

SAUSALITO SHORELINE ADAPTATION Community Workshop 2



January 2025

WRT

Agenda

1. Introduction
2. Vulnerability Overview
3. Tools and Precedents (local and international)
4. Adaptation Approaches (4 Zones)
5. Implementation: Where do we go from here?
6. Breakout – Small Group Discussion
7. Wrap Up



01

Introduction



Project Timeline



Engagement To Date

- Focus Group Meetings
Spring 2024
- Shoreline Walking Tour
May 2024
- Community Pop-ups
June 28, July 19,
and August 6, 2024
- Workshop 1
September 7, 2024
- Online Survey
September 7 – November 19
200 Respondents
- **Workshop 2**
January 25, 2025 - TODAY!
- Workshop 3
To come



Internal Charrette



Shoreline Walking Tour



Shoreline Walking Tour



Pop-up Events



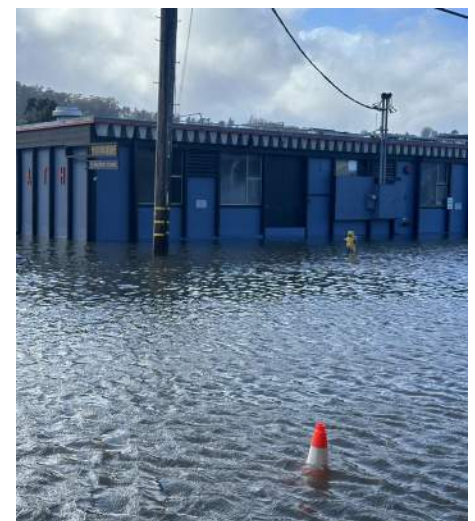
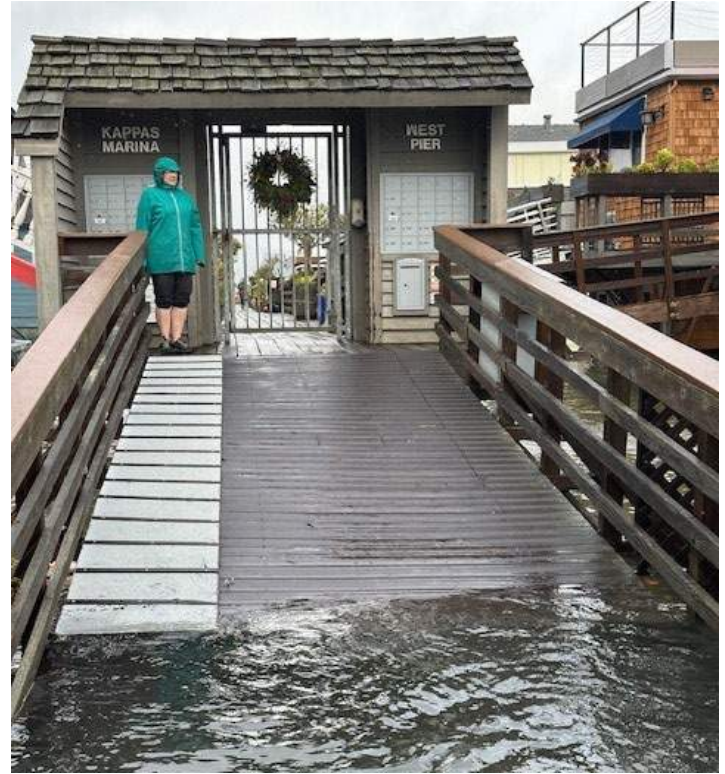
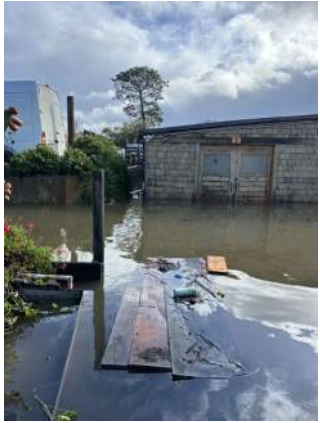
Pop-up Events

What We've Heard

- City is ready to move forward with SLR planning
- Importance of alignment with community character
- Interest in innovative floating approaches
- Vulnerability concerns – (infrastructure, Bridgeway)
- Near-term needs we cannot miss (e.g. flap gates at Gate 5; subsidence and groundwater monitoring;)



Why We're Here



Project Goals

DRAFT

- Develop **shared understanding of the vulnerability** in the City based on the most up-to-date science; in line with regional guidance.
- Document potential **community visions for shoreline adaptation** that balance the following:
 - Maintain **community character** and **connections along the shoreline**
 - Enhance **ecological opportunities**
 - Support **long-term economic vitality** for local businesses
 - Promote **arts and culture** in the public realm
 - Understand **financial implications and tradeoffs** of various adaptation approaches

02

Vulnerability Overview



Summary of Vulnerable City-wide Assets

City Assets	1 2050 0.8' SLR w/o Storm	2 2050 0.8' SLR w/ Storm OR 4.3' SLR w/o Storm	3 2100 3.1' SLR w/ Storm OR 6.6' SLR w/o Storm	BY TYPE
City Stormwater	8 Storm Drains 1,700 ft Storm Pipe	50 Storm Drains 8,100 ft Storm Pipe	110 Storm Drains 16,700 ft Storm Pipe	
City Sewer	1,300 ft Sewer Pipe	10,300 ft Sewer Pipe	24,400 ft Sewer Pipe	
Roads & Transportation	2,900 ft Road 4,700 ft Fixed Pier, 25,700 ft Floating Pier 0 Bus Routes 0 Bus Stops	23,900 ft Road 6,400 ft Fixed Pier, 26,300 ft Floating Pier 8 Bus Routes 6 Bus Stops	49,500 ft Road 8,000 ft Fixed Pier, 26,300 ft Floating Pier 8 Bus Routes 6 Bus Stops	
Evacuation Routes	0 ft Evacuation route	5,000 ft Evacuation route	5,000 ft Evacuation route	
Habitat	Eelgrass: Reduction across most of Richardson Bay Marshes: No significant change in marsh area Beaches: Potential erosion and narrowing	Eelgrass: Significant reduction Marshes: Transition to lower mudflat Beaches: Potential erosion and narrowing	Eelgrass: Significant reduction Marshes: Transition to lower mudflat Beaches: Potential erosion and narrowing	
Community Facilities & City Properties	10 Residential buildings 20 Commercial buildings 30 Industrial buildings 10 Public/City-owned buildings	30 Residential buildings 80 Commercial buildings 80 Industrial buildings 20 Public/City-owned buildings	40 Residential buildings 110 Commercial buildings 110 Industrial buildings 30 Public/City-owned buildings	ALL TYPES
Land Use	26% of all land use area (25% present day) 52% of inundated area is Public/City-owned	31% of all land use area 45% of inundated area is Public/City-owned	37% of all land use area 43% of inundated area is Public/City-owned	
TOTAL COST OF NO ACTION	\$160-\$70M 55% INDIVIDUAL BUILDINGS 45% COLLECTIVE INFRASTRUCTURE	\$500-\$1.8B 75% INDIVIDUAL BUILDINGS 25% COLLECTIVE INFRASTRUCTURE	\$1.2B-\$4.2B 65% INDIVIDUAL BUILDINGS 35% COLLECTIVE INFRASTRUCTURE	



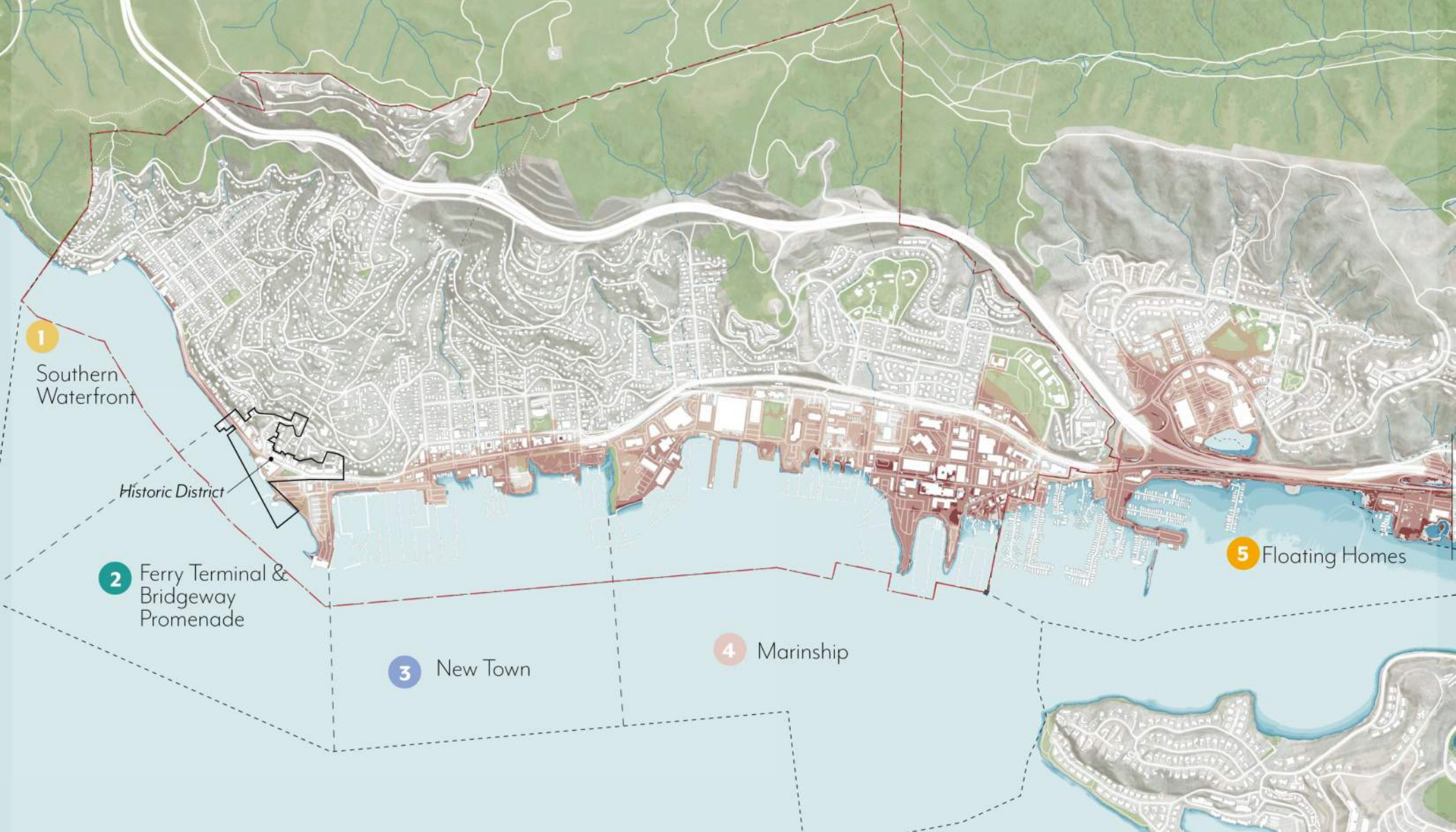
Materials available to review on the City's project website:

- Community Workshop 1 Boards
- Draft Vulnerability Summary
- Today's Community Workshop 2 Materials

Understanding City-wide Vulnerability in line with Regional Guidance

THREE SEA LEVEL RISE SCENARIOS FOR THE PROJECT:

	SLR Scenario	Sea Level Rise		Storm surge (100-yr)	Total Water Level
		Inches	Feet		
1	2050	10	0.8	0	0.8
2	2050	10	0.8	3.5	4.3
3	2100 Intermediate	37	3.1	3.5	6.6
	2100 High	79	6.6	0	6.6



Sausalito SLR Vulnerability

Map Sources: California State Lands Commission, City of Sausalito, County of Marin

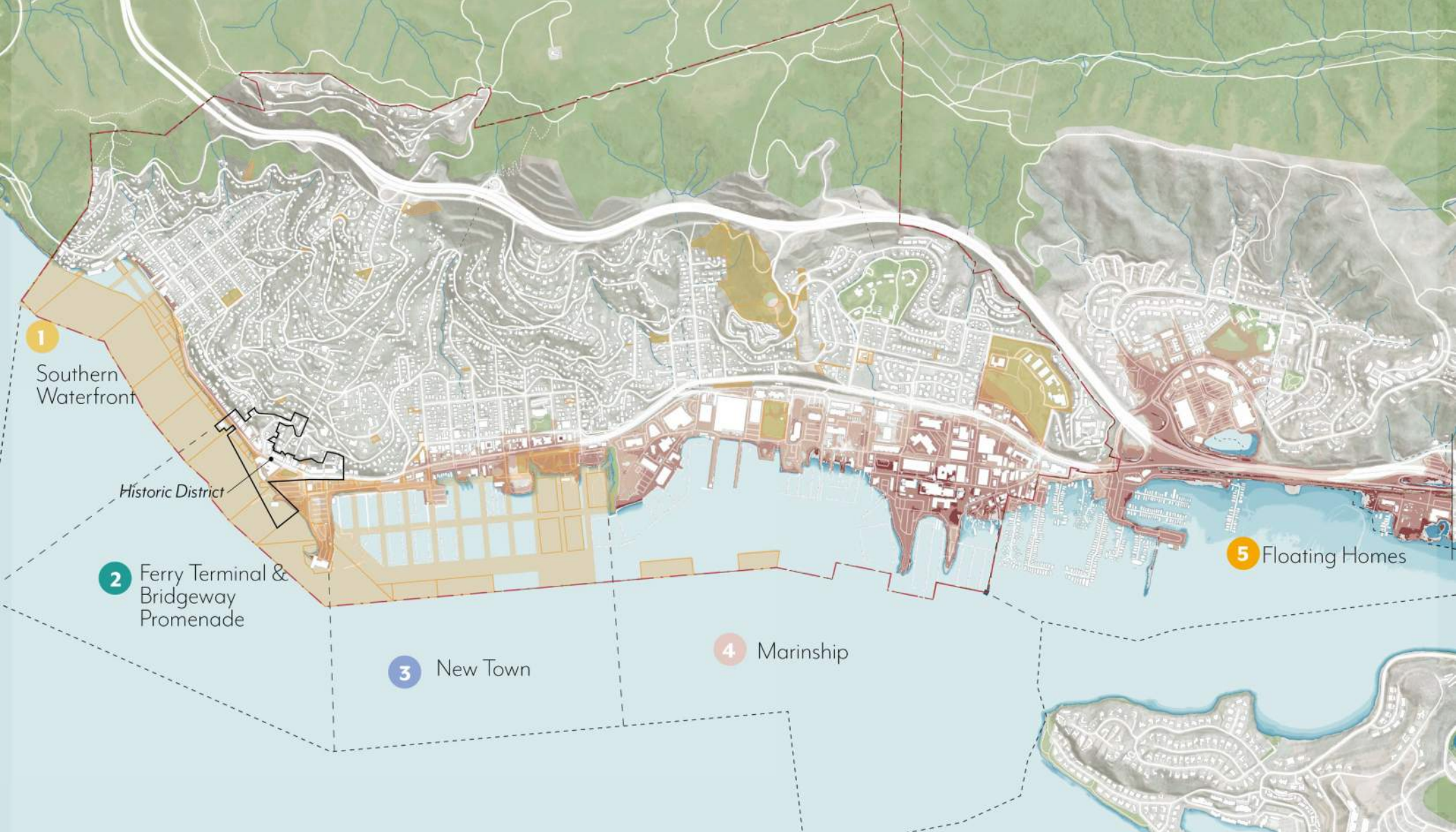
Map Author: WRT, 2024

Base Map

- Sausalito City Boundary
- Sphere of Influence
- Parks

Sea Level Rise Scenarios

- 1 .8 feet
- 2 .8 feet + 100-yr Storm
- 3 3.1 feet + 100-yr Storm



City Owned and Granted Parcels

Map Sources: California State Lands
Commission, City of Sausalito, County of Marin

