SCAPE LANDSCAPE ARCHITECTURE DPC

HAYWARD REGIONAL SHORELINE MASTER PLAN
CITY COUNCIL WORK SESSION

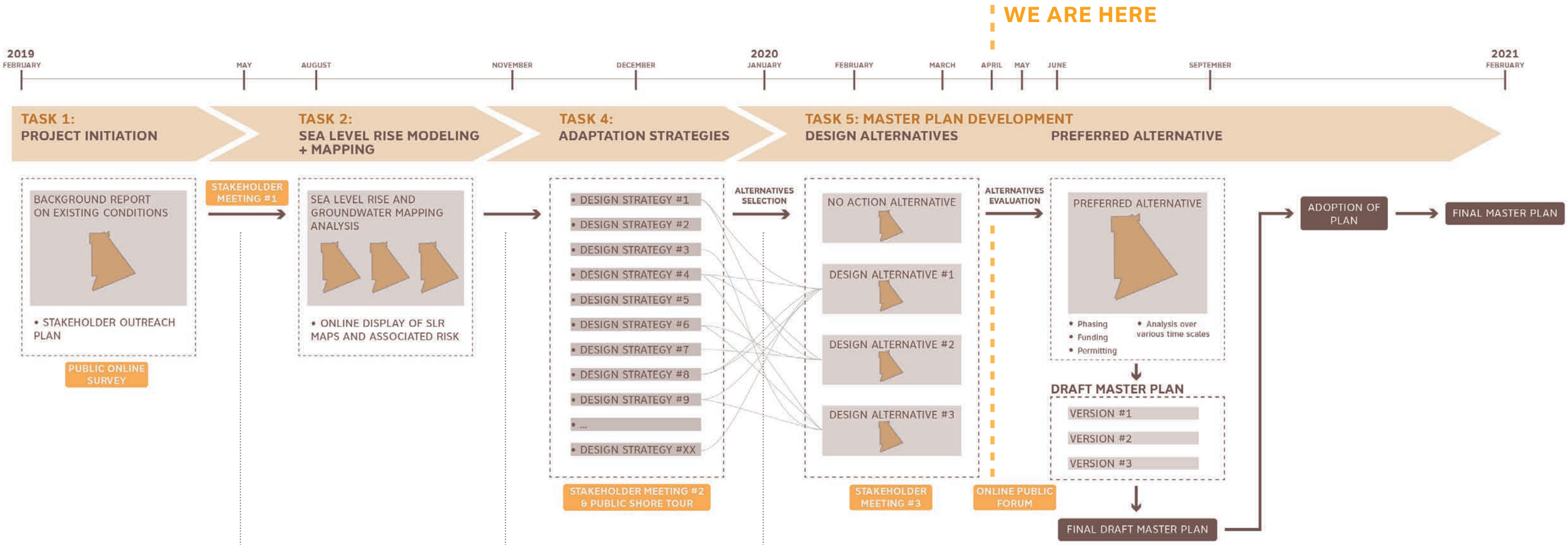
MAY 05, 2020

CITY COUNCIL WORK SESSION
Agenda

- **Project Timeline / What We've Done**
    - **Project Goals**
    - **Study Area**
    - **Stakeholder Engagement**
- **Master Plan Assumptions**
- **Design Alternatives**
- **Preliminary Cost Estimates**

PROJECT TIMELINE
WHAT WE’VE DONE

PROJECT TIMELINE / WHAT WE'VE DONE



- Analysis of Existing Conditions
- Stakeholder Engagement Plan
- Online Survey

- Sea Level Rise and Groundwater Mapping Analysis
- Online Display of Sea Level Rise Maps & Associated Risk

- Project Goals
- Policy Considerations
- Adaptation Strategies

- Master Plan Assumptions
- Draft Design Alternatives

PROJECT GOALS

PROJECT GOALS

- **Create a Resilient Shoreline Environment for People and Ecology**
  - Enhance the shoreline's ecological value and adapt to sea level rise
  - Enhance recreational opportunities and adapt to climate change
  - Create a management framework for adapting to sea level rise over time
  - Provide refuge to help endangered shoreline species to adapt climate change
- **Enhance the Shoreline Environment to Reduce Risk to Critical Infrastructure and Built Assets**
  - Align with and enhance existing management and capital improvement plans
  - Reduce risk to regional critical utilities from sea level rise, groundwater intrusion, and flood events
  - Reduce risk to transportation infrastructure from sea level rise, groundwater intrusion, and flood events
  - Reduce risk to agency assets such as the San Francisco Bay Trail and marsh restoration project(s)
- **Build Social Resilience in the Community**
  - Promote social equity, environmental justice, and public health
  - Preserve the local economy and increase resilience to climate change
  - Prevent the disruption of key community services
- **Build Capacity for Future Generations to Adapt to Climate Change**
  - Build organizational and community capacity
  - Provide a place for education, interpretation and understanding of the shoreline and climate change
  - Foster stewardship of the shoreline's cultural and ecological resources

