON

- Main Street/ Downtown
- Blackie's Pasture
- Greenwood Cove

Legend

-  Shallow Groundwater
-  Existing Water Bodies
-  60 inches SLR + 100-year storm
-  City Boundary



DOWNTOWN

Existing Condition



DOWNTOWN

+ 10"



BayWAVE Scenario 2 (10 inches) SLR + 100 year Flood

DOWNTOWN

+ 20"



BayWAVE Scenario 4 (20 inches) SLR + 100 year Flood

DOWNTOWN

+ 60"



BayWAVE Scenario 6 (60 inches) SLR + 100 year Flood

DOWNTOWN

Vulnerable Assets



BayWAVE Scenario 6 (60 inches) SLR + 100 year Flood

DOWNTOWN // MAIN STREET



DOWNTOWN // MAIN STREET

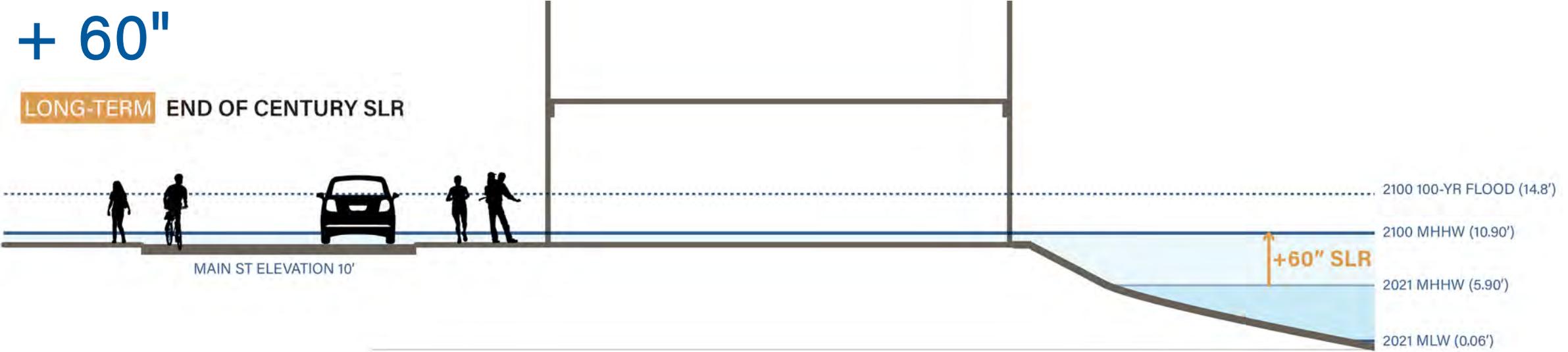
+ 20"