Map Author: WRT, 2024

Base Map

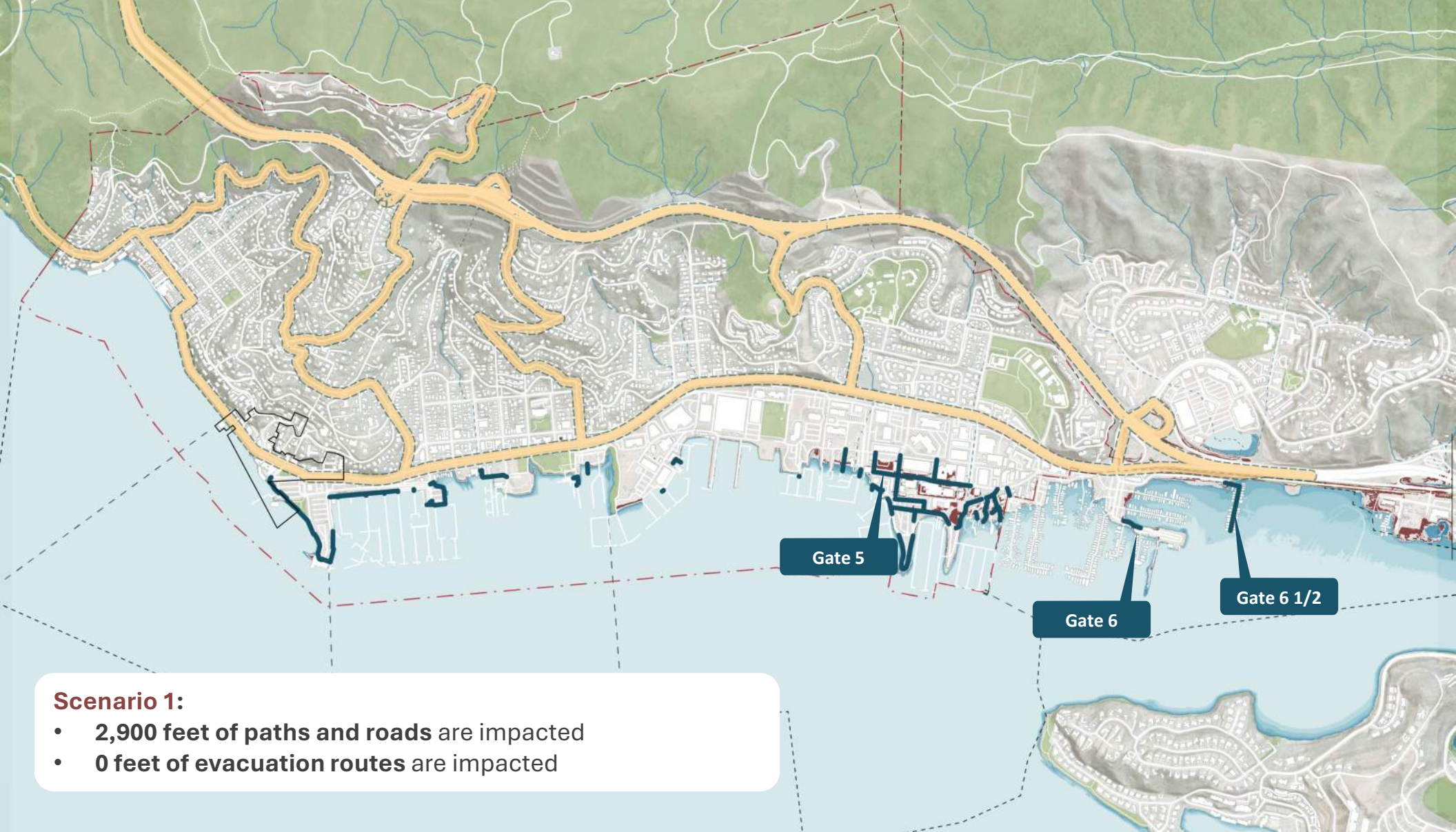
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Sea Level Rise Scenarios

- 1 .8 feet
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Summary of Vulnerable City-wide Assets

1. City Stormwater
2. City Sewer
3. Roads & Transportation
4. Evacuation Routes
5. Habitat
6. Community Facilities & City Properties
7. Land Use



Scenario 1:

- 2,900 feet of paths and roads are impacted
- 0 feet of evacuation routes are impacted

Impacted Roads & Evacuation Routes

Map Sources: Fire Safe Marin

Map Author: WRT, 2024

Evacuation Routes

 Primary

Base Map

 Sausalito City Boundary

 Sphere of Influence

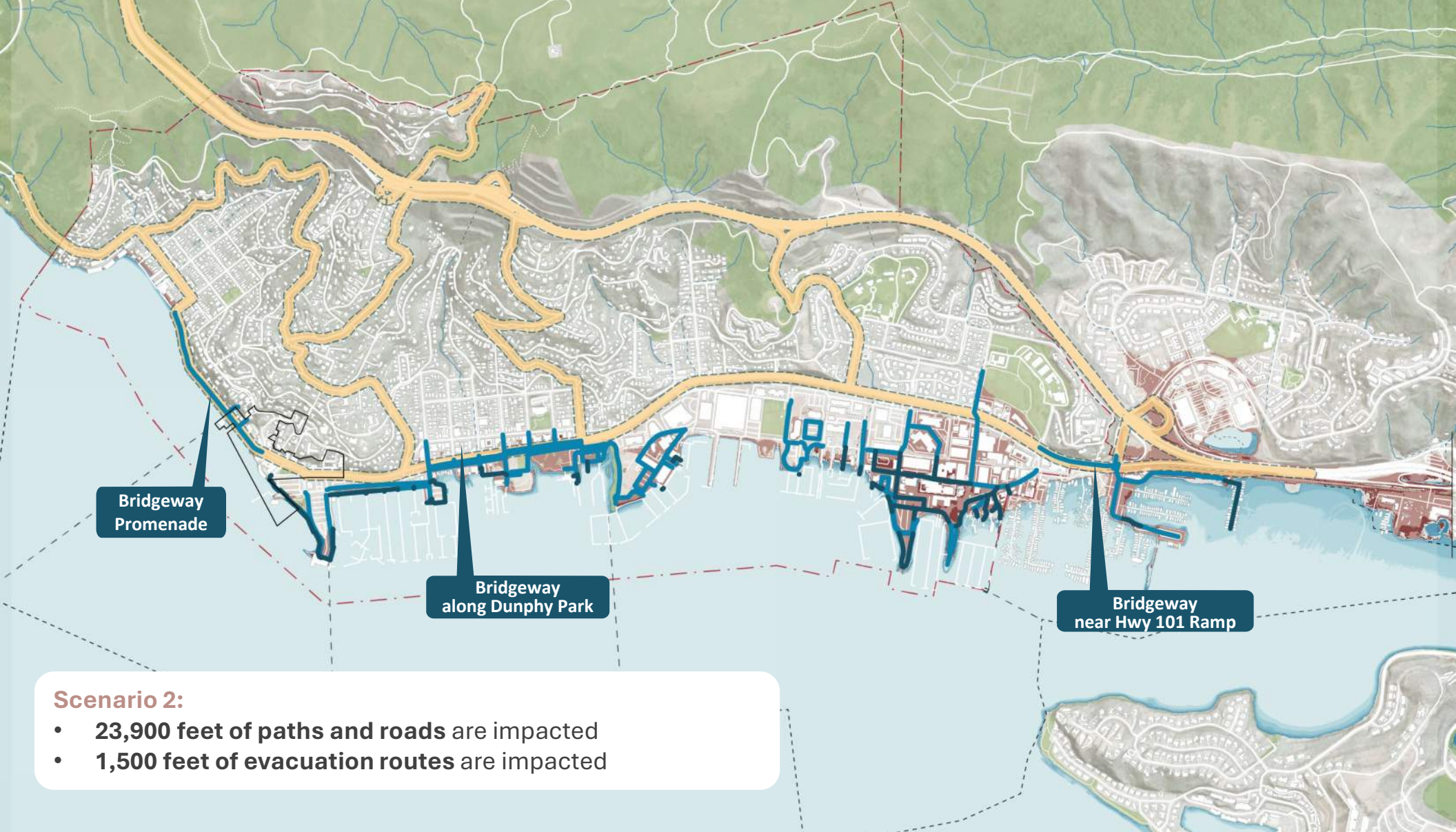
 Parks

Roads Impacted per Scenario

- ①  Scenario 1
- ②  Scenario 2
- ③  Scenario 3

Sea Level Rise Scenarios

- ①  .8 feet)
- ②  .8 feet + 100-yr Storm
- ③  3.1 feet + 100-yr Storm



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Evacuation Routes

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Sphere of Influence

Parks

Roads Impacted per Scenario

1 Scenario 1

2 Scenario 2

3 Scenario 3

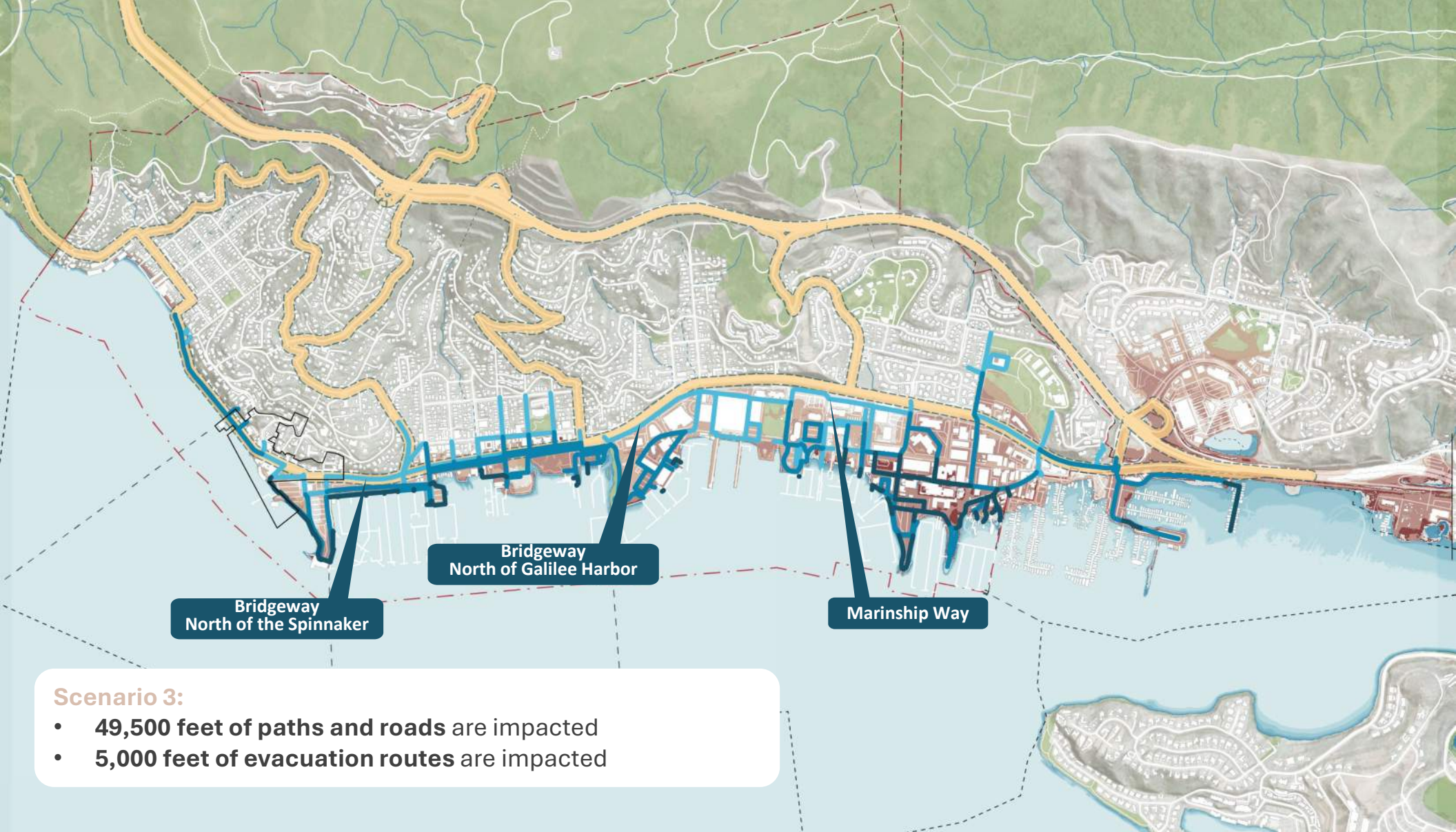
Sea Level Rise Scenarios

1 .8 feet)

2 .8 feet + 100-yr Storm

3 3.1 feet + 100-yr Storm

0 250 500 1,000 1,500 2,000 Feet



Scenario 3:

- 49,500 feet of paths and roads are impacted
- 5,000 feet of evacuation routes are impacted

Impacted Roads & Evacuation Routes

Map Sources: Fire Safe Marin

Map Author: WRT, 2024

Evacuation Routes

Primary

Base Map

Sausalito City Boundary

Sphere of Influence

Parks

Roads Impacted per Scenario

- Scenario 1
- Scenario 2
- Scenario 3

Sea Level Rise Scenarios

- .8 feet)
- .8 feet + 100-yr Storm
- 3.1 feet + 100-yr Storm

Summary of Vulnerable City-wide Assets

DRAFT

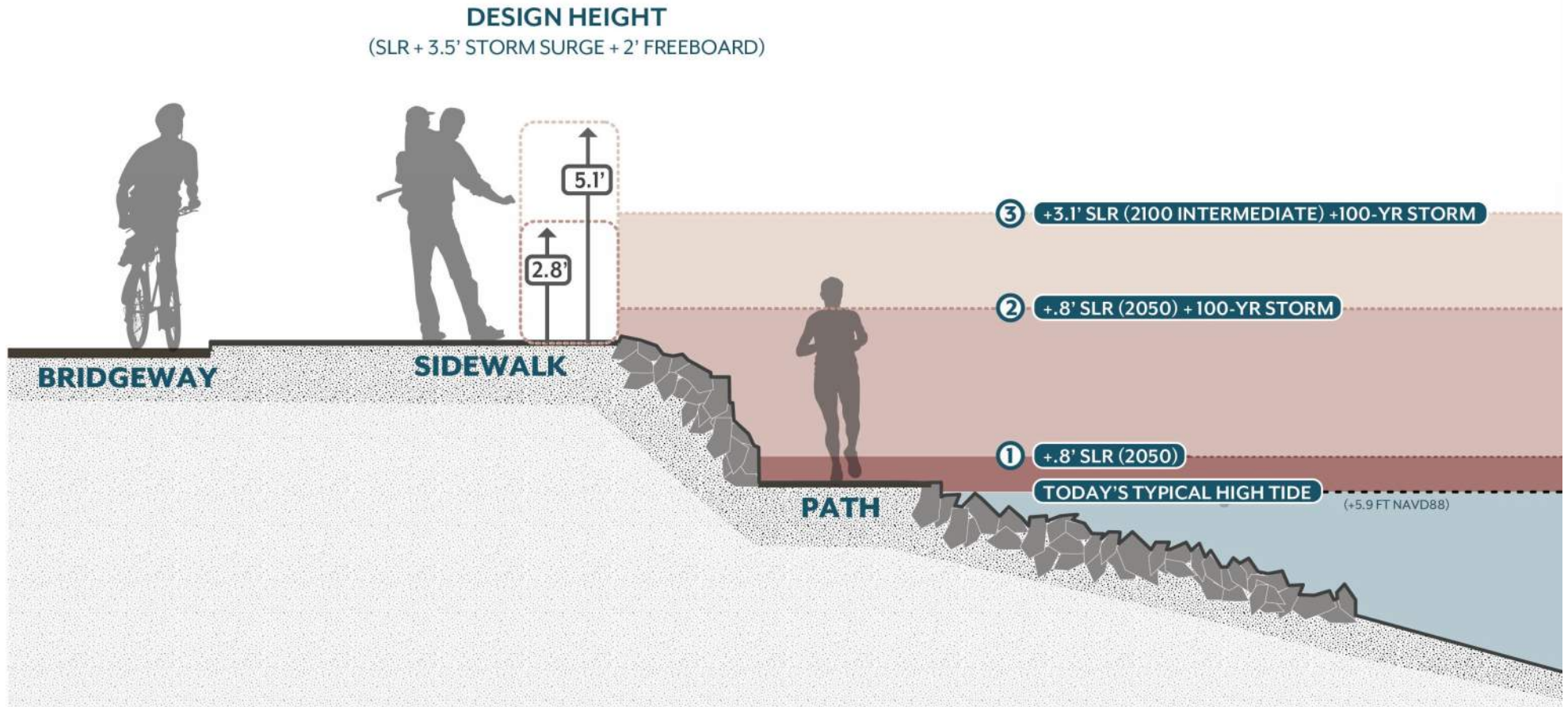
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BY TYPE

ALL TYPES

Design Height Guidance

TYPICAL BRIDGEWAY SECTION



	Scenario	MHHW (NAVD)	SLR	Storm	Freeboard	TWL	Existing Sidewalk Elev. (NAVD)	Design Height of Strategy
1	2050 (permanent)	5.9'	0.8'	n/a	2'	8.7'	9.38'	n/a
2	2050 (temporary)	5.9'	0.8'	3.5'	2'	12.2'	9.38'	2.8'
3	2100 Intermediate	5.9'	3.1'	3.5'	2'	14.5'	9.38'	5.1'

03

Tools & Precedents



Adaptation Tools

- Refining strategies to align with Sausalito's character (based on what we heard)
- Following tools and precedents correspond with adaptation scenarios (collective, individual, living with water) :
 - *A. Floating*
 - *B. Raise Buildings and Infrastructure*
 - *C. Hardening the Edge*
 - *D. Reducing Impact*