STUDY AREA

HAYWARD REGIONAL SHORELINE

Oro Loma WWTP

Restored Tidal Marsh

Diked Baylands

Landfills

Wastewater Wet Weather Storage Ponds

Tidal Marsh

Biosolids Management

Solar Fields

Hayward WWTP

Muted tidal marsh

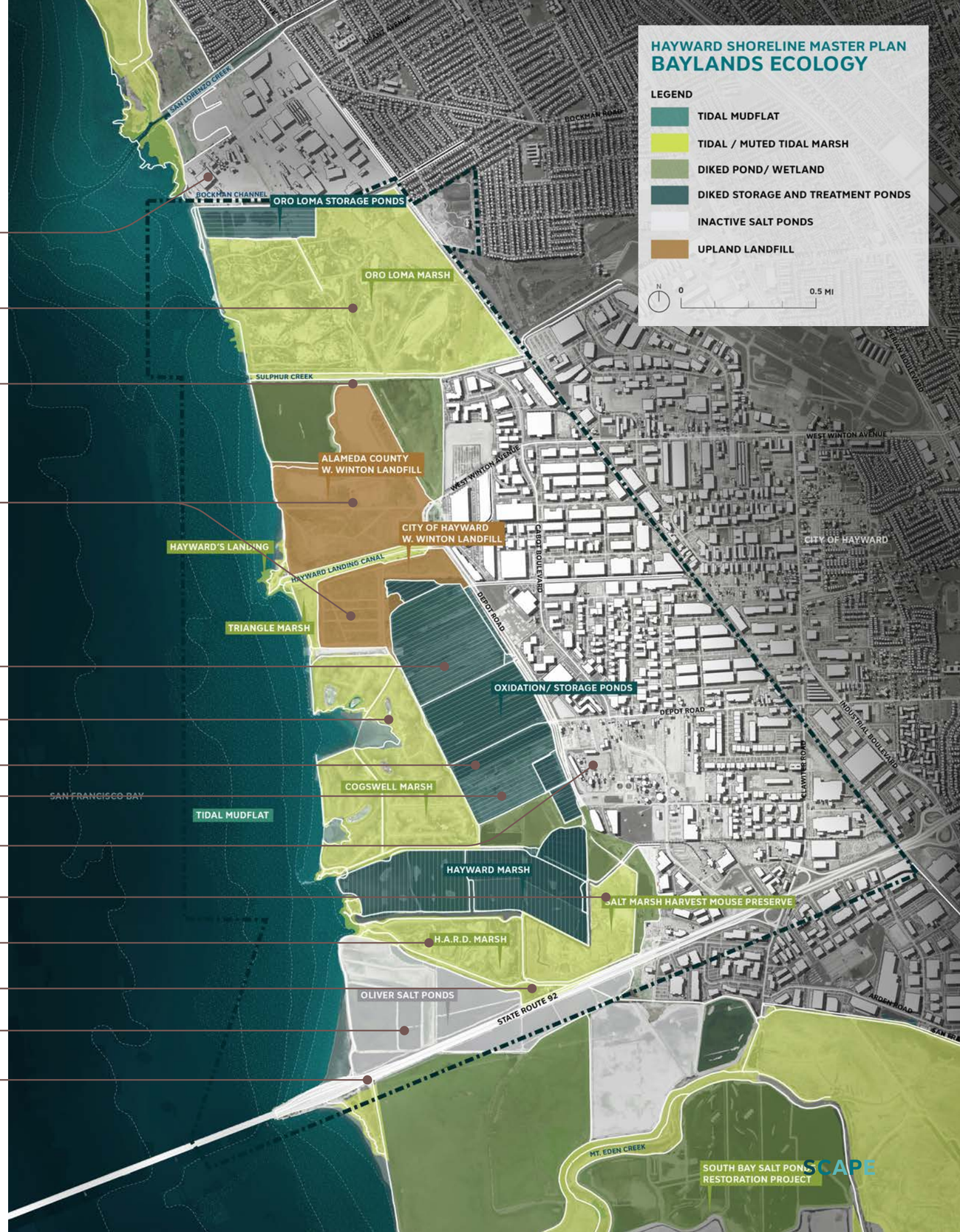
Bay Trail

Interpretive Center

Inactive Salt Ponds

SR-92 Bridge Landing

HAYWARD SHORELINE MASTER PLAN
May 5, 2020



STAKEHOLDER ENGAGEMENT

STAKEHOLDER ENGAGEMENT

- Community Workshops
- Shore Tour
- Online Forum (in progress)

Public Meeting

May 2019

- **ACMAD**
- **HARD**
- **ACFCD**
- **SCC**
- **SFEI**
- **HASPA**
- **BCDC**

Shore Tour

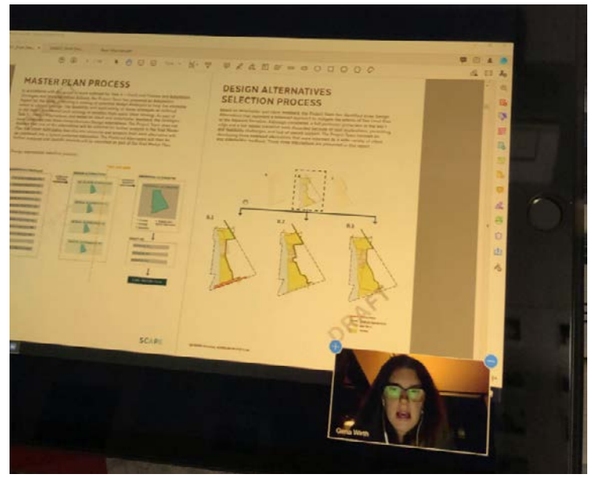
Oct 2019

- **General Public**
- **Hayward Public Works**
- **SCC**
- **ACFCWD**
- **SBSP**
- **ACMAD**