NEAR-TERM MID-CENTURY SLR



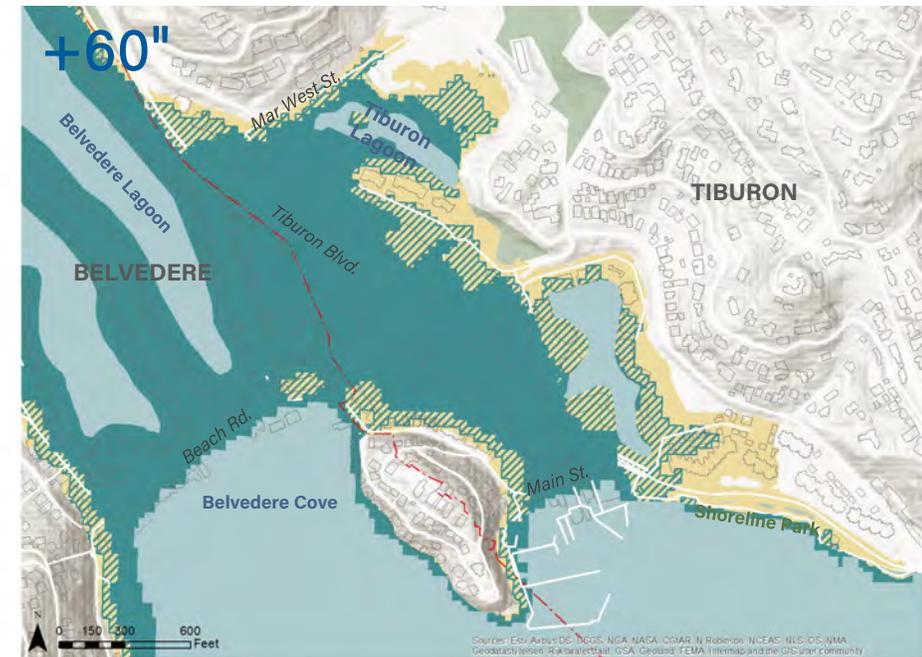
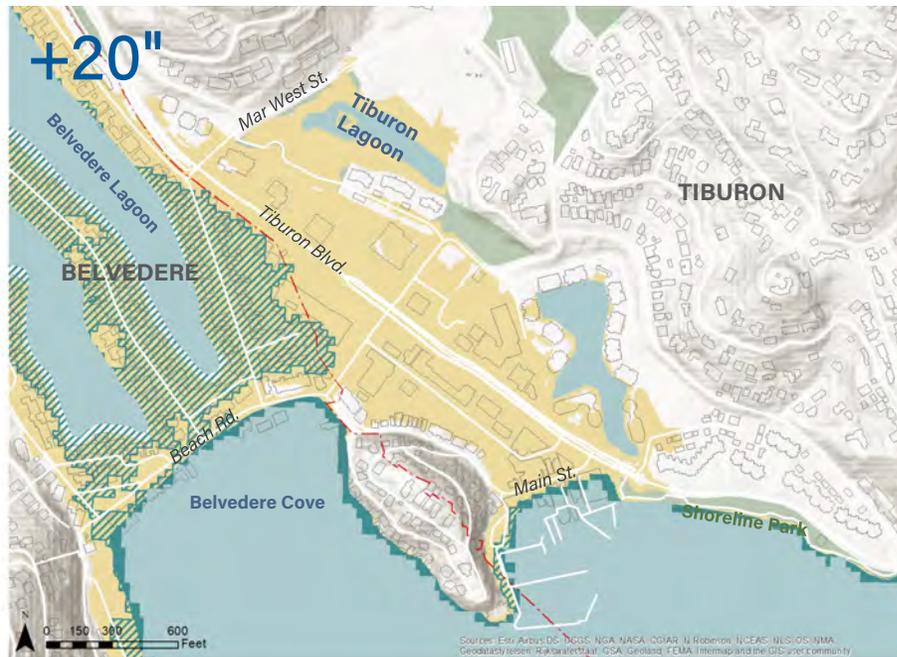
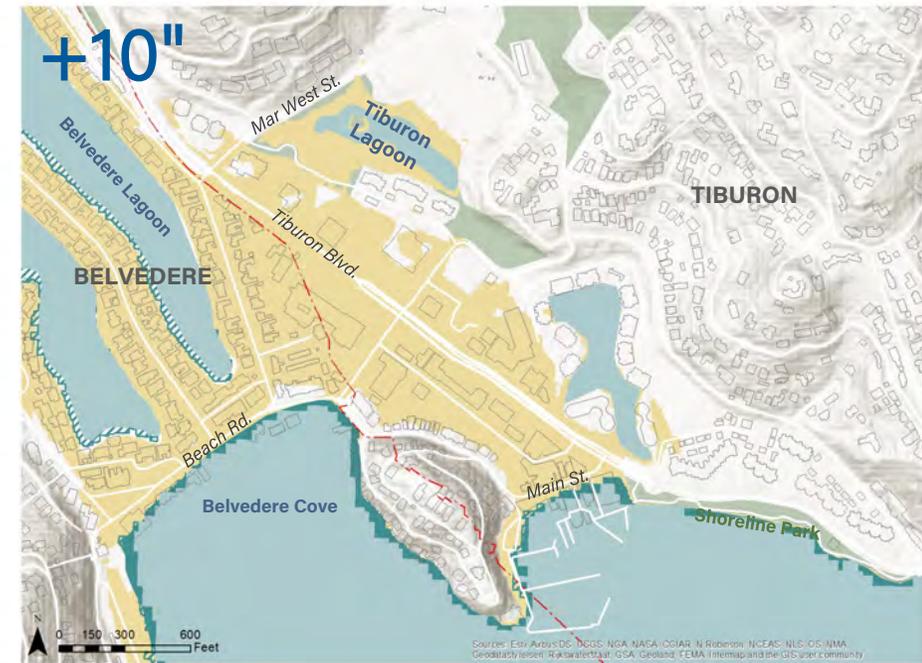
+ 60"