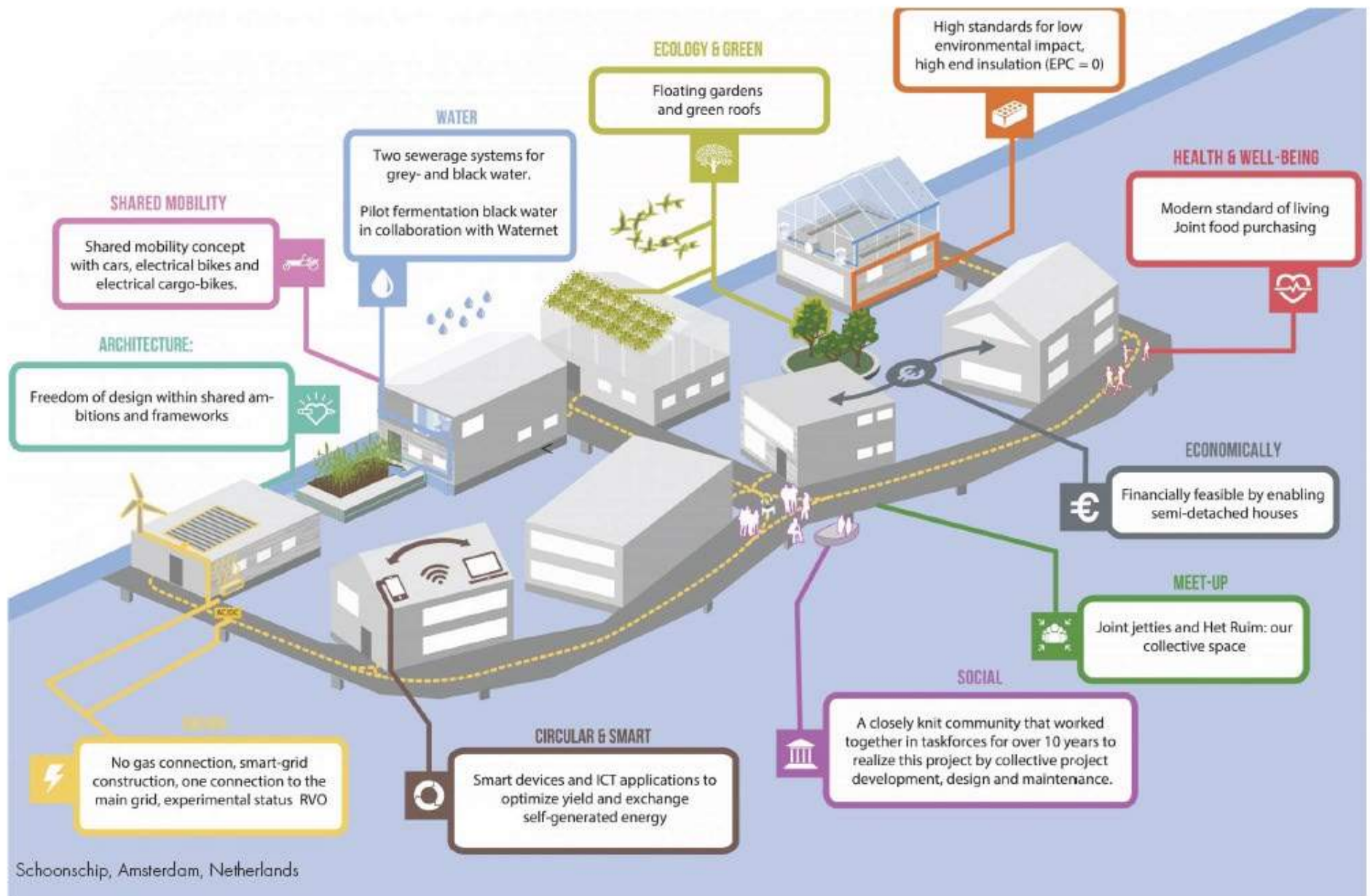
Adaptation Tools

Questions to ask:

- Who does what?
- Short term or long term?
- Land-use impacts
- Community impacts
- Ecological impacts
- Sausalito's relationship to water
- Constructability/permitability/fundability



A. Live with water: scaling up floating



Local Example – Floating Homes



**Waldo Harbour,
Sausalito, CA**

Live with water – Amphibious



**Floating pavilion,
Rotterdam, Netherlands**

**Amphibious house,
Maasbommel**



Amphibious House, Dura Vermeer & Factor Architects Maasbommel



Live with water – Large Facilities

**Global Centre,
Rotterdam**



Global Centre on Adaptation Office, Rotterdam, Netherlands

Live with water – Infrastructure



Schoonship, Amsterdam

**Dutch Floating Bridge,
Le Grandstraat,
Bergen op Zoom,
Netherlands**



Live with water – Infrastructure



**Waterschap Rivierenland's
Floating Solar Project,
INNOZOWA, Netherlands**

**Floating Farm,
Rotterdam**



Live with water – Infrastructure



**RETI Center,
New York**

**Recycled Park,
Rotterdam,
Netherlands**



Live with water – Transportation



**Floating Ferry Terminal,
Terengganu, Malaysia**

**Battery Park Ferry Terminal,
New York**



B. Raise Buildings and Infrastructure (individual)



**Raised homes,
Hurricane Harvey
aftermath,
Texas**

**Whitney Museum
Flood Protection,
New York**



Local Examples – Dry Floodproofing (individual)



**Lake Edith at Heath
Ceramics, Sausalito,
CA**

Raise Infrastructure (collective)



**Raised Road and Pier –
Brannan Street Wharf,
San Francisco**

**Foster City Levee
Trail, Foster City**



C. Hardening the Edge (collective)



**Berms, Foster City
System, California**

**ESCR seawall,
New York City**



D. Reducing Impact (collective)

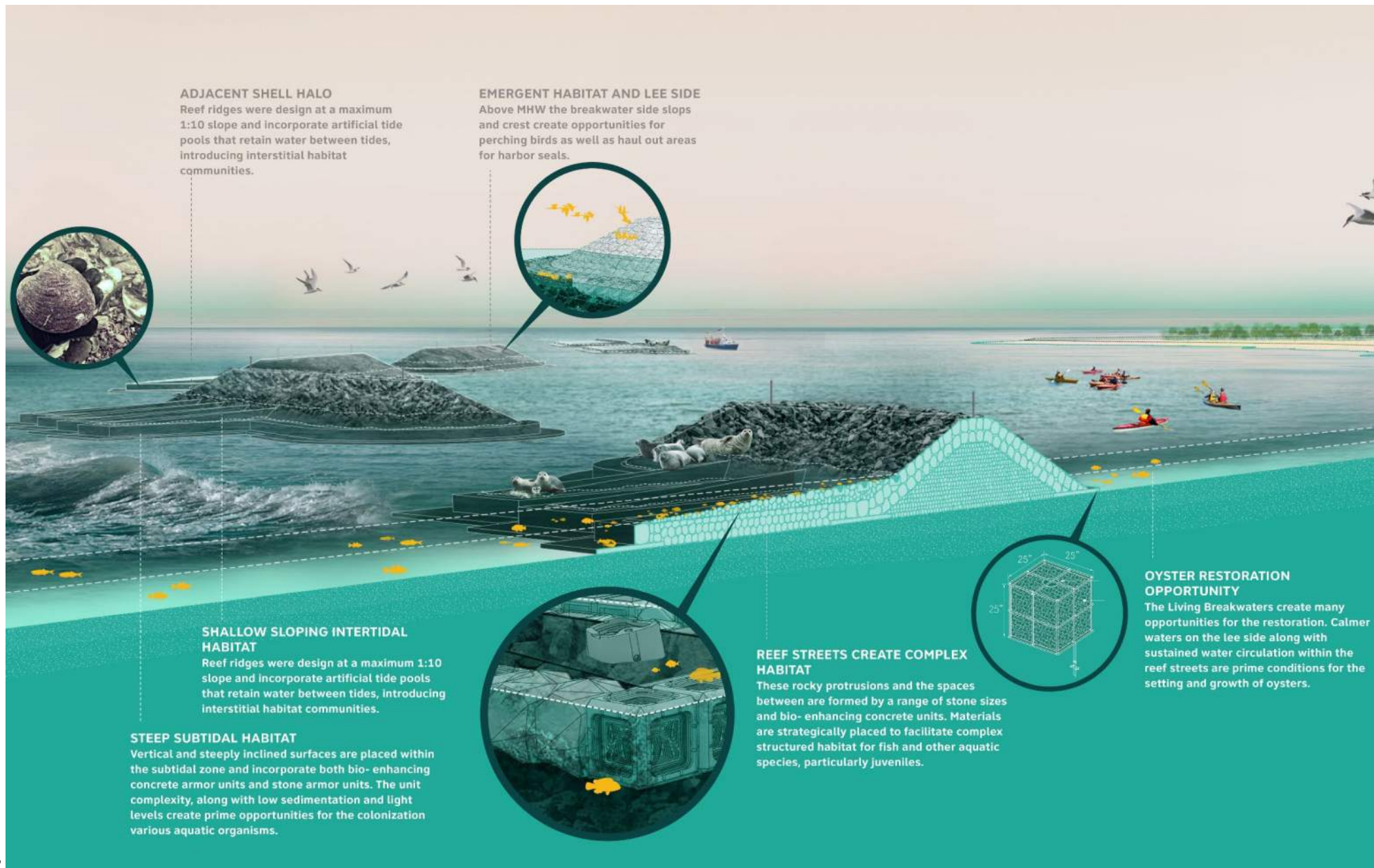


**Retention Pond,
KD Landscape, Chicago**

Reducing Impact – Living Breakwaters (collective)



Reducing Impact – Living Breakwaters (collective)



Individual vs Collective Actions

Do we want to plan for big moves?

Individual Action

- Individual asset owners will determine how and when to invest in adaptation.
- Government will take a similar approach but prioritize more publicly-valued assets.
- Result in a greater variety of adaptation levels over time, thus more challenging to maintain urban cohesion.

2050

Adaptation is a constant; property owners decide when and how

2100

Adaptation is more challenging as difference between assets increases

Collective Action

- The City leads with an integrated adaptation strategy to transform the coastline and the land use behind it collectively.
- Pooling resources and sharing benefits
- More cohesive and cost-efficient but requires buy-in and coordination

2050

Focus on the adaptation of critical systems. Individuals need to buy-in and wait.

2100

The capacity is built in to increase levels of protection

04

Adaptation Approaches



What is a community vision?



Visioning to understand tradeoffs

What can this visioning exercise help us understand about the future?

Comparing benefits and impacts across multiple approaches

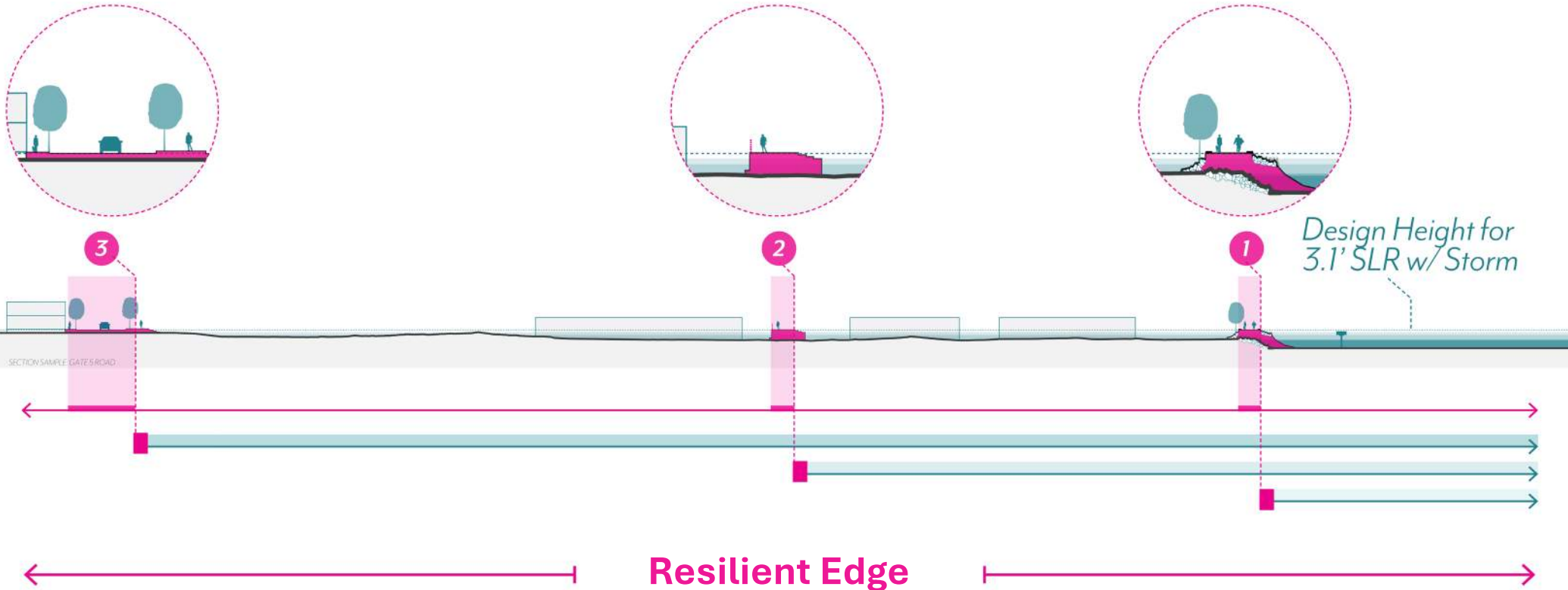
- **Community Character:** What feels authentic to Sausalito?
- **Shoreline Connection:** Views, access, water adjacent uses
- **Ecological Opportunities:** Habitat and nature-based solutions
- **Economic Vitality:** Innovation, land use impacts, business continuity
- **Arts and Culture:** Community infrastructure and tourism
- **Cost-Benefit:** Who pays? Who benefits?
- **Permitability:** Changes to current and future regulation
- **Collective Action:** Shared benefits and trade-offs

Adaptation Approaches

3

2

1



VISION AND EXPLORATION:

Where do you define the "**resilient edge**"?

What are the tradeoffs to managing water above and below the line?

Adaptation Approaches – 4 Zones

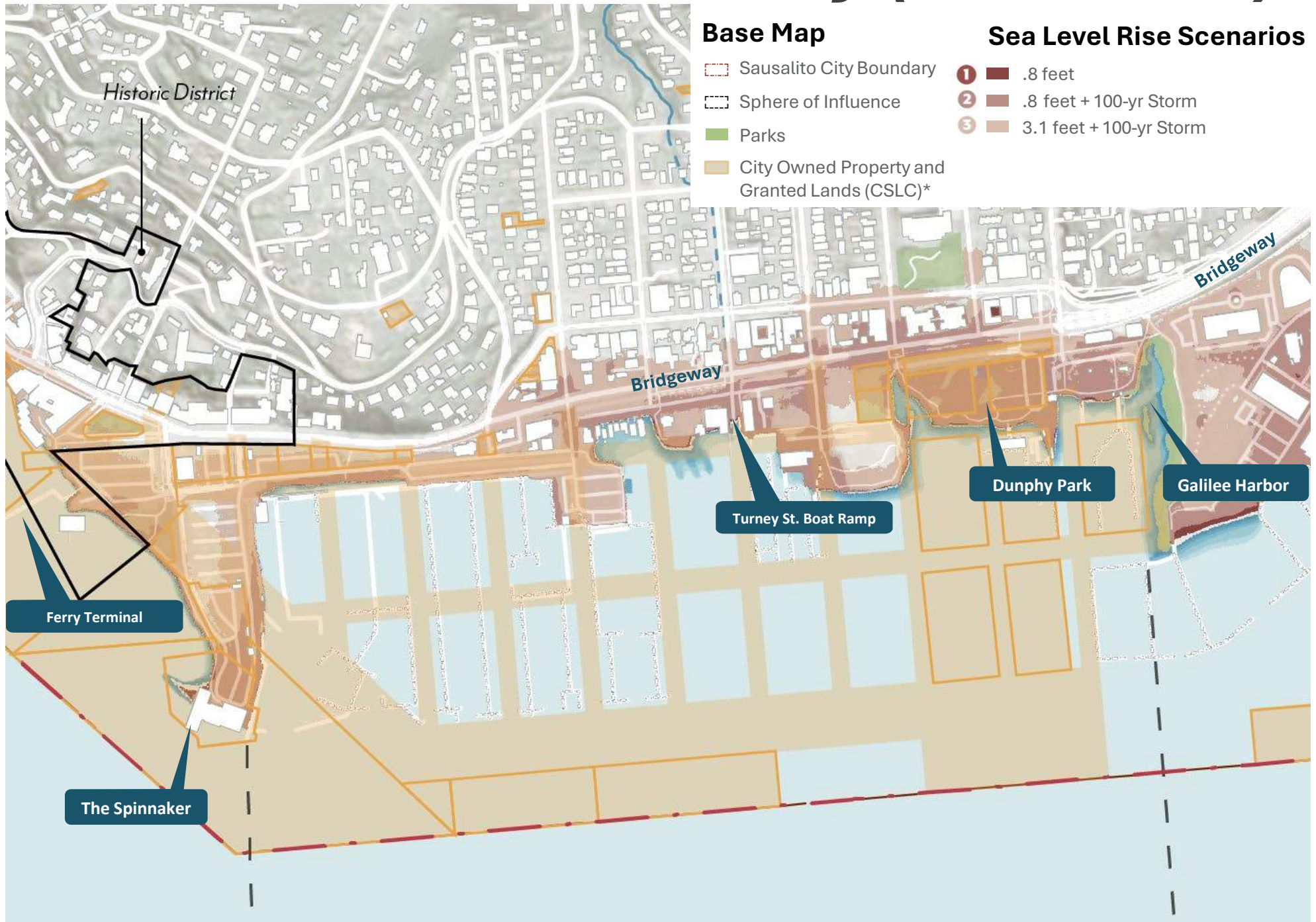
- **New Town**
- **Southern Waterfront & Promenade**
- **Marinship - Gate 5 & Varda Landing**
- **Floating Homes - Gate 6 & 6 1/2**