Stakeholder Meetings

Jan 2020

- **ACFCD**
- **HARD**
- **CalTrans**
- **Oro Loma WWTP / EBDA**
- **HASPA Board**
- **Hayward Public Works**
- **BCDC**
- **EBDA**



Stakeholder Meetings

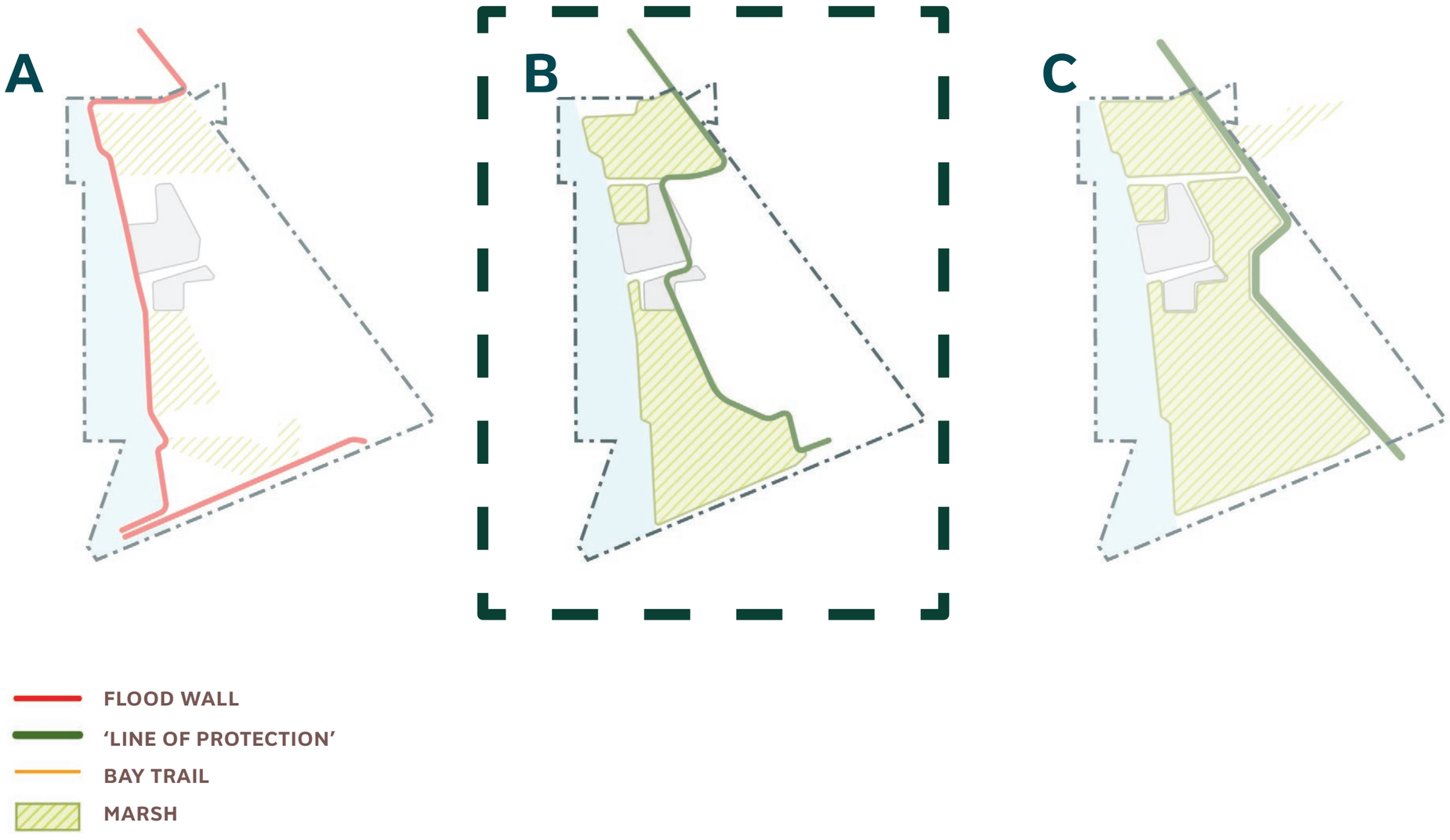
April 2020

- **ACFCD**
- **BCDC**
- **CalTrans**
- **CDFW**
- **Oro Loma WWTP / EBDA**
- **Hayward Public Works**
- **ACMAD**
- **SBSP**
- **EBDA**

MASTER PLAN ASSUMPTIONS

MASTER PLAN ASSUMPTIONS

- Working towards feasible and implementable alternatives



MASTER PLAN ASSUMPTIONS

Overarching

- The plan aims to **preserve and enhance the ecological features** of the Hayward Shoreline over time. Many Bayland ecosystems, like tidal marshes and mudflats, require connectivity to the Bay for survival, but are also vulnerable to sea level rise.