LONG-TERM END OF CENTURY SLR

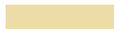


DOWNTOWN

SLR + Shallow Groundwater

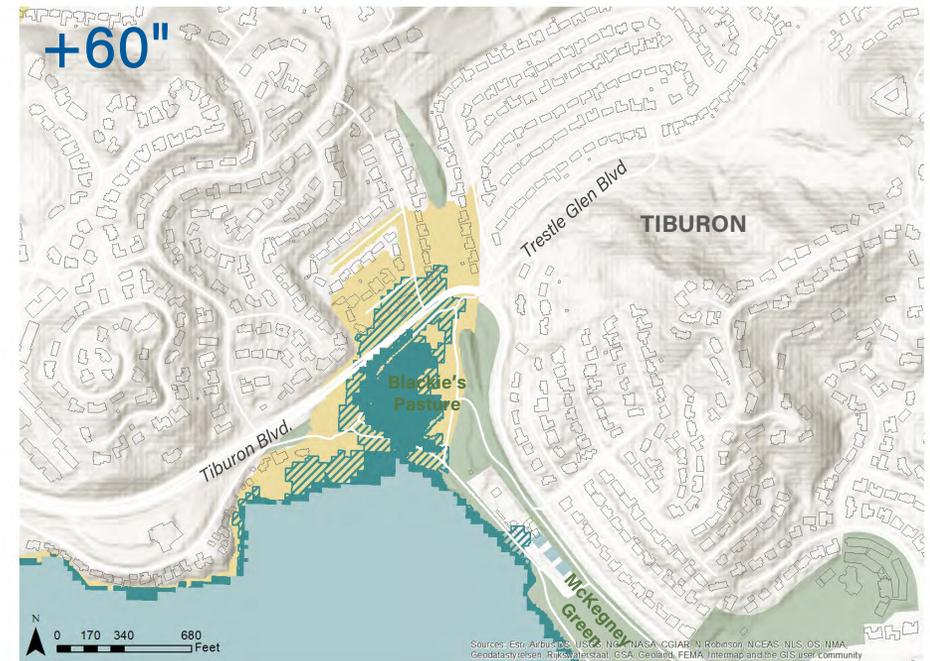


Legend

-  Shallow groundwater
-  Existing water bodies
-  Tidal inundation
-  100-year storm inundation

BLACKIE'S PASTURE

SLR + Shallow Groundwater



Legend

- Shallow groundwater
- Existing water bodies
- Tidal inundation
- 100-year storm inundation