New Town



New Town: Vulnerability (No Action)

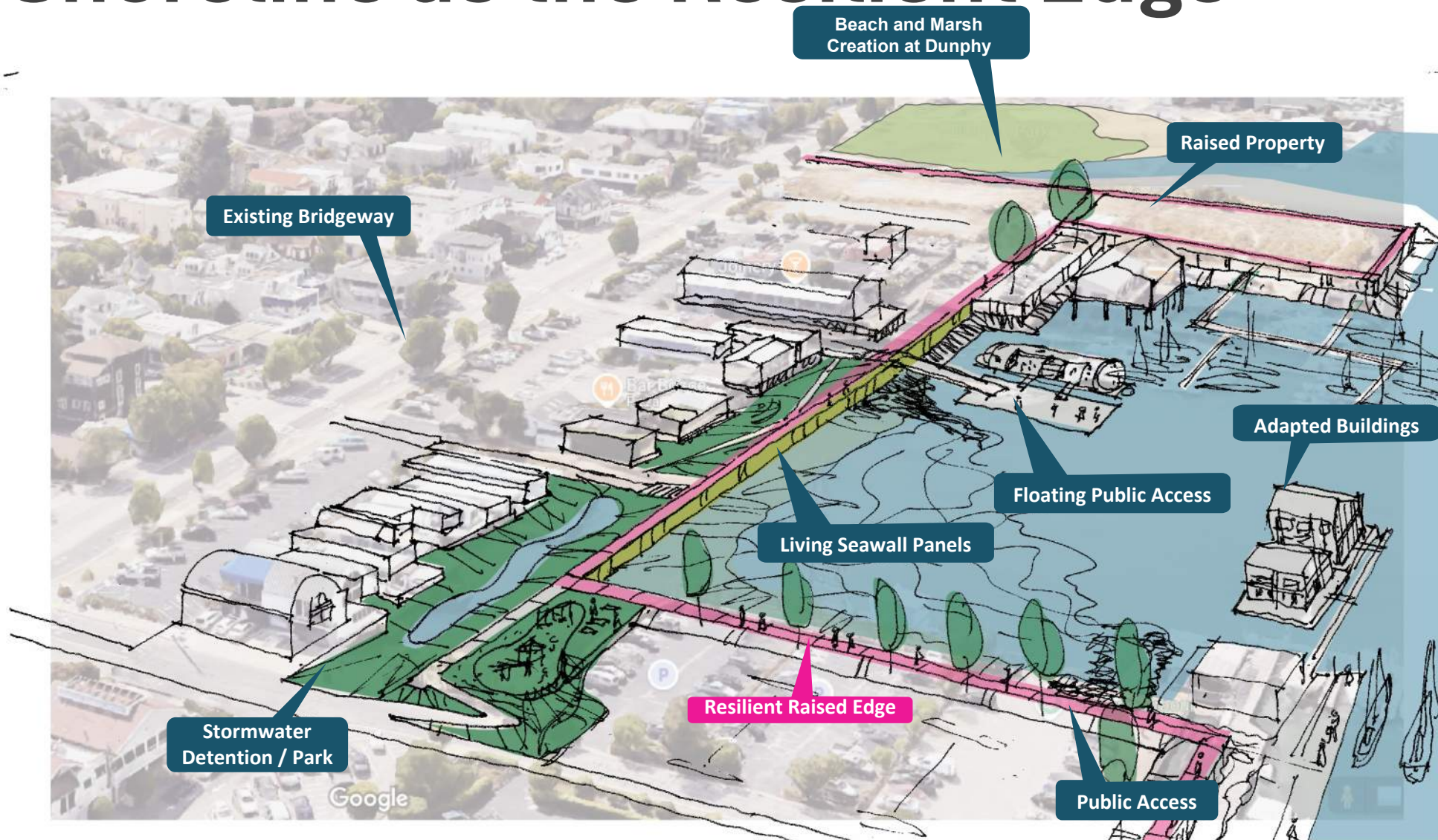


New Town

Existing Conditions



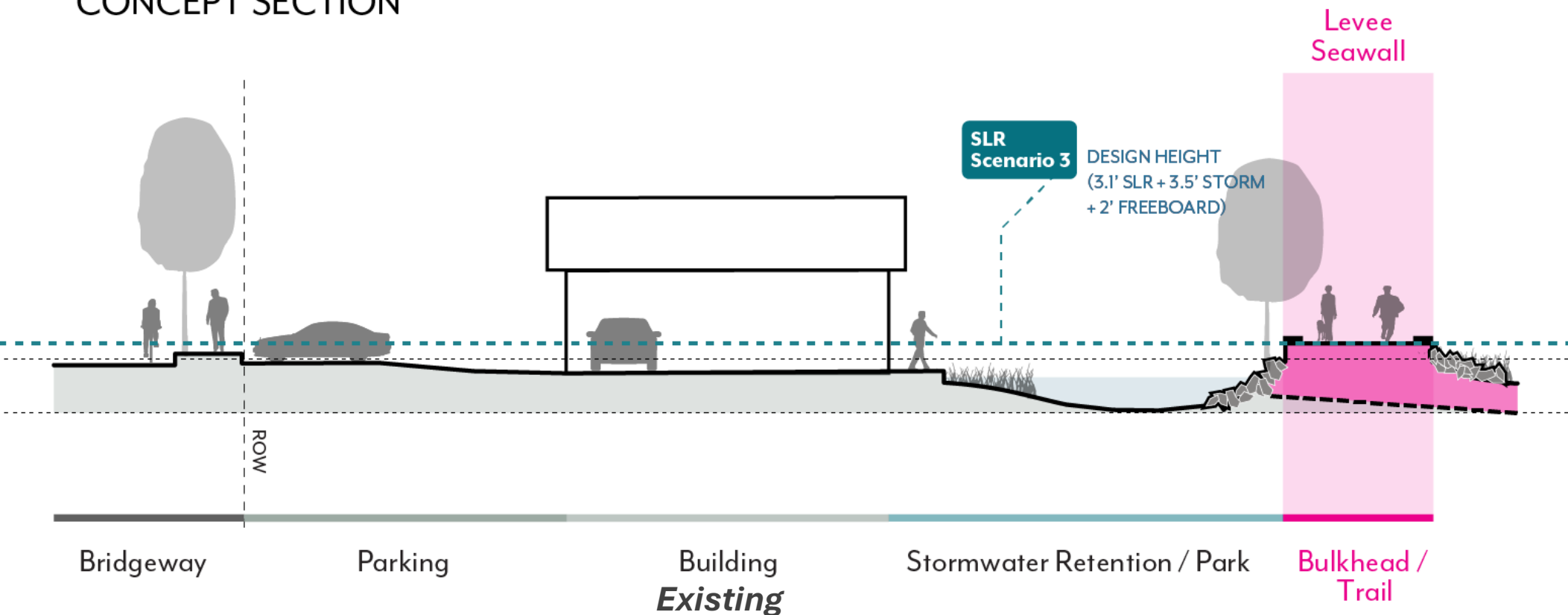
Shoreline as the Resilient Edge



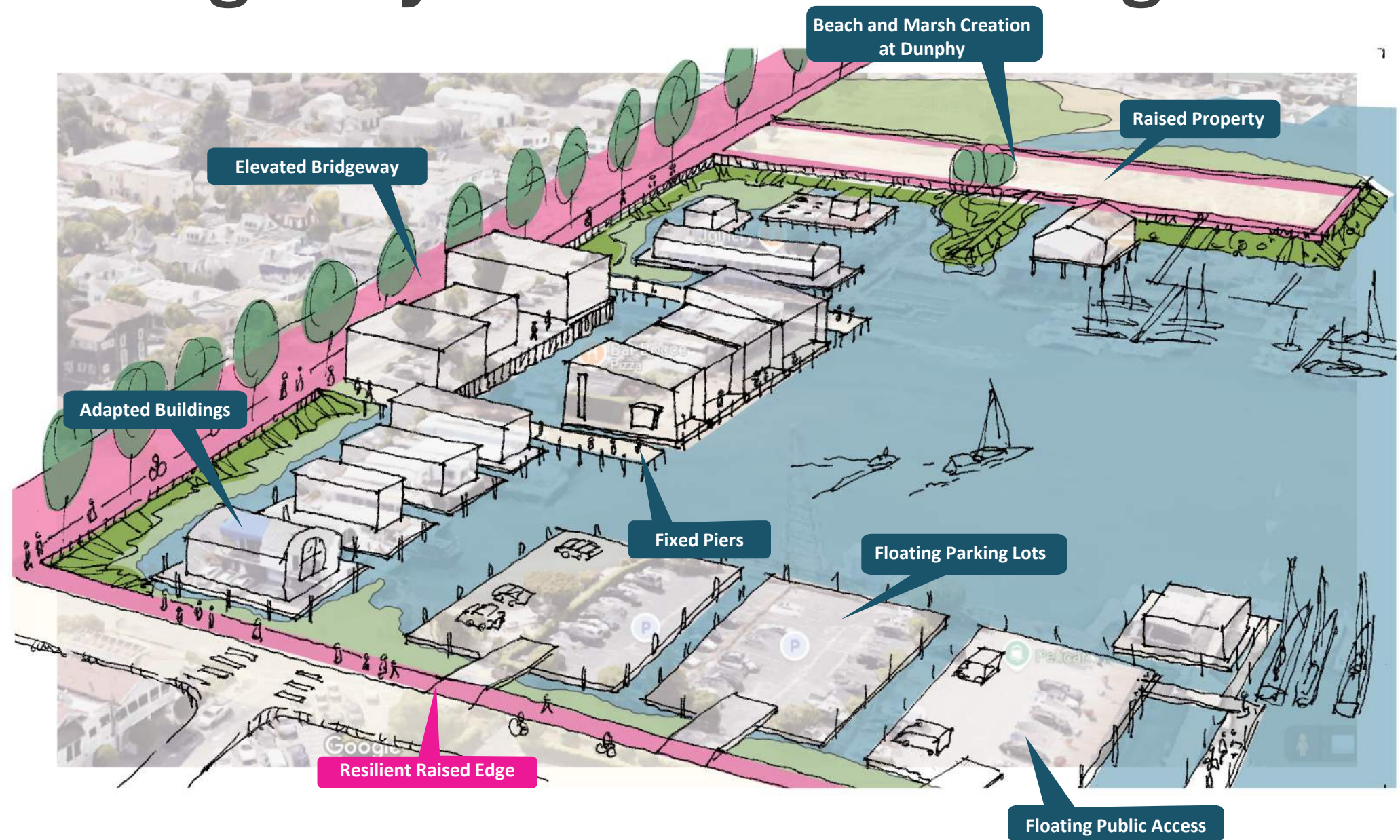
Shoreline as the Resilient Edge



CONCEPT SECTION



Bridgeway as the Resilient Edge



Bridgeway as the Resilient Edge

CONCEPT SECTION

Levee/Seawall
In City ROW

SLR
Scenario 3

DESIGN HEIGHT
(3.1' SLR + 3.5' STORM
+ 2' FREEBOARD)