- The plan aims to **reduce risk to the urban fabric** (streets, buildings), economy, land use, and critical built infrastructure in and adjacent to the study area. These assets are **assumed to remain in place** for the planning horizon.

- The plan is considering a **perimeter protection approach to critical assets** and an **adaptation approach to shoreline ecosystems.** This approach has been developed in conversation with many stakeholders and landowners in the project area.

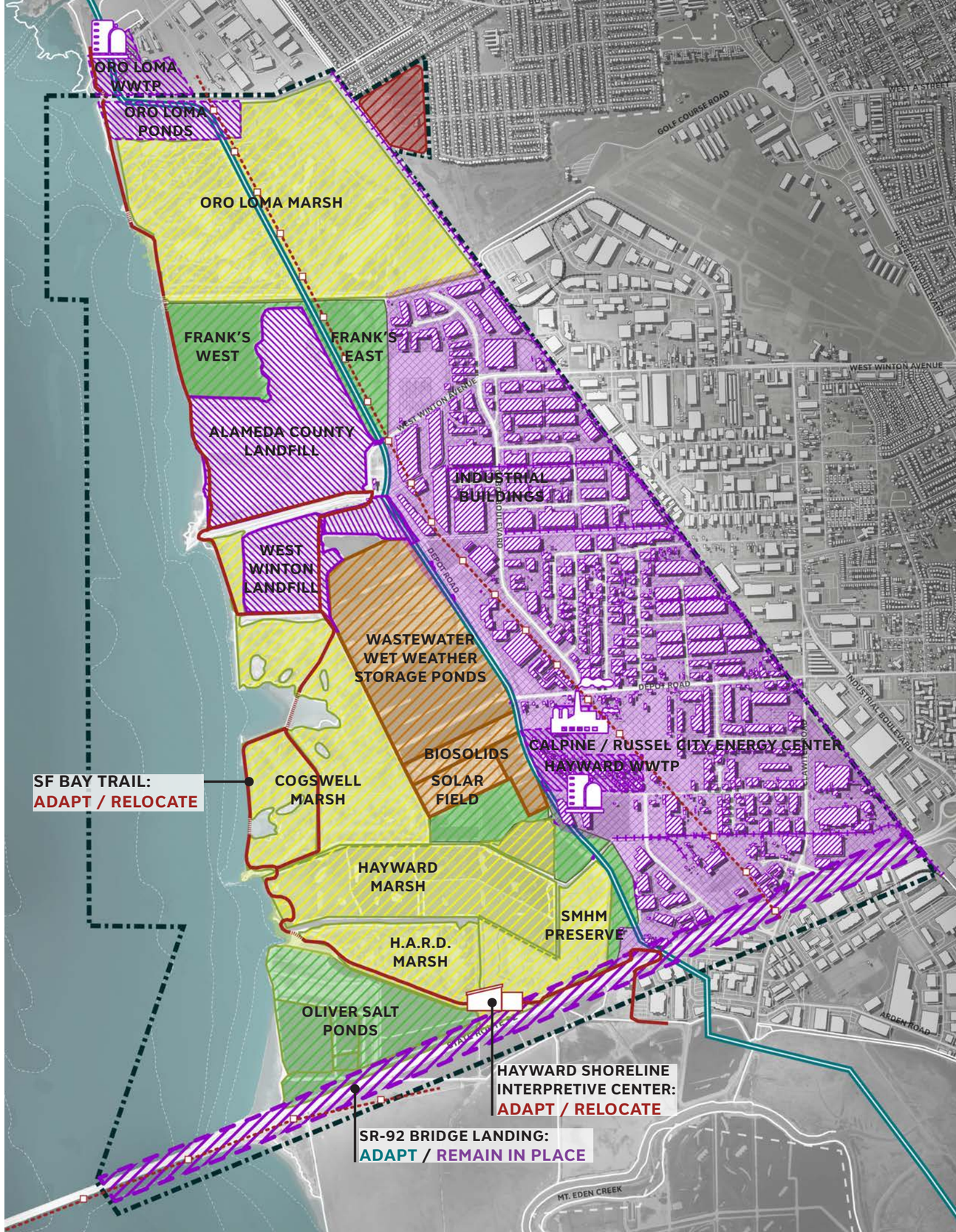
- **Non-structural strategies**, such as building scale adaptation, managed retreat, and land elevation, will be articulated in the final plan, and would likely be required to adapt to a higher SLR scenario long-term.

- The intent is to **reduce risk to critical assets** from **daily tidal inundation and future 100-year storm surge** from **2’- 4’ of SLR** on top of the current mean higher high tide.

STAKEHOLDER FEEDBACK

Compiled Assumptions

- REMAIN IN PLACE
- MAINTAIN CRITICAL USES
- ADAPT IN PLACE (NATURAL ASSET)
- ADAPT IN PLACE (BUILT ASSET)
- ADAPT / RELOCATE (NATURAL ASSET)
- ADAPT / RELOCATE (BUILT ASSET)



HAYWARD SHORELINE MASTER PLAN
May 5, 2020

SEA LEVEL RISE SCENARIO

- The plan is based on adapting the project area over a **mid-range time frame.** Based on State guidance this time frame is estimated to be between **50 and 60 years** long.