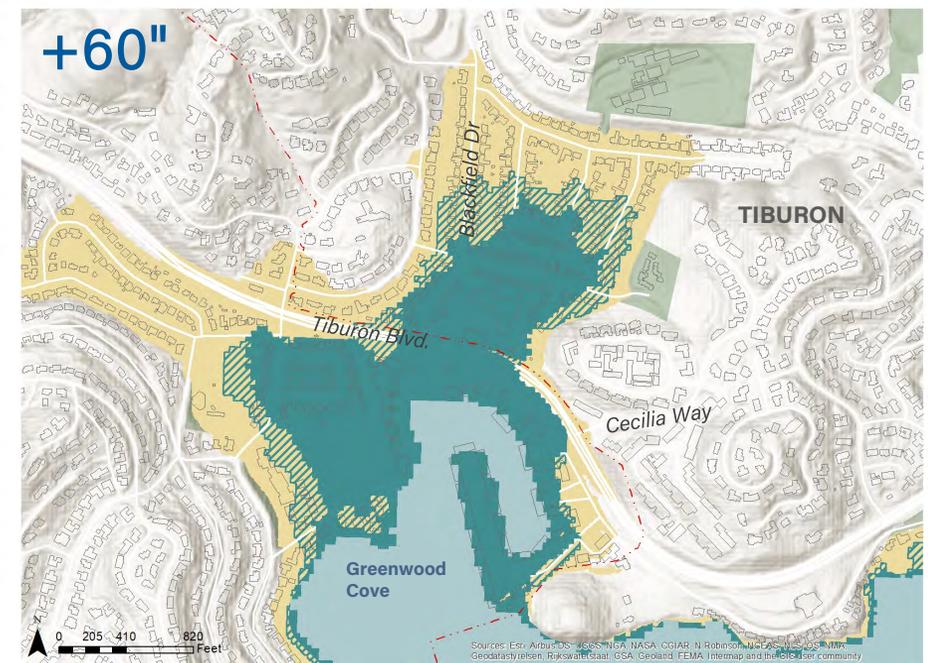
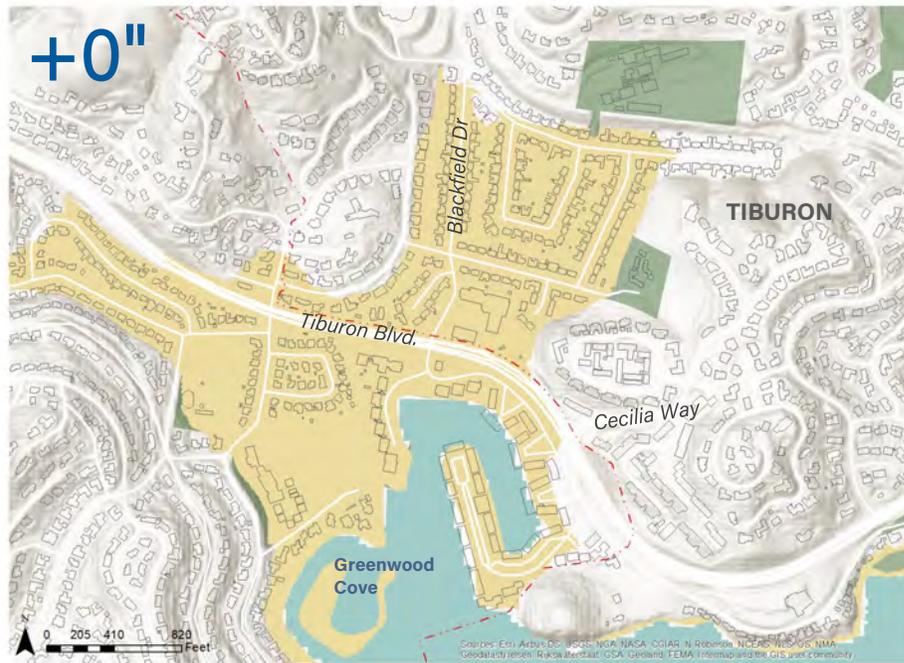
BLACKIE'S PASTURE

SLR + Shallow Groundwater

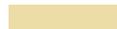


GREENWOOD COVE AREA

SLR + Shallow Groundwater



Legend

-  Shallow groundwater
-  Existing water bodies
-  Tidal inundation
-  100-year storm inundation

5 ADAPTATION CHOICES

OUR CHANGING SHORELINE

Over its history, Tiburon has adapted its shoreline to suit changing needs



Image: Belvedere-Tiburon Landmarks Society

DEVELOPING A STRATEGY

1 / What is our *vision* for Tiburon? Does our adaptation strategy help achieve it?



DEVELOPING A STRATEGY

1 / What is our *vision* for Tiburon? Does our adaptation strategy help achieve it?

2 / What is the right match between an adaptation tool and its *environment*, keeping in mind our vision for that place in the future?

Approach to the Shoreline



DEVELOPING A STRATEGY

1 / What is our *vision* for Tiburon? Does our adaptation strategy help achieve it?

2 / What is the right match between adaptation tools and their *environment*, keeping in mind our vision for that context in the future.

3 / What additional *benefits* could we gain, depending on the adaptation tool we choose?



Ecological Benefits



Cultural/Historic Preservation



Transportation



Public Access



Recreational Use



**Redevelopment/
Revitalization**



**Community
Character**

DEVELOPING A STRATEGY

4 / How long should our adaptation tool last in a given location? What should be the *duration* of our investment?