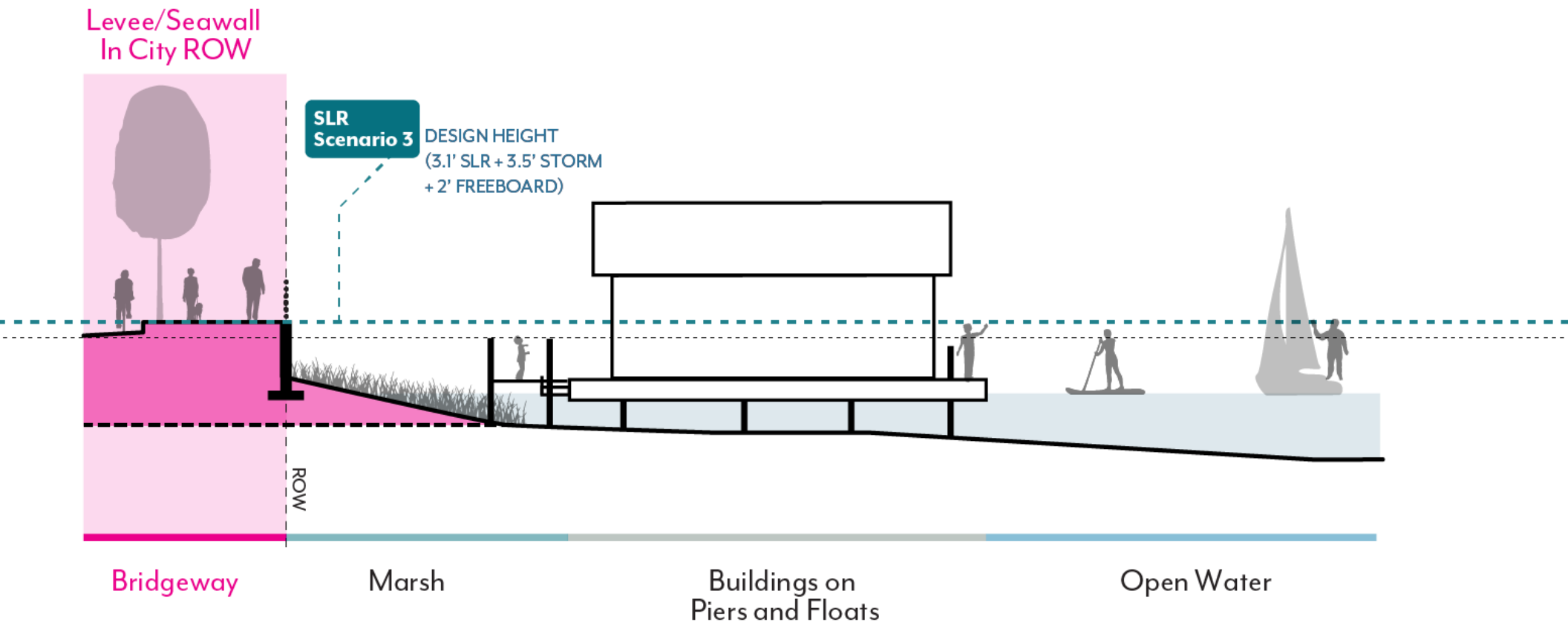
ROW

Bridgeway

Marsh

Buildings on
Piers and Floats

Open Water



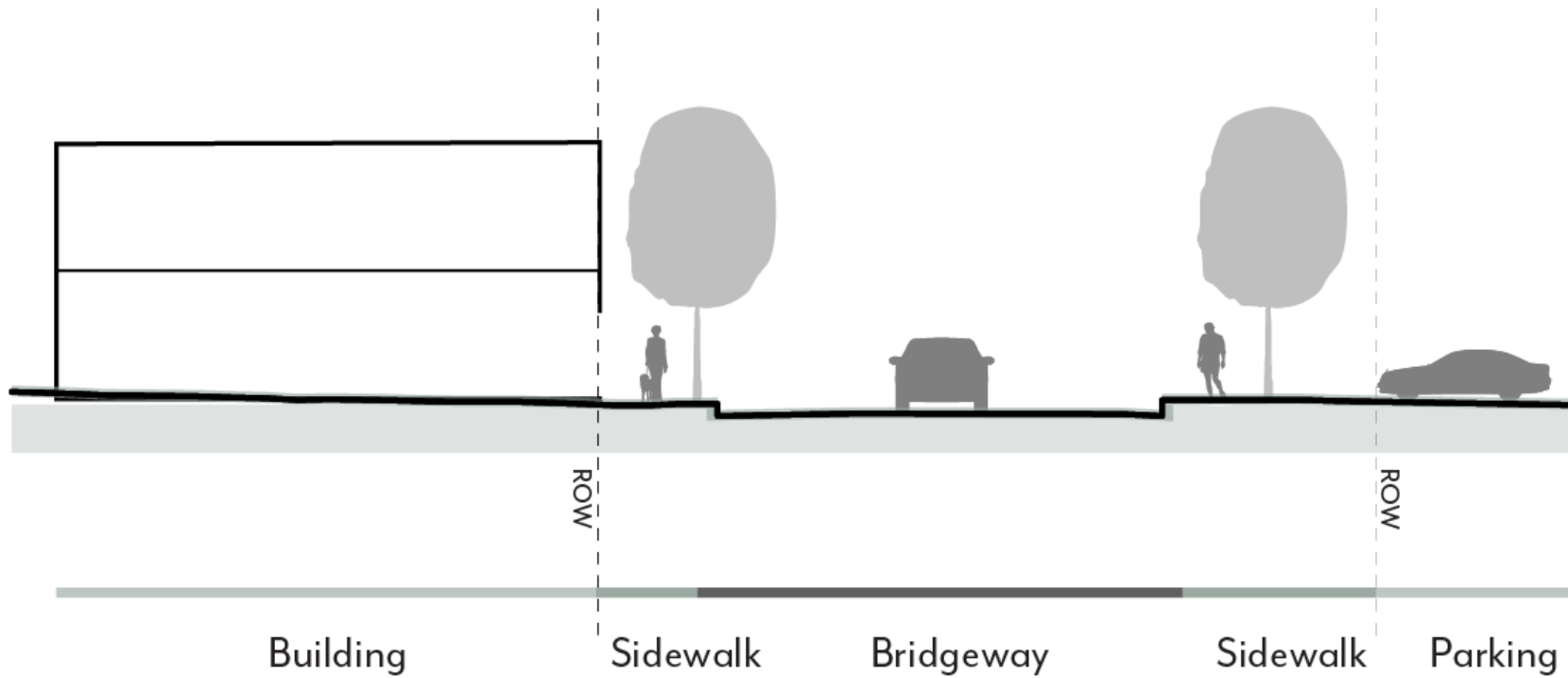
New Town

Closer Look: **Bridgeway**



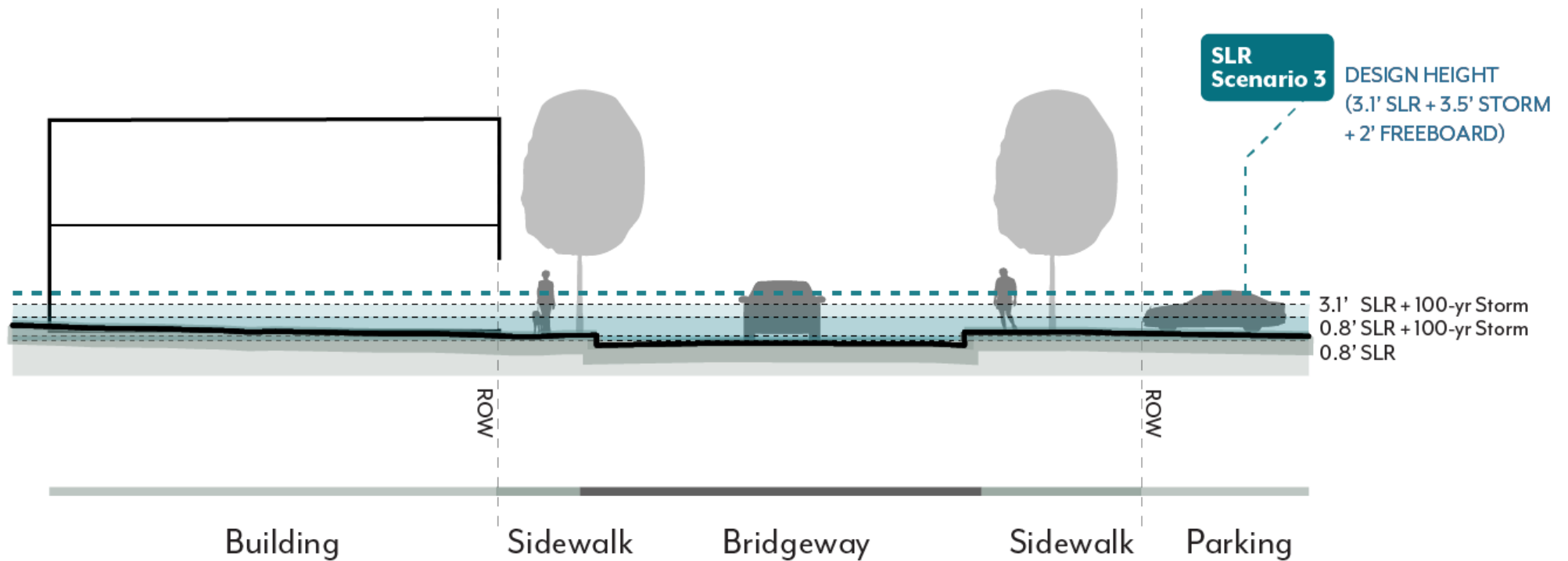
New Town

Bridgeway: Existing



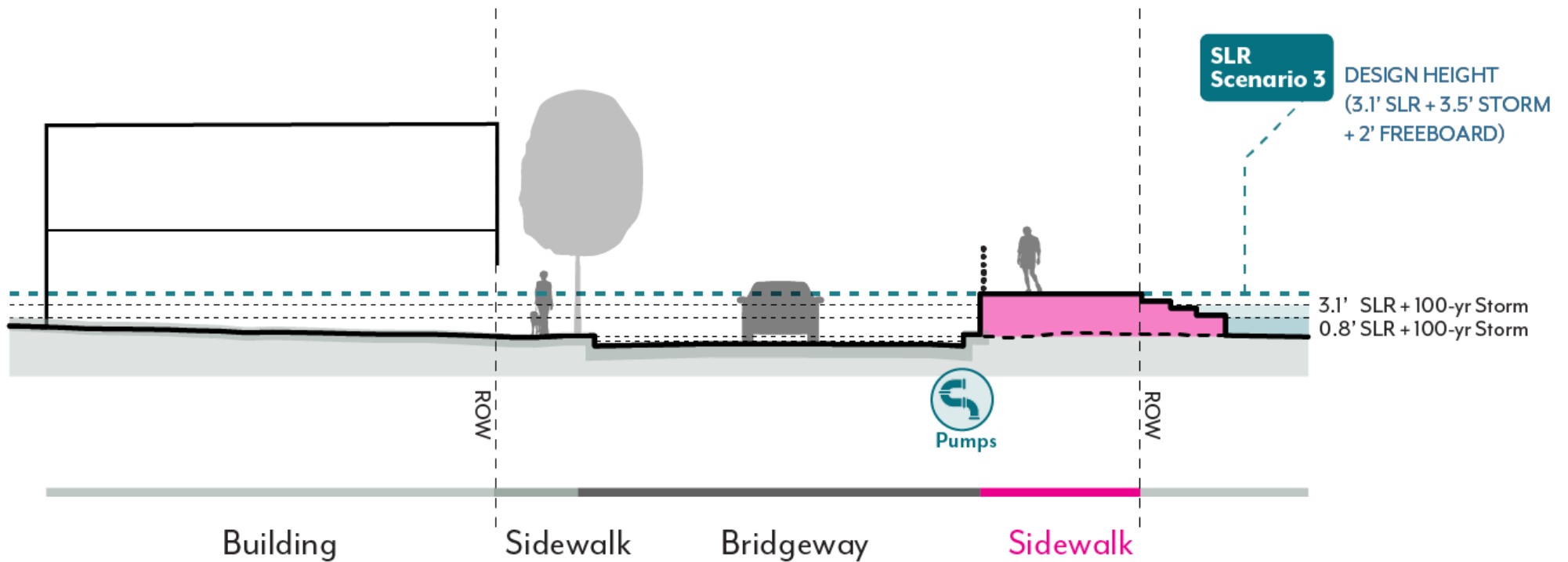
New Town

Bridgeway: No Action



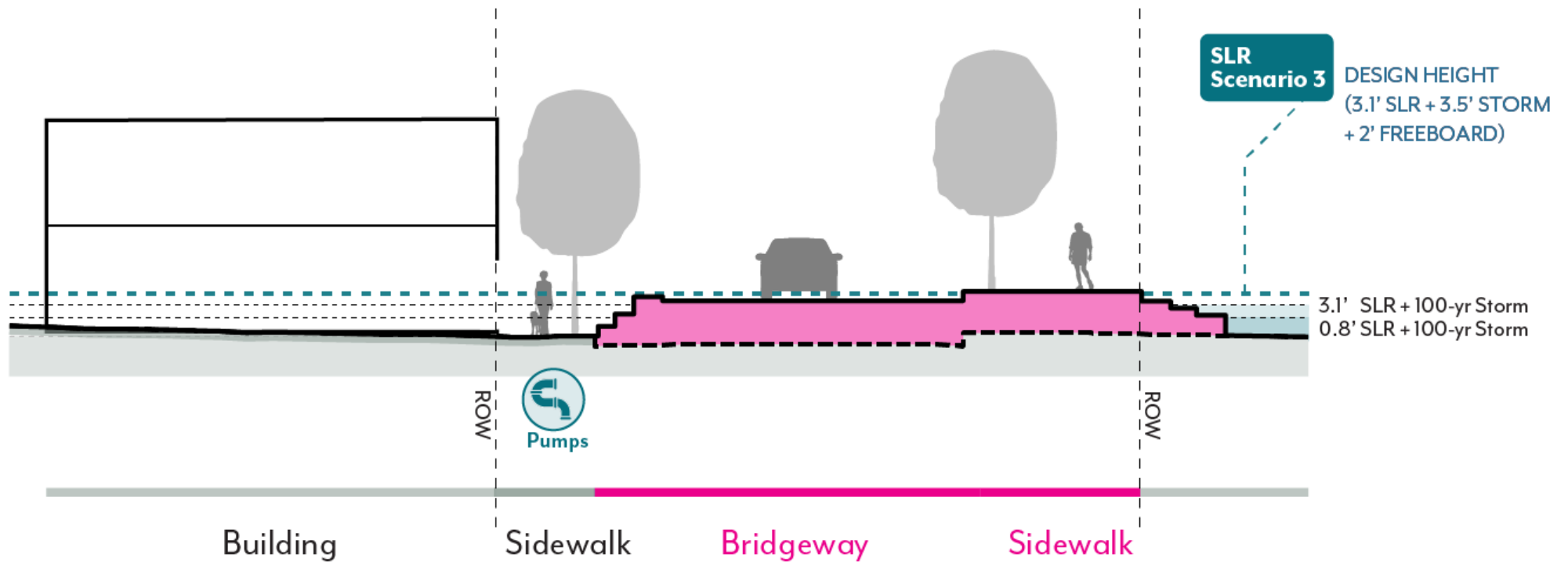
New Town

Bridgeway: Elevate Sidewalk



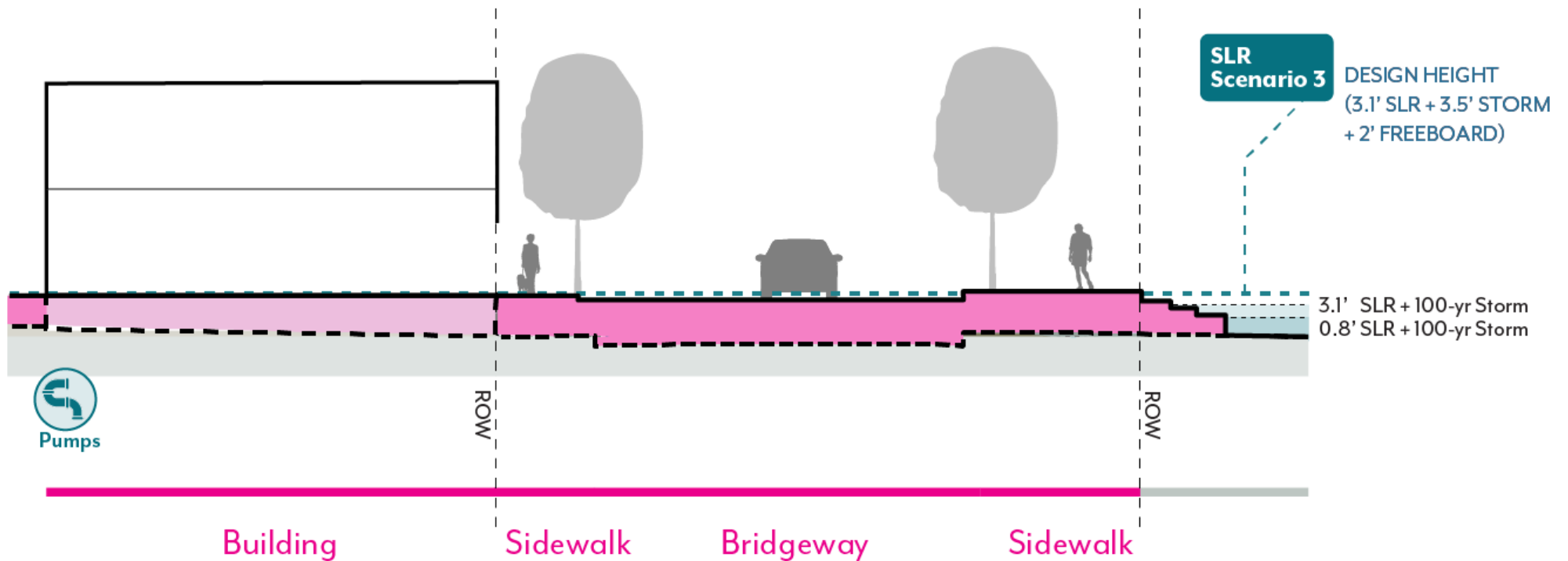
New Town

Bridgeway: Elevate Sidewalk + Road



New Town

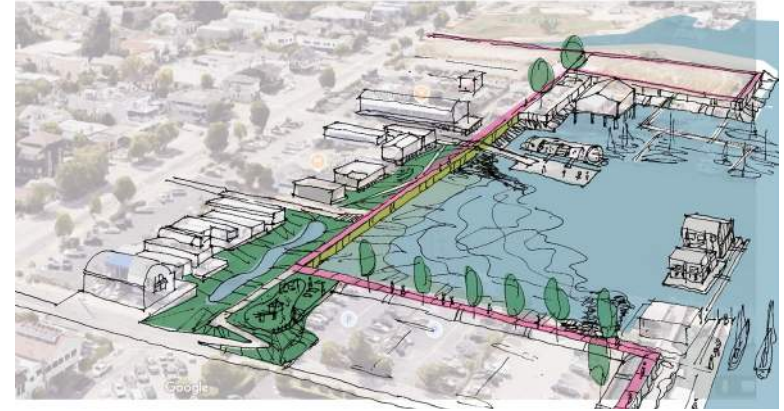
Bridgeway: Elevate Sidewalk + Road + Building



Comparing Approaches



Living with Water



Hardening the Edge

Community Character

Shoreline Connection

Ecological Opp.