- The intent is to **reduce risk to critical assets** from **daily tidal inundation and future 100-year storm surge** from **2'- 4' of SLR** on top of the current mean higher high tide.

Table 8: Sea level rise increments by time horizon and level or risk aversion, based on the California Coastal Commission recommendations.

# Years from now	Year	Identifies areas that...	17% Prob. SLR meets or exceeds *Low Risk Aversion*	5% Prob. SLR meets or exceeds *Medium Risk Aversion*	0.5% Prob. SLR meets or exceeds *Medium-High Risk Aversion*	
10	2030	are at **immediate** flood risk	0.5	0.6	**0.8**	
20	2040		0.8	1.0	**1.3**	
30	2050		1.1	1.4	**1.9**	Up to 2 ft
40	2060	are at **intermediate** flood risk	1.5	1.8	**2.6**	
50	2070		1.9	2.4	**3.5**	
60	2080		2.4	3.0	**4.5**	**Up to 4.5 ft**
70	2090	Will be **potentially** flooded	2.9	3.6	**5.6**	
80	2100		3.4	4.4	**6.9**	Up to 7 ft
90	2110		3.5	4.5	7.3	
100	2120		4.1		8.6	

SEA LEVEL RISE SCENARIO

- While no target design elevation will be selected with this study, the project team has looked at a line of protection at **14.3' NAVD 88** for planning purposes only, to identify tie-back points and feasibility of a perimeter protection feature.

BCDC POLICY

ACFCD

FEMA CERTIFICATION

SLR	MHHW + SLR	MHHW + SLR + 100 YEAR STORM	MHHW + SLR + 100 YEAR STORM + 2' FREEBOARD	MHHW + SLR + 500 YEAR STORM
0'	7'	10.3'	12.3'	11.3'
2'	9'	12.3'	14.3'	13.3'
4'	11'	14.3'	16.3'	15.3'
7'	14'	17.3'	19.3'	18.3'

DESIGN ALTERNATIVES

#1: CLOSER TO THE BAY

The LOP aligns closer to the Bay and wraps in front of Oro Loma WWTP to protect it in place

The LOP Cuts through the middle of Oro Loma Marsh, which places a larger extent of muted marsh inland of the line of protection.

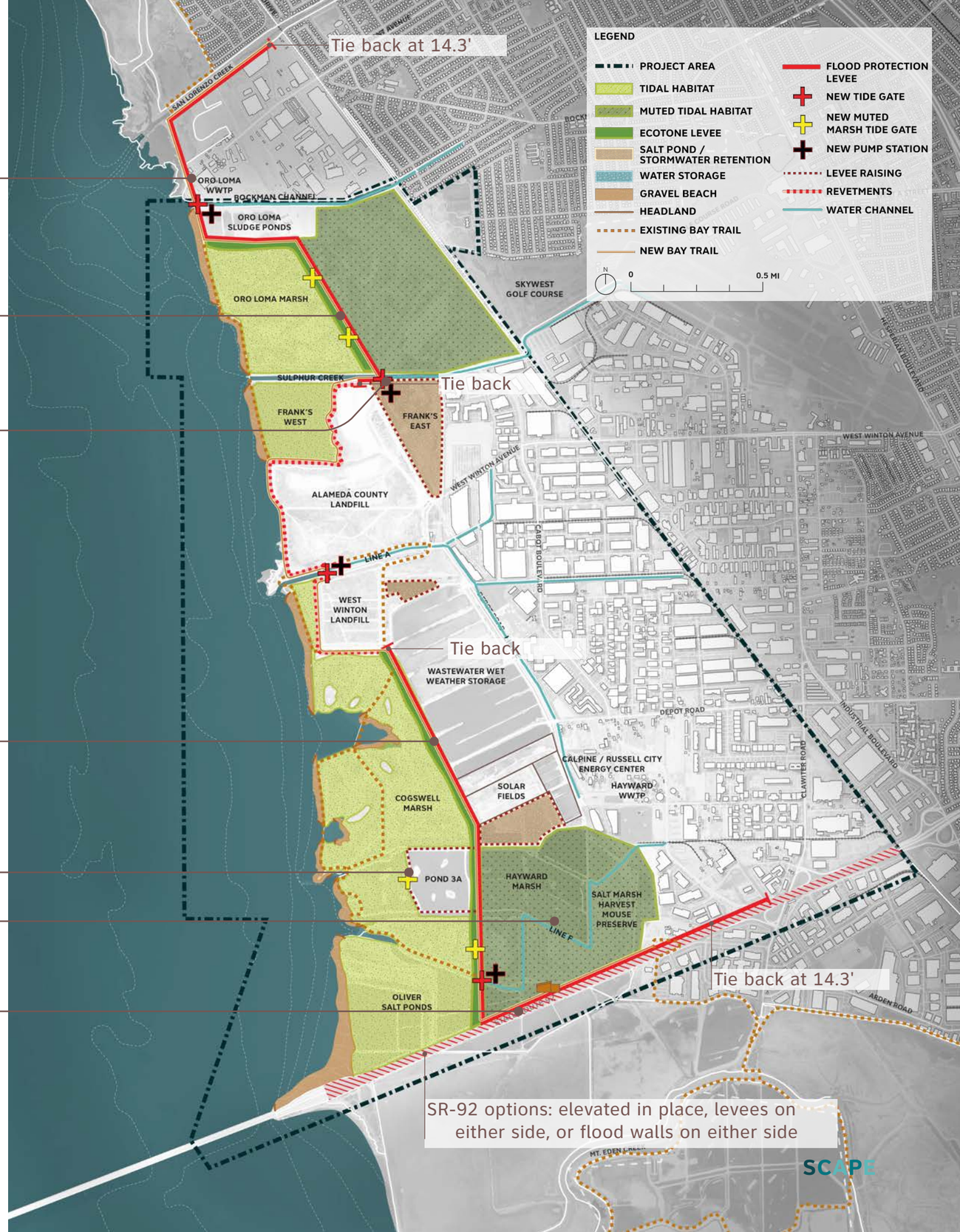
Connects to high ground of the landfills