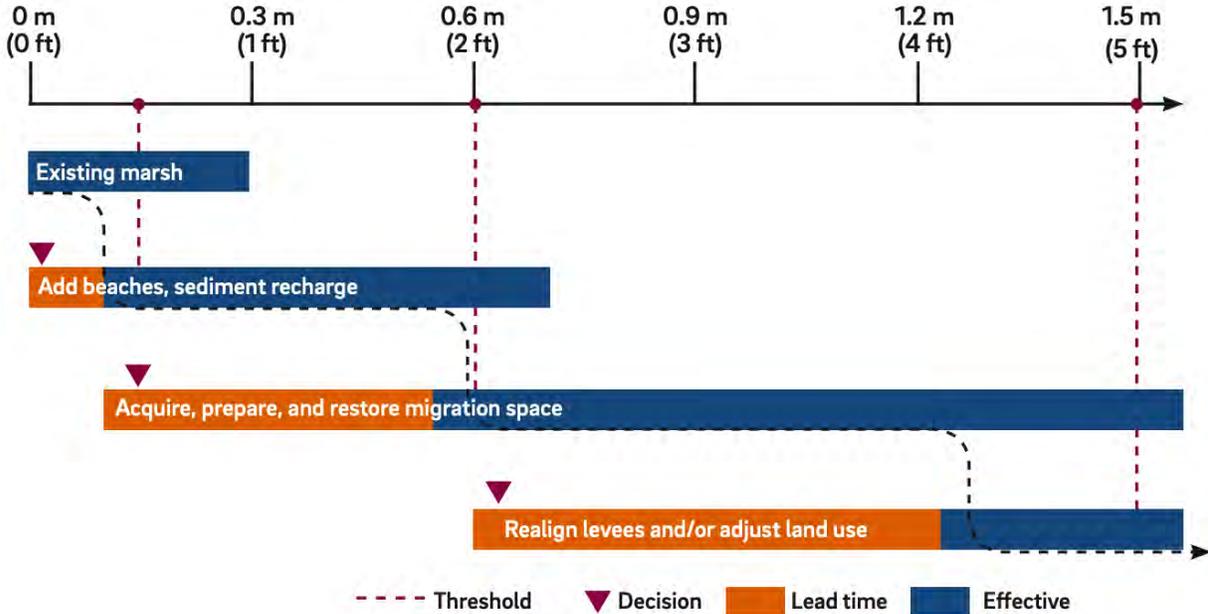
Longevity of Adaptation



DEVELOPING A STRATEGY

4 / How long should our adaptation tool last in a given location? What should be the *duration* of our investment?

5 / Can we adapt over time, as a *sequence* of staged strategies?



DEVELOPING A STRATEGY

4 / How long should our adaptation tool last in a given location? What should be the *duration* of our investment?

5 / Can we adapt over time, as a *sequence* of staged strategies?

6 / What *level of impact* can we live with? Where do we set our thresholds?

When to Adapt



DEVELOPING A STRATEGY

4 / How long should our adaptation tool last in a given location? What should be the *duration* of our investment?

5 / Can we adapt over time, as a *sequence* of staged strategies?

6 / What *level of impact* can we live with? Where do we set our thresholds?

7 / Who should be *responsible* for protecting vulnerable assets, thinking at a range of scales?

Approach to Public Investment



DEVELOPING A STRATEGY

4 / How long should our adaptation tool last in a given location? What should be the *duration* of our investment?

5 / Can we adapt over time, as a *sequence* of staged strategies?

6 / What *level of impact* can we live with? Where do we set our thresholds?

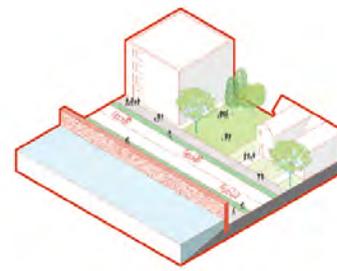
7 / Who should be *responsible* for protecting vulnerable assets, thinking at a range of scales?

8 / Who can be our *partners*, to help manage the burden?