Economic Vitality

Arts & Culture

Cost Benefit

Permitability

Collective Action

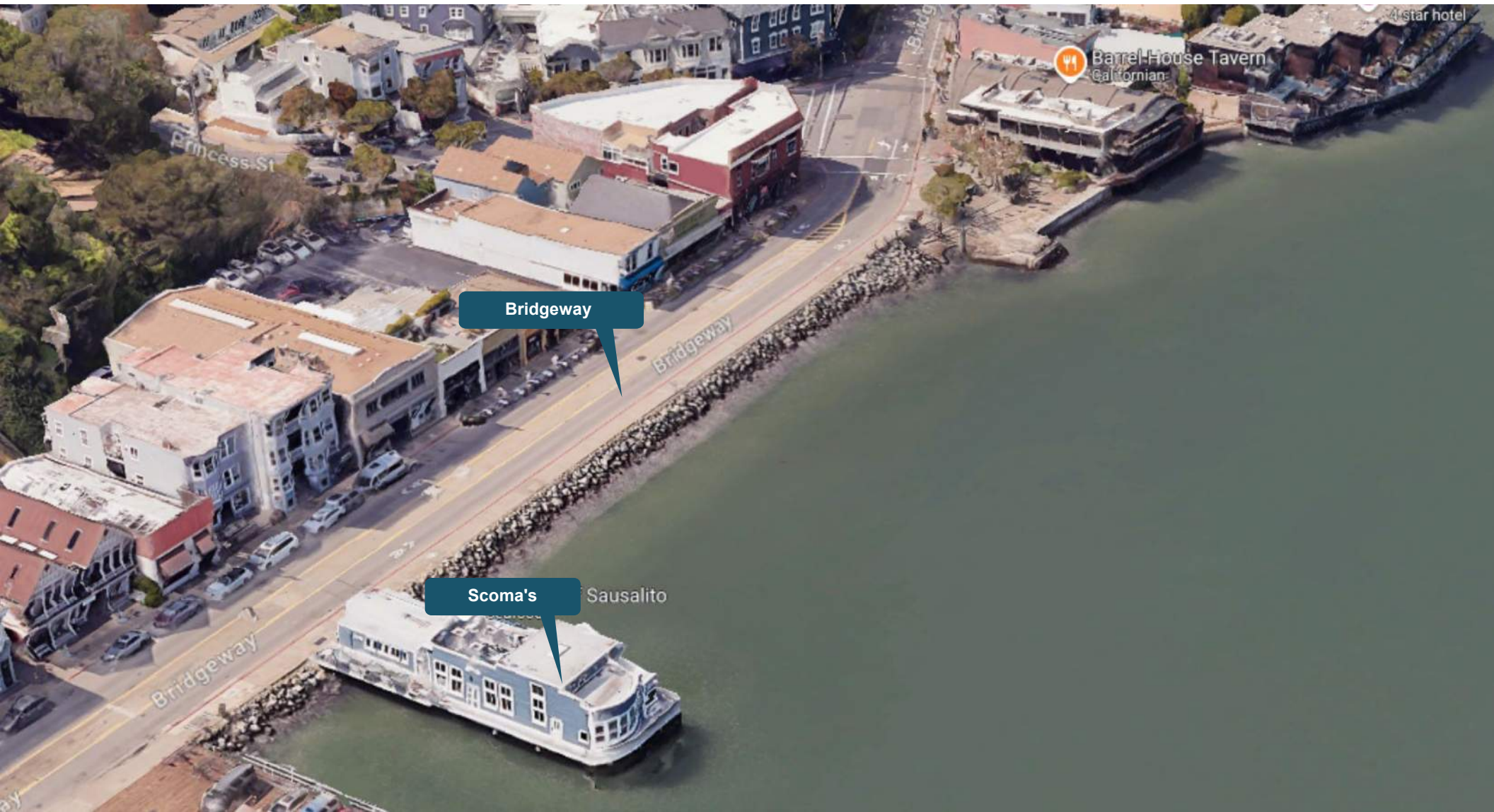
Southern Waterfront & Promenade



Southern Waterfront & Promenade

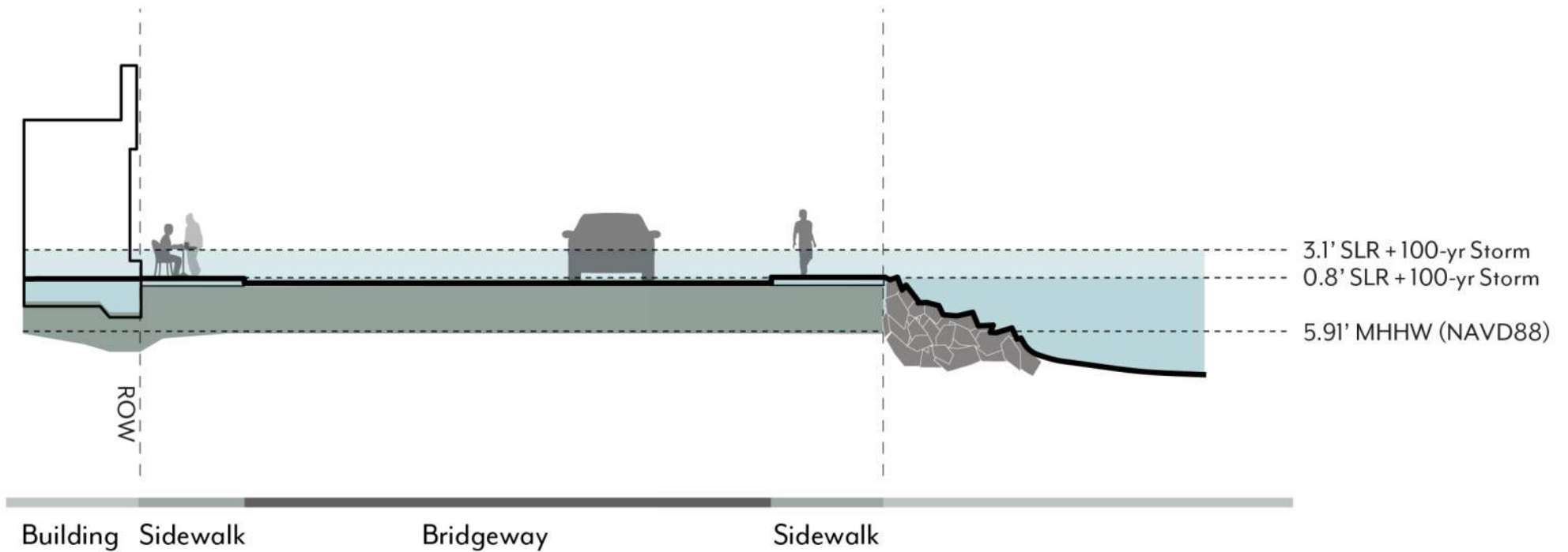


Southern Waterfront & Promenade



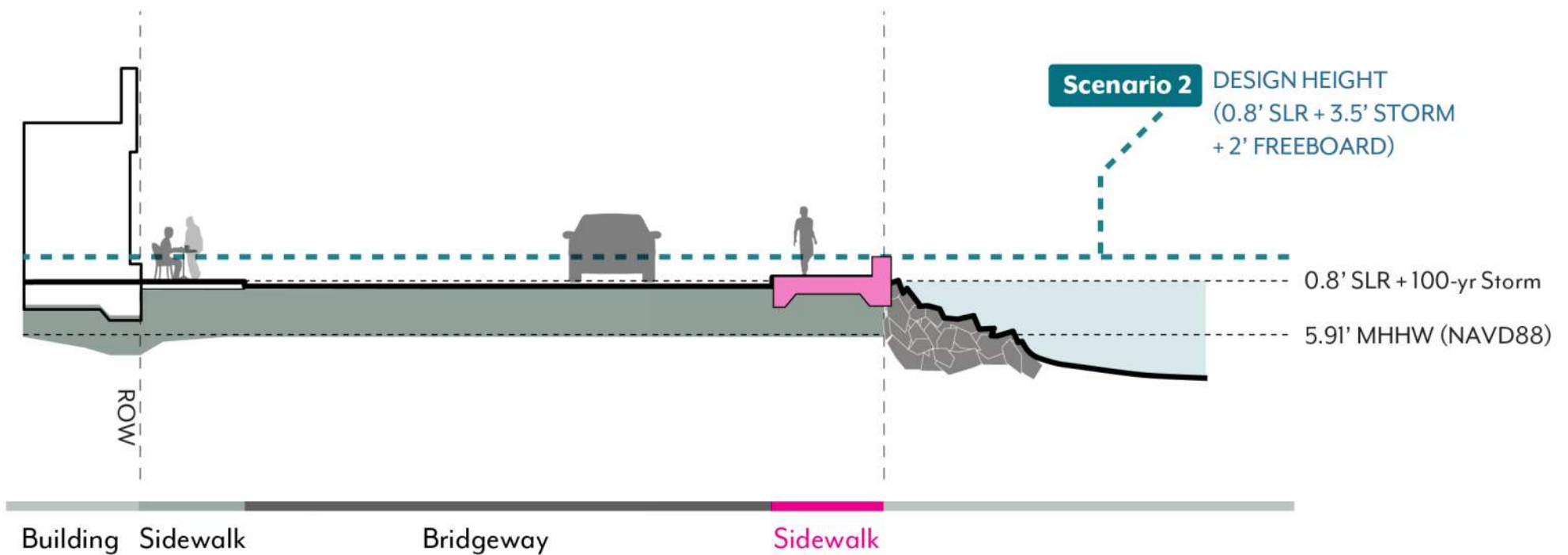
Southern Waterfront & Promenade

Existing



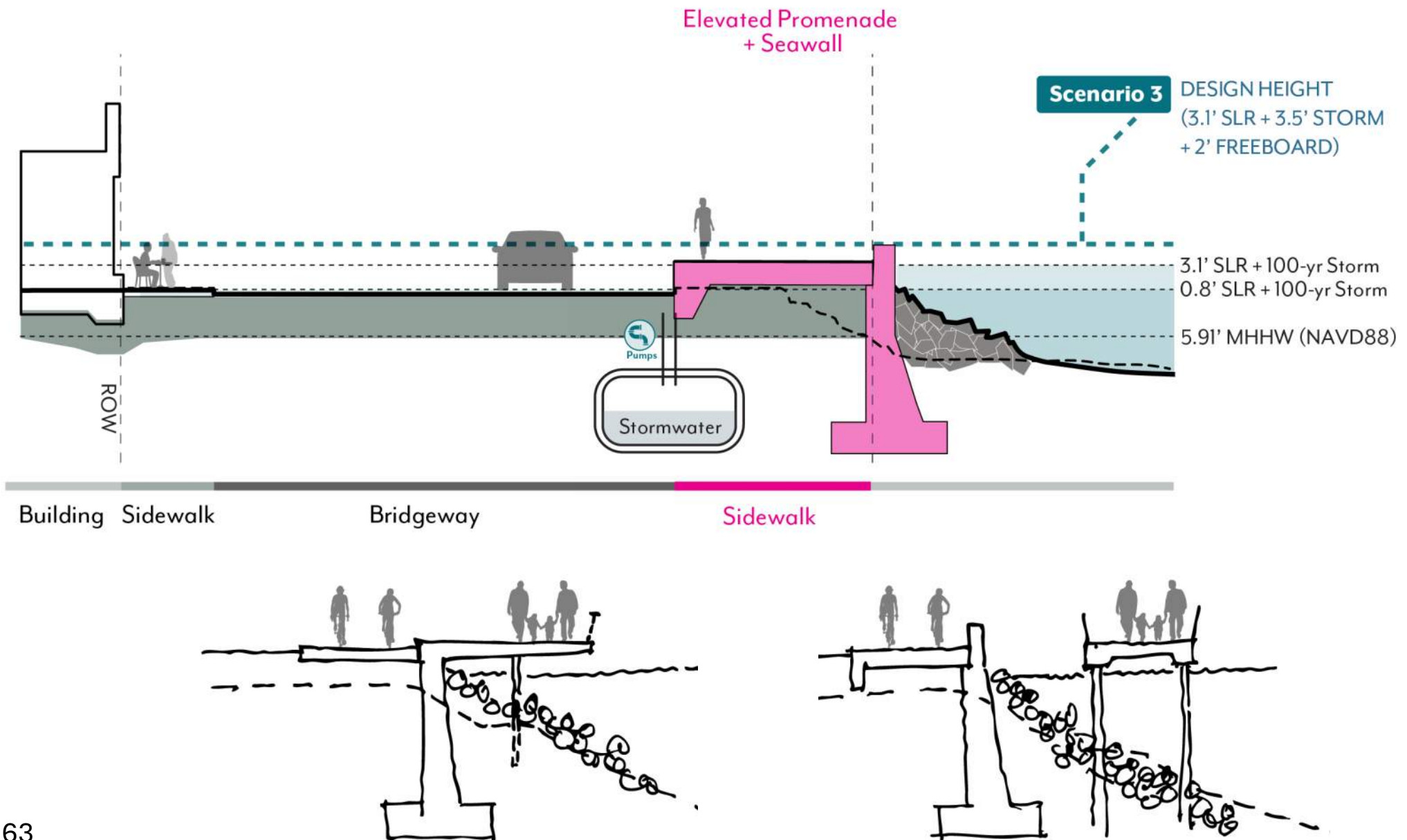
Southern Waterfront & Promenade

Mid-Century Approach: Sidewalk and Low Seawall



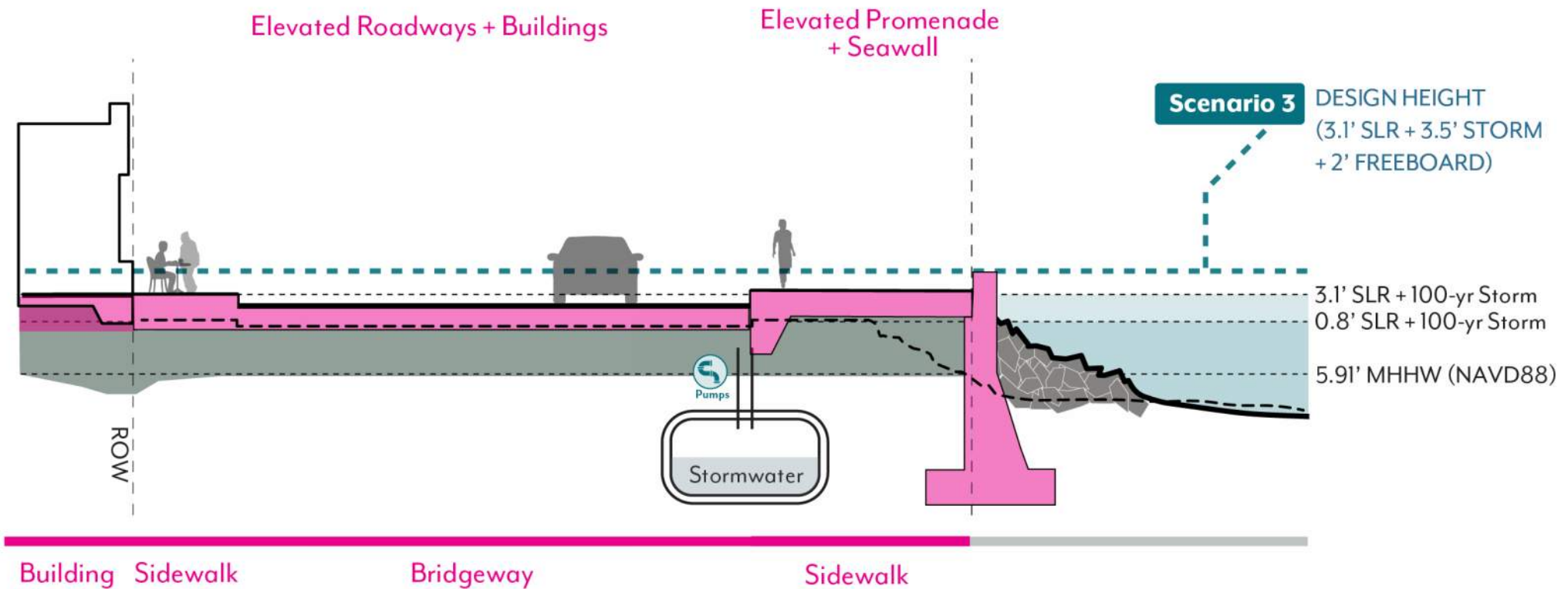
Southern Waterfront & Promenade

Elevate Promenade



Southern Waterfront & Promenade

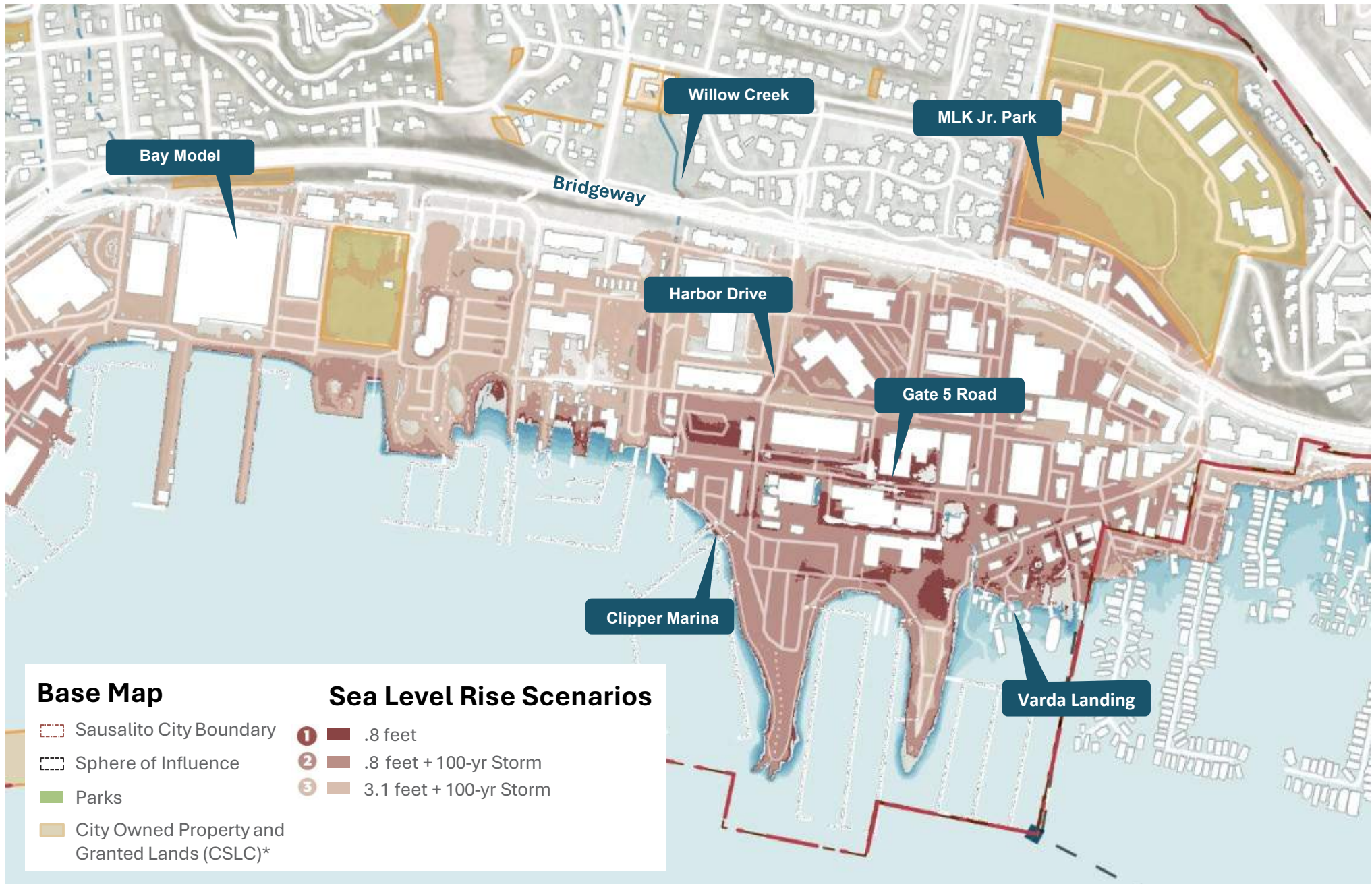
Elevate Promenade + Road + Buildings



Marinship - Gate 5 Rd & Varda Landing



Marinship - Gate 5 Rd & Varda Landing

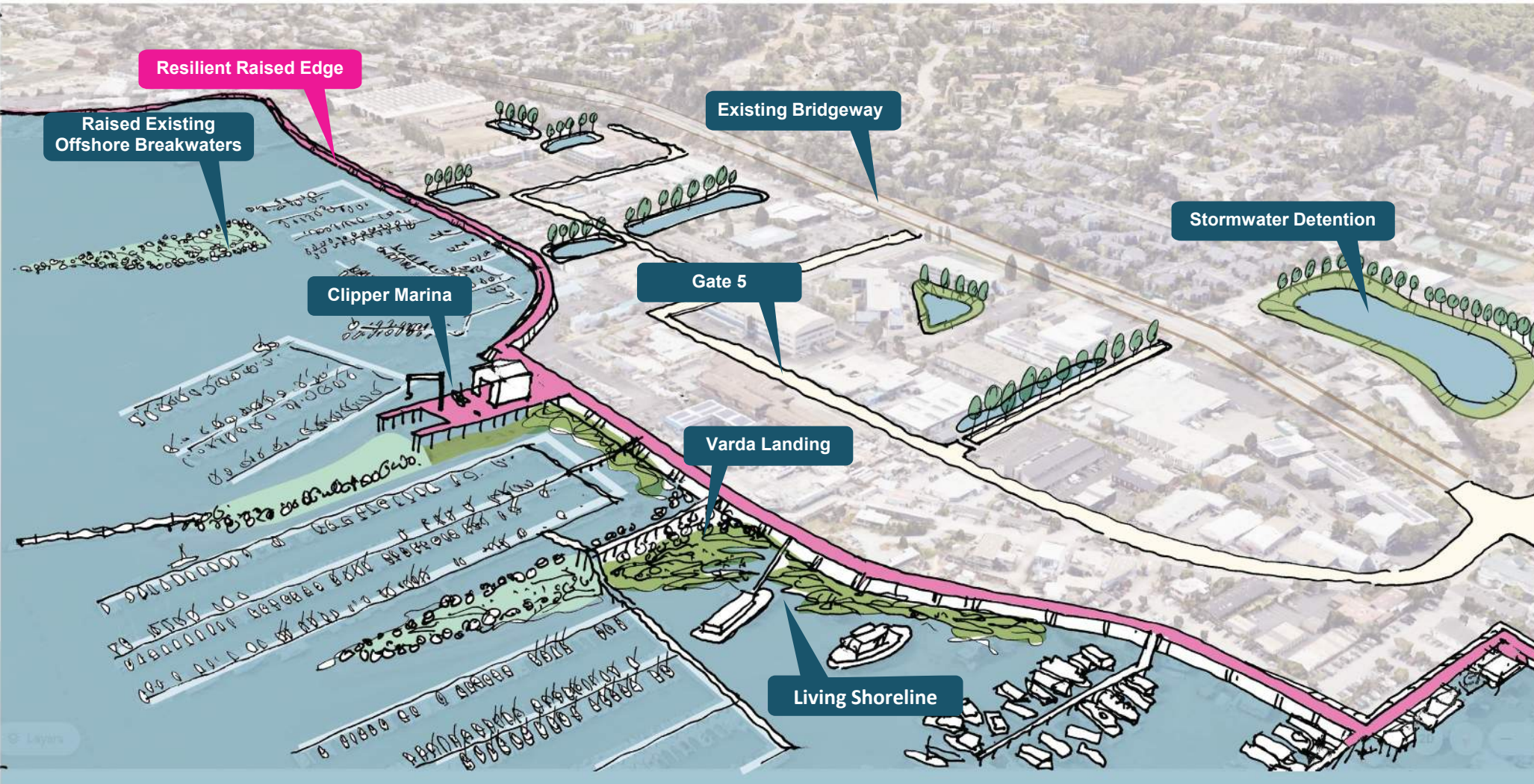


Marinship - *Gate 5 Rd & Varda Landing*



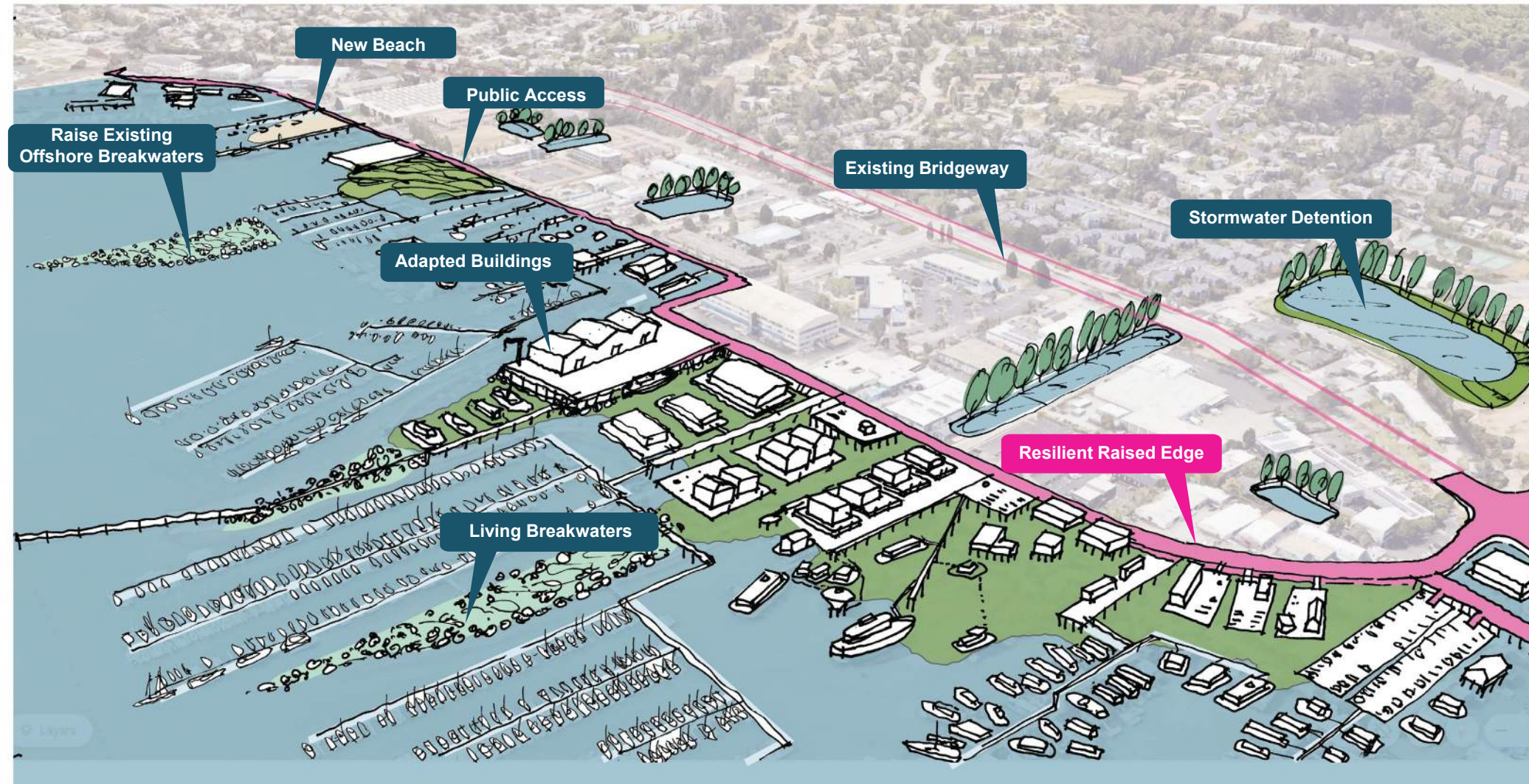
Marinship - Gate 5 & Varda Landing

Shoreline as Resilient Edge

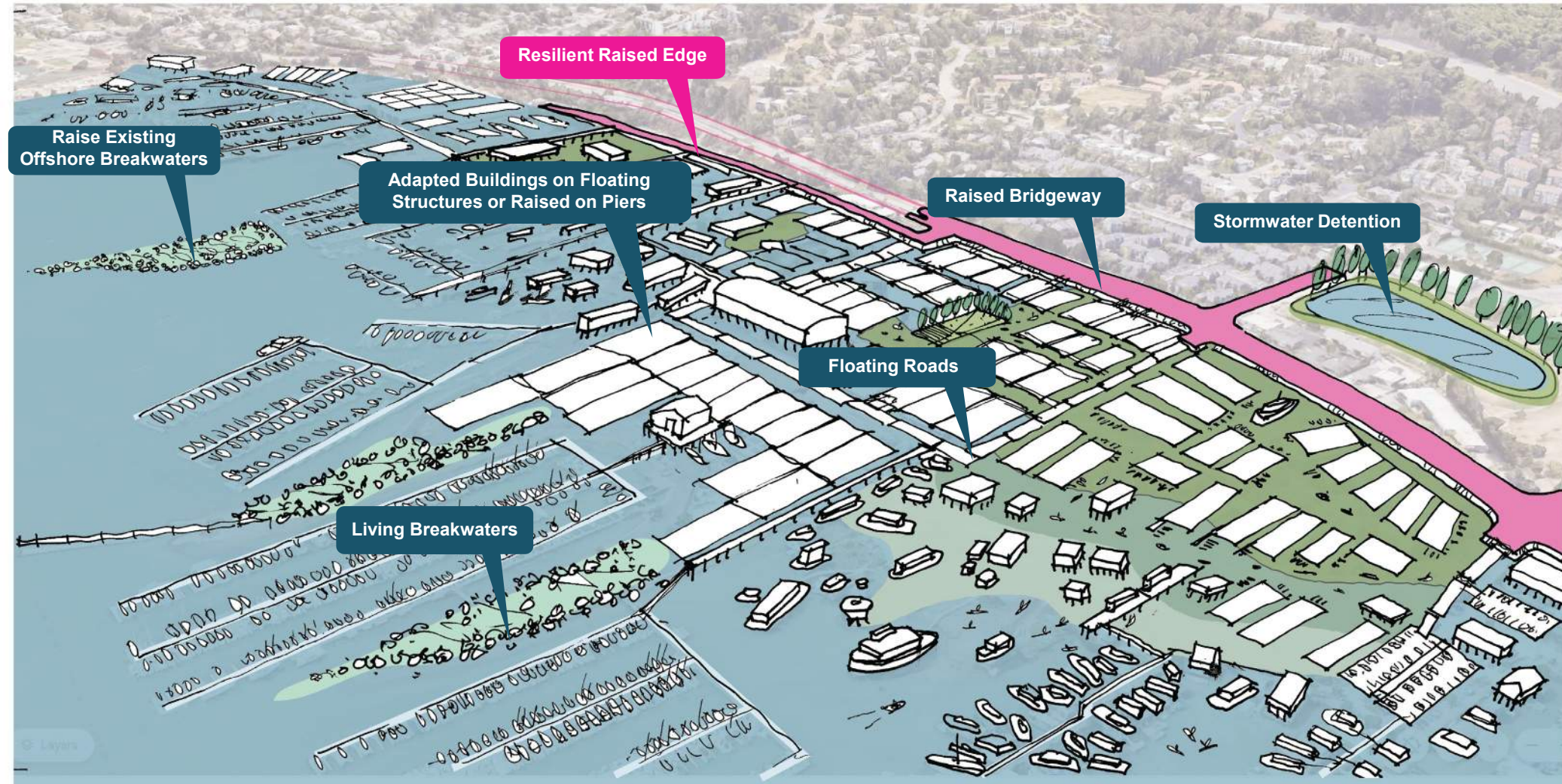


Marinship - Gate 5 & Varda Landing

Gate 5 as Resilient Edge



Bridgeway as Resilient Edge



Floating Homes - Gate 6 & 6 1/2



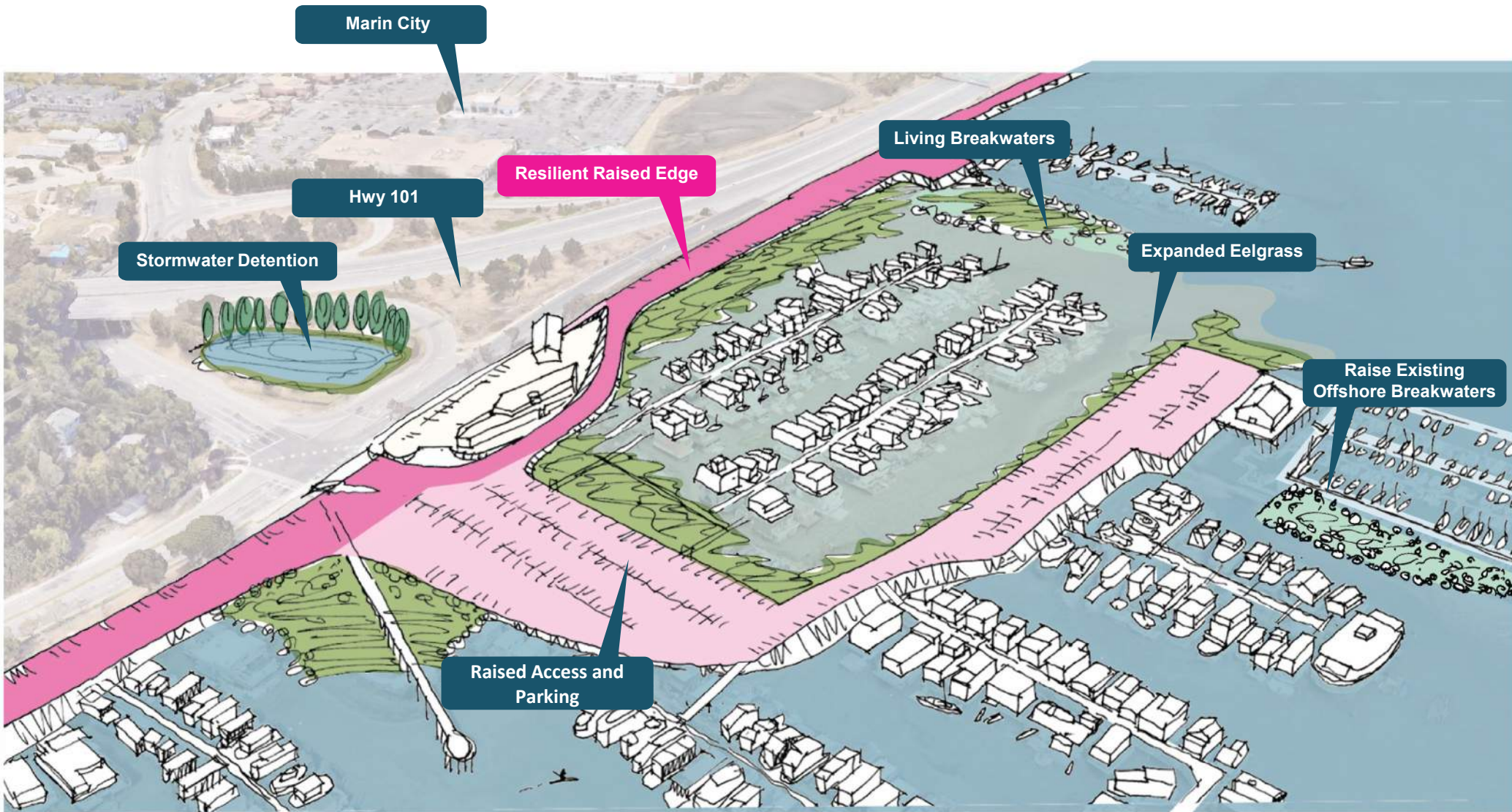