The alignment then follows the western edge of the Wastewater Wet Weather Storage Ponds and cuts immediately south through Hayward and HARD Marsh.

Levee raising to protect endangered species habitat

Places a larger extent of muted marsh inland of the line of protection

A raised access road along SR-92 ties back to high ground at the intersection of Clawiter Road.



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May 5, 2020

#2: DOWN THE MIDDLE

The LOP pulls back along the Union Pacific Rail Corridor

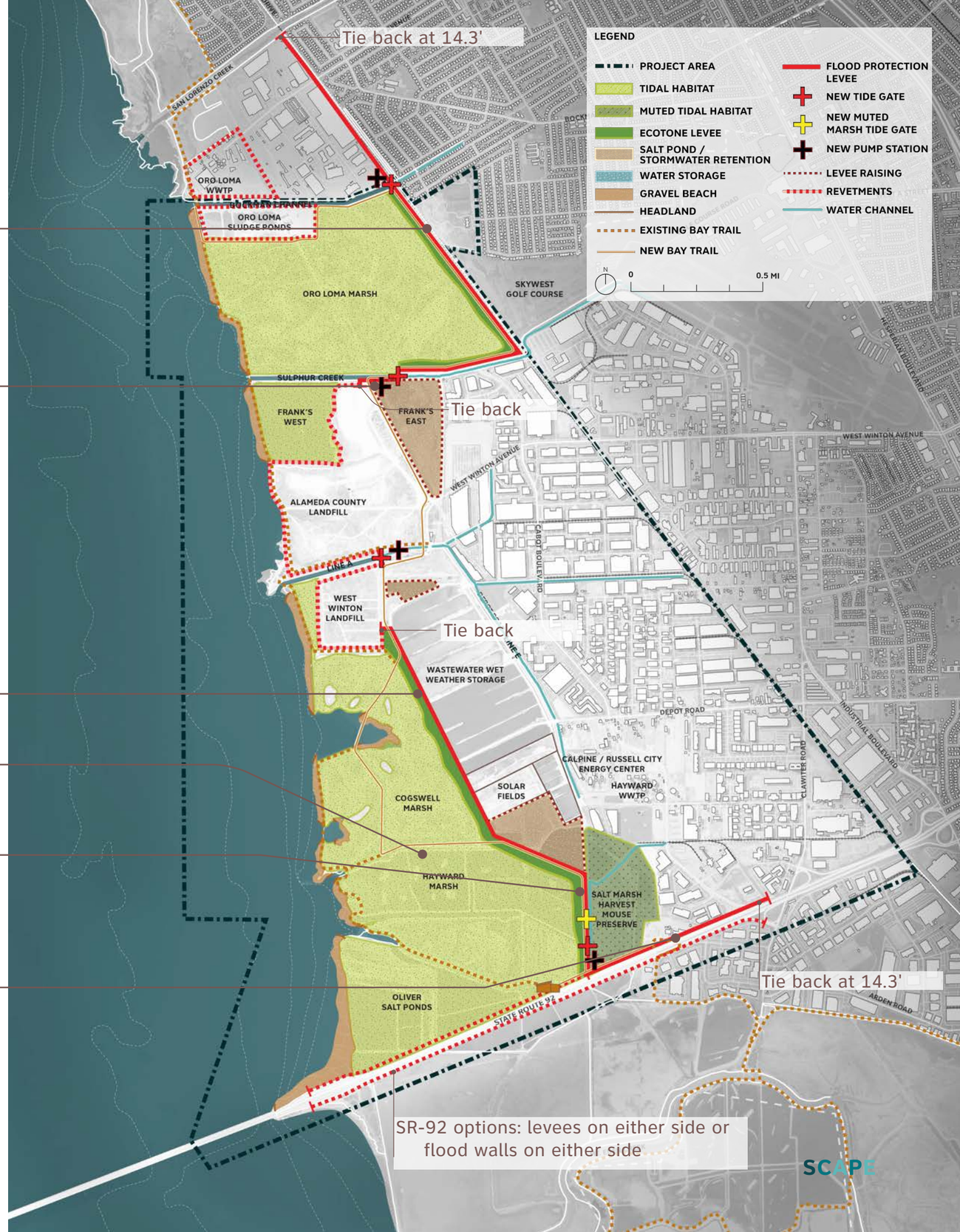
Connects to high ground of the landfills