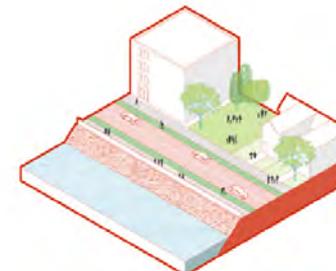


ADAPTATION TOOLS

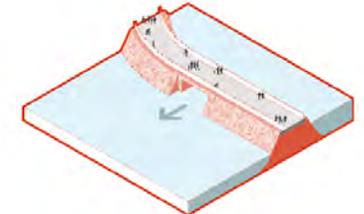
- *Shoreline hardening tools*
- *Nature-based tools*
- *Adaptation tools for our roads and infrastructure*
- *Tools to shift development out of harm's way over time*



Sea Wall



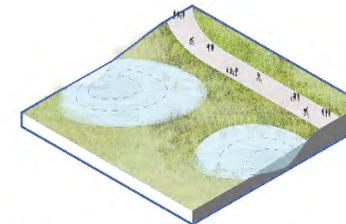
Super Levee



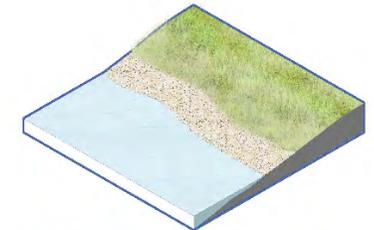
Tide Gate



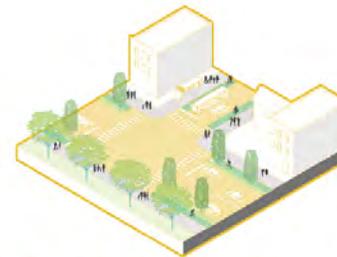
Ecotone Slope



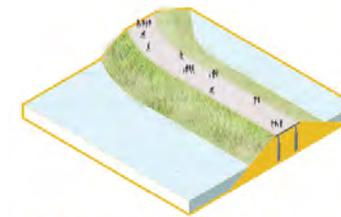
Detention Ponds



Coarse Beach



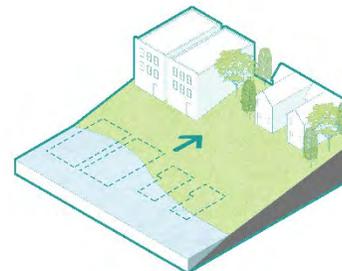
Complete Street



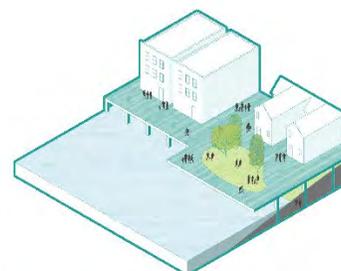
Elevated Levee



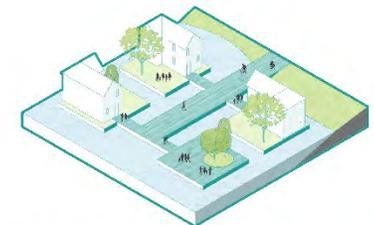
Floating Trail/
Causeway



Retreat



Elevated on Piers



Floating Houses

WHAT ARE WE DOING TODAY?

- The General Plan Update is our opportunity to define Tiburon's goals and priorities at a high level
- Adapting to sea level rise is an important challenge to address



QUESTIONS?

6. THE "A" GAME

HOW TO PLAY

Each group will be given **one area of Tiburon** to adapt to sea level rise.

As a group, you'll consider:

- *What is our vision for Tiburon? What vulnerable **assets** are **most critical to the public**?*
- *What **co-benefits** do we want to achieve here?*
- *What **values** are driving our decisions?*
- *What is a potential **set of tools** that might be appropriate? (extra credit)*

The facilitator will keep track of the conversation and decisions by marking up the "game board."

When we come back, one member of each group will report back on what you've done.

NEXT STEPS

Adapting to sea level rise:

- Survey will be posted on CreateTiburon2040.org
- Workshop presentation and video will be posted
- Planning Commission meeting in April to review community input, receive policy direction
- Town Council meeting in August to discuss policy alternatives
- Draft General Plan in March 2022

General Plan Update:

- Community workshop on Open Space, Parks, and Safety on March 30th
- Community workshop on Downtown, April 27th
- Community workshop on draft Climate Action Plan in April
- Check the website often for workshop registration, new surveys, draft documents
- Sign up for the mailing list at CreateTiburon2040.org





Tiburon General Plan Update

ADAPTING TO SEA LEVEL RISE

March 2021