Floating Homes - Gate 6 & 6 1/2



Floating Homes - Gate 6 & 6 1/2



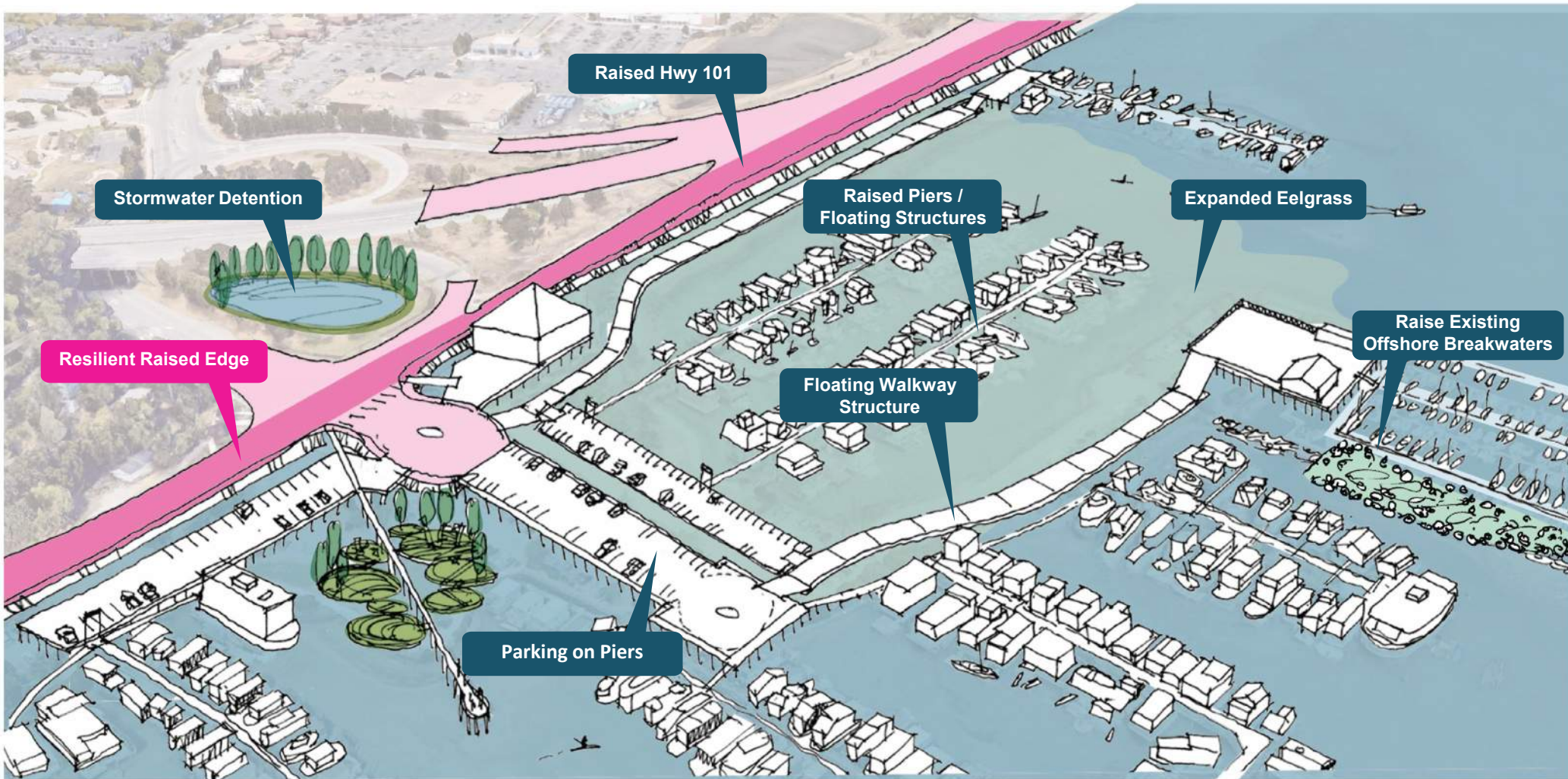
Roadways as Resilient Edge



Floating Homes - Gate 6 & 6 1/2



Bridgeway as Resilient Edge



05

**Implementation:
Where do we go from here?**



Where do we go from here?

There are many steps...

What have you already accomplished?

- **Heath – building waterproofing**
- **Clipper Marina, Waldo Point – elevated parking lot**
- **Bridgeway – long-term complete streets planning**
- **Galilee Harbor – early adaptations**

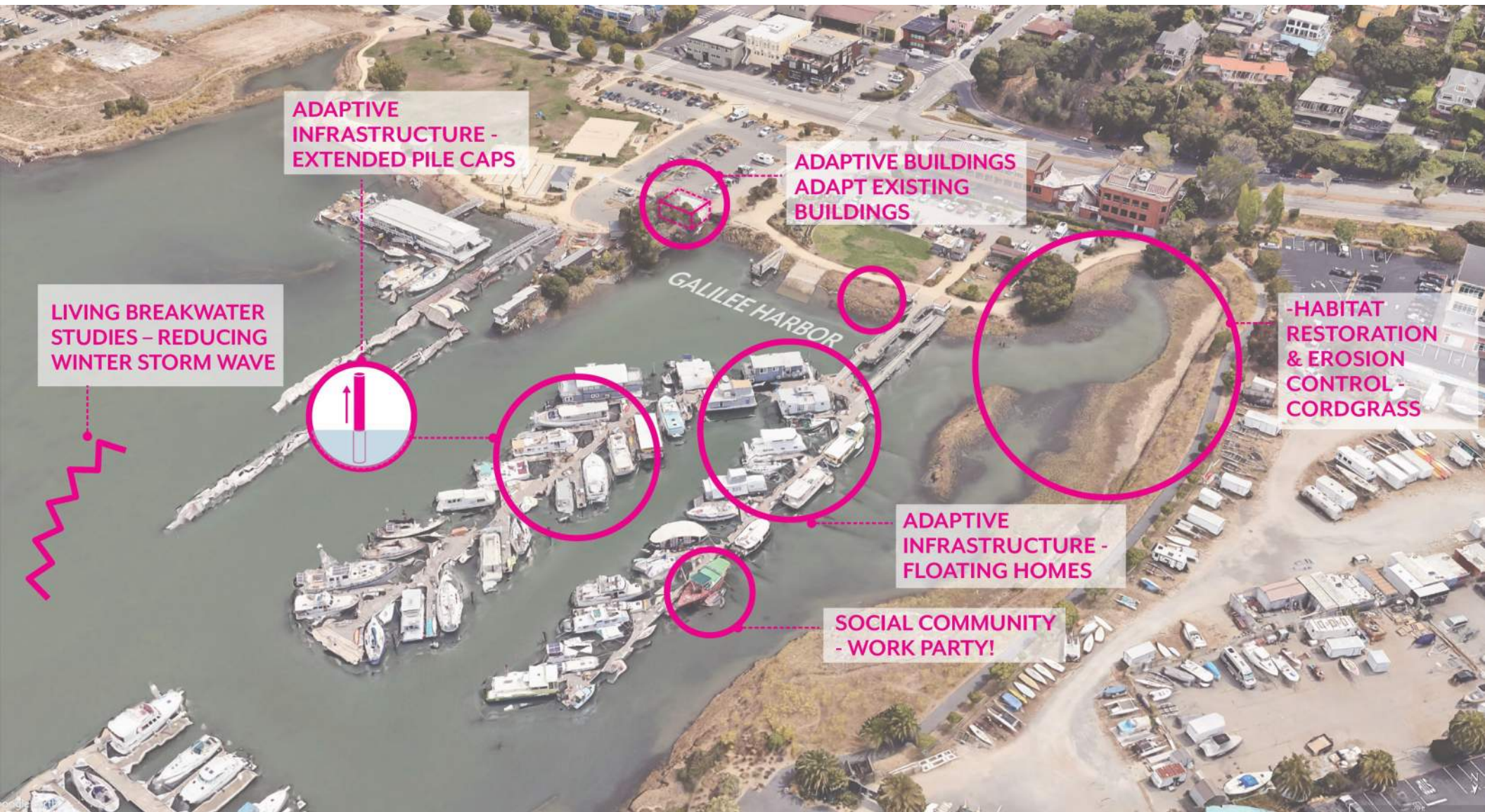
Local Example: Galilee Harbor

What makes a resilient community?

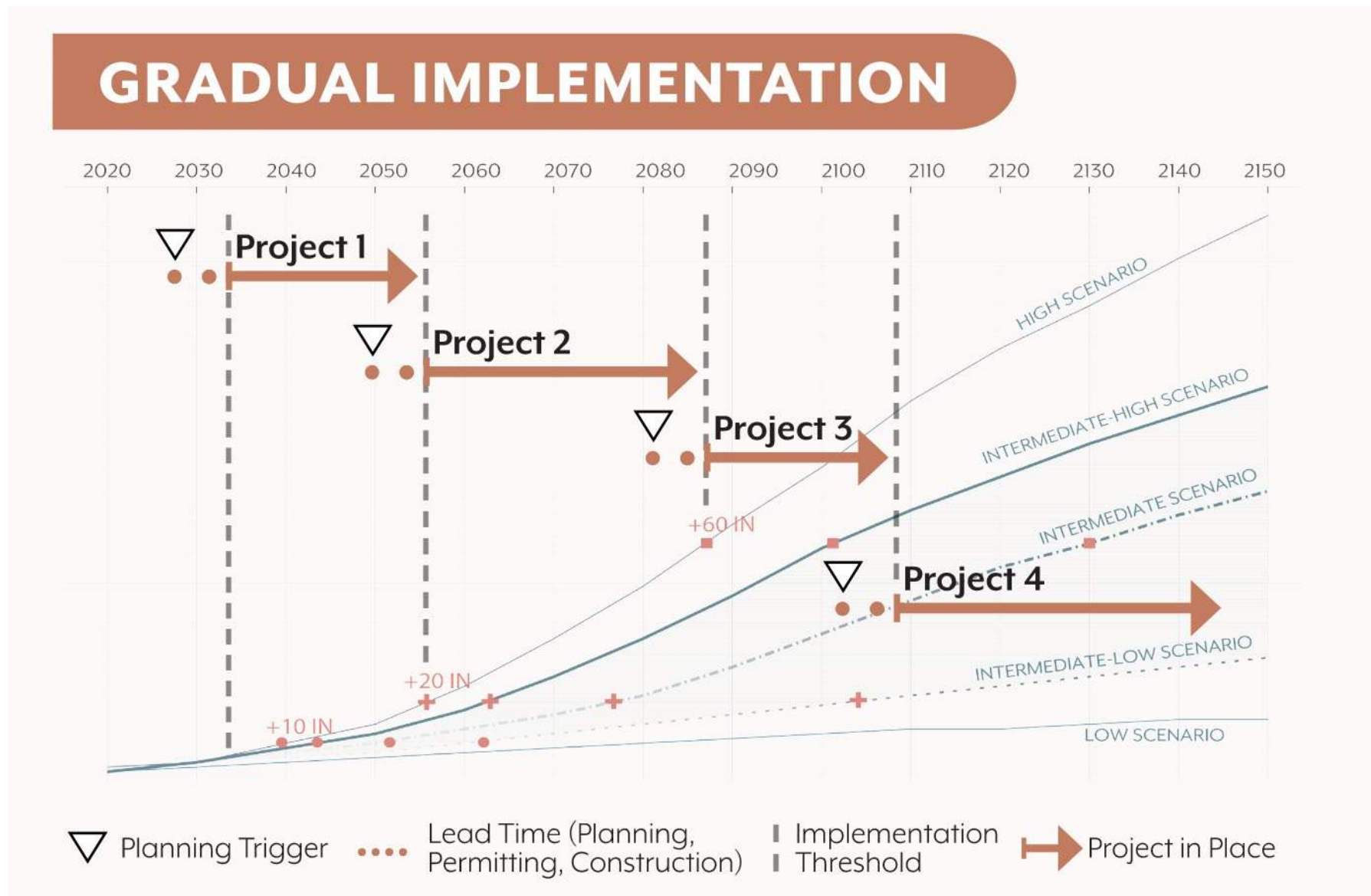


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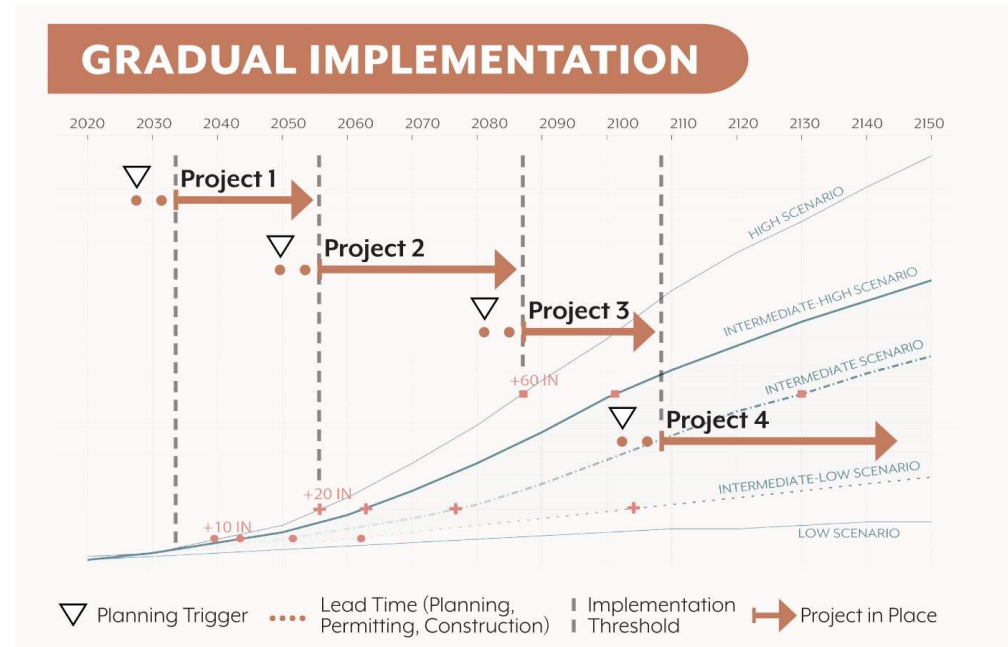
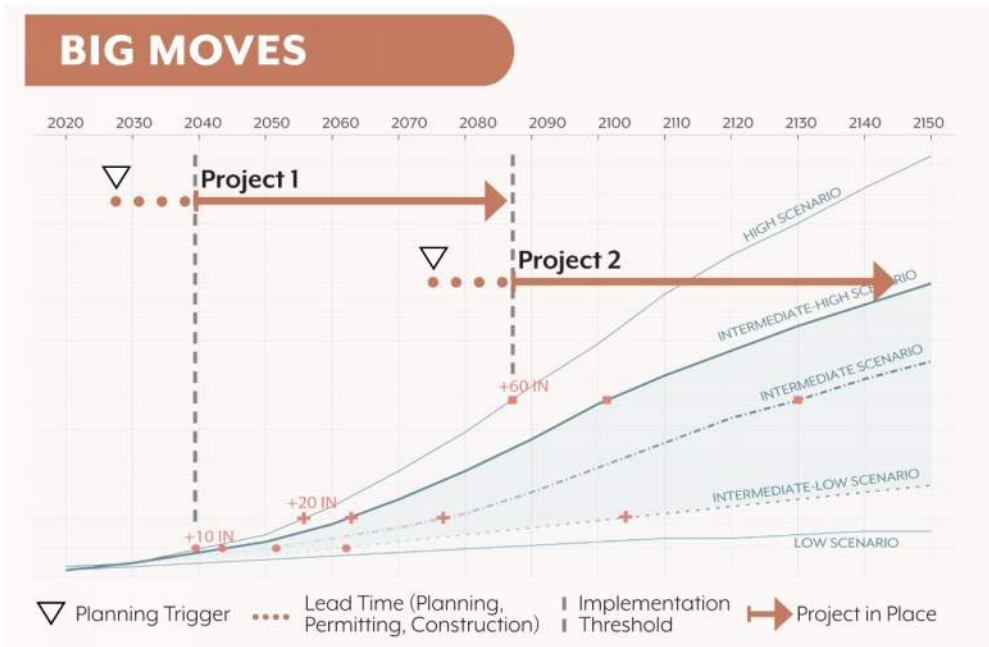
What makes a resilient community?



Adaptation Pathways



Adaptation Pathways



Considerations for implementation:

- Construction Impacts
- Consensus and community buy-in for collective actions
- Many small projects vs. one big project and when?

Collective Approach Feasibility