Levee aligns into the Wastewater Wet Weather Storage Ponds

Maintains a larger extent of tidal habitat, while still reducing risk to critical infrastructure

The alignment pulls back in the southern portion of the site and cuts through the middle of the Salt Marsh Harvest Mouse Preserve

Ties back along a new levee along the access road for SR-92



HAYWARD SHORELINE MASTER PLAN
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#3: FURTHER INLAND

The LOP pulls back along the Union Pacific Rail Corridor

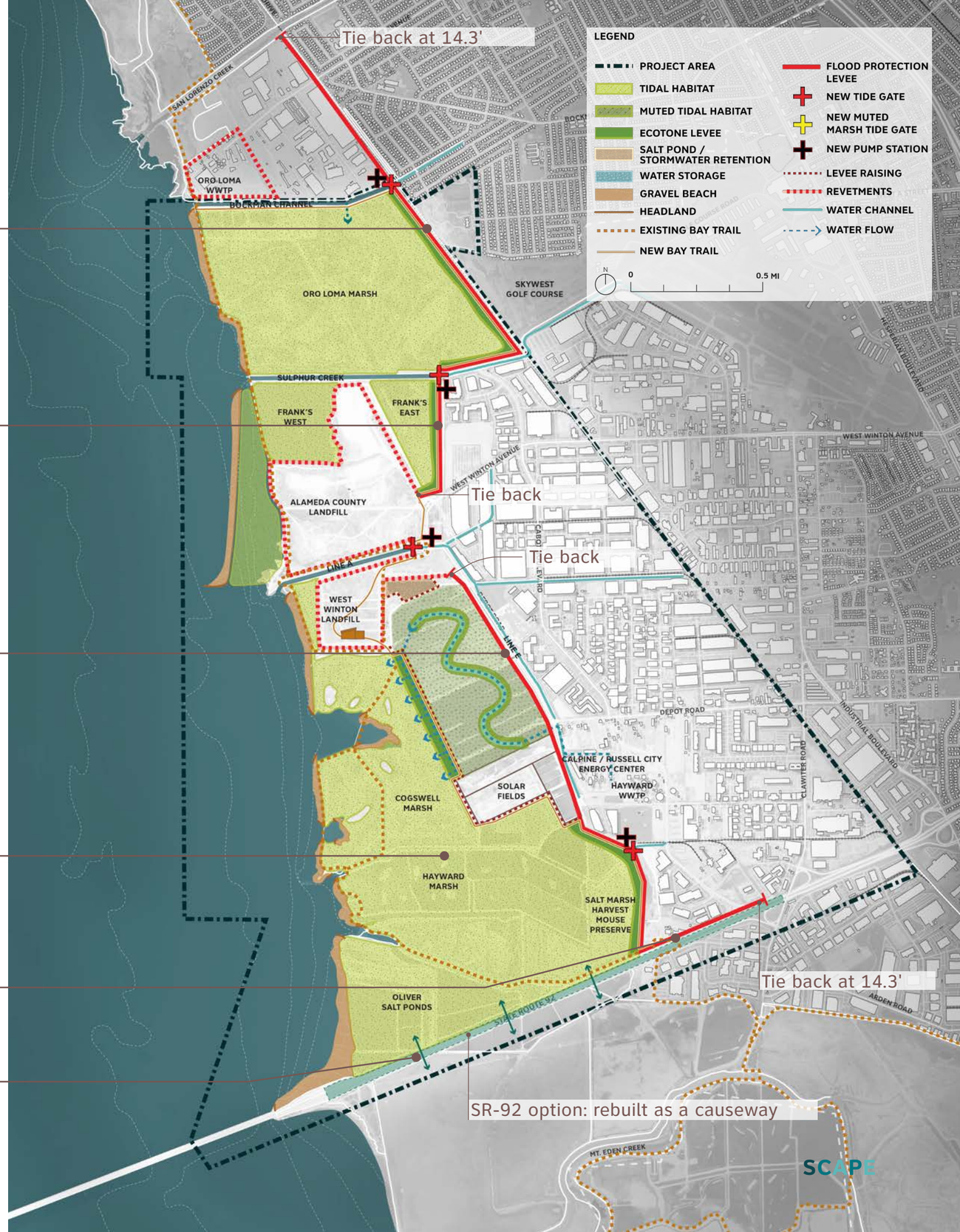
Aligns to the eastern edge of Frank's East and ties back to high ground at the two existing landfills

Pulls to the east of the Wastewater Wet Weather Storage Ponds and follows the eastern extent of the diked Baylands to the south

Prioritizes a larger extent of connected tidal habitat that is Bayward of the line of protection and incorporates ecological and risk reduction infrastructure along a wider extent of Baylands