Notes and initial takeaways on the ongoing cost benefit analysis:

- Cost-benefit exercise started to test feasibility
- Looking at near-term planning (2050) – an integrated flood protection does not provide a positive cost-benefit.
- In the long-term, Individual and collective approaches are expensive but give a positive benefit-cost ratio. Greater potential for additional benefits in the collective solution.
- A collectively-built integrated flood protection in Marinship provides a lot more protected property ("benefit") than one would in New Town

Next Steps for this Study

Use your input today and combine it with our analysis to:

- Identify critical assets that need to be adapted in the near term / short-term actions
- Identify areas where collective approaches may be viable from a cost-benefit and community perspective
- Identify areas where there is potential for ecological enhancements and nature-based solutions
- Refine approaches that align with community character
- Describe the planning processes and establish actions to adapt to sea level rise

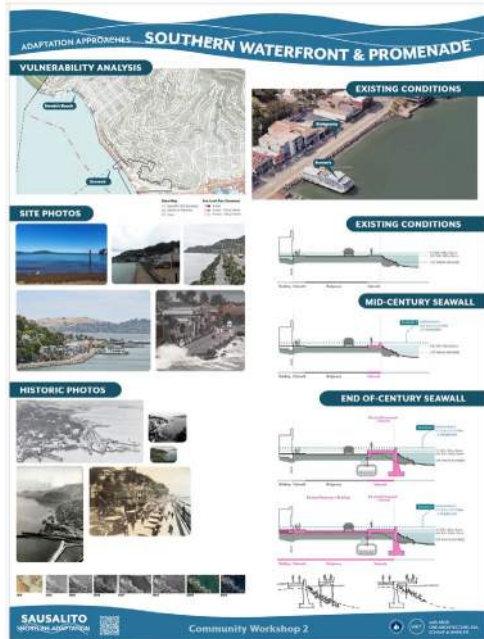
06

Small Group Discussion



Small Group Discussion

1



2



3



4