Ties back to high ground with a levee parallel to SR-92 along Clawiter Road

SR-92 rebuilt as a causeway



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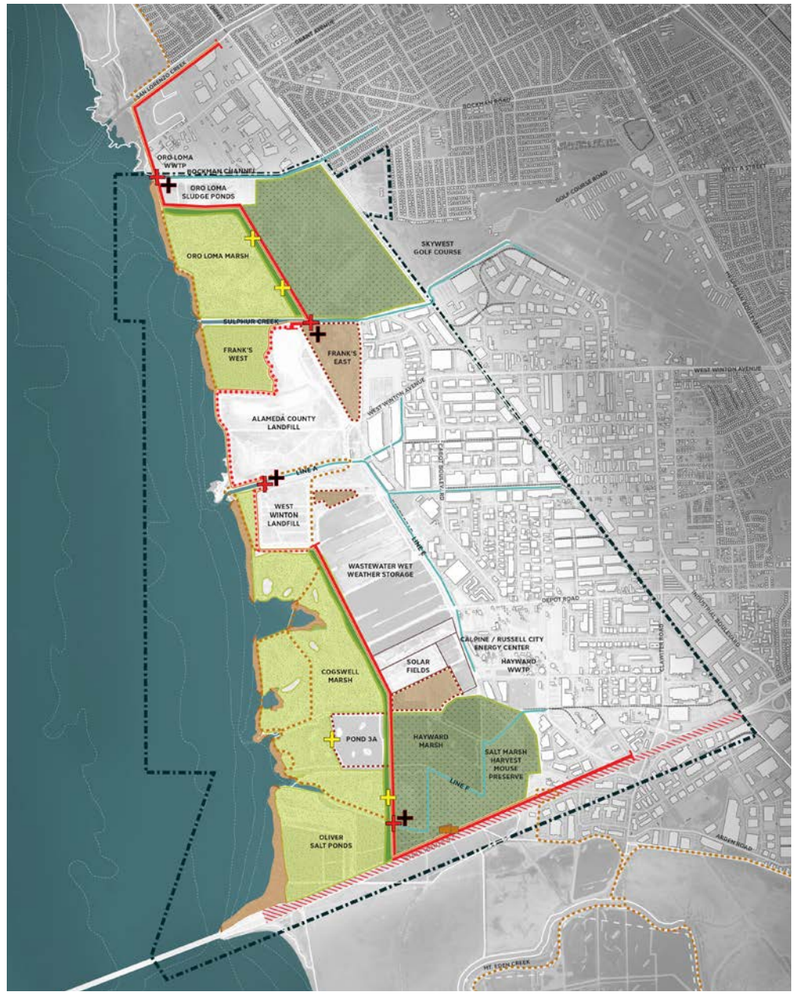
DRAFT DESIGN ALTERNATIVES

1. Closer to the Bay



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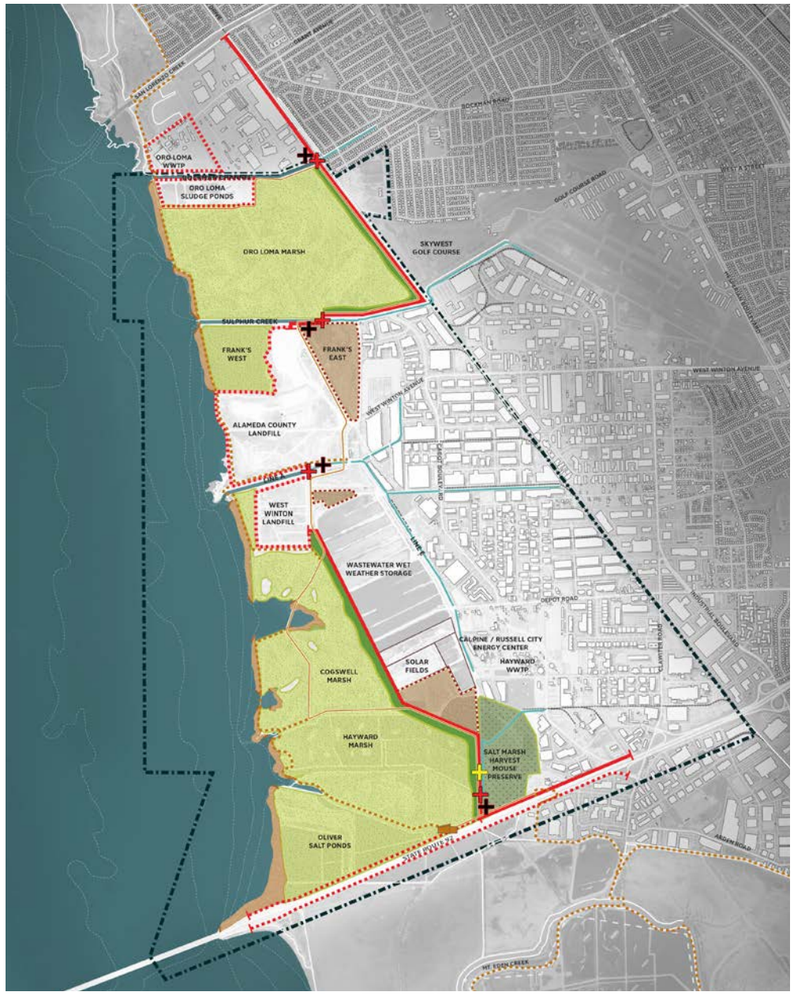
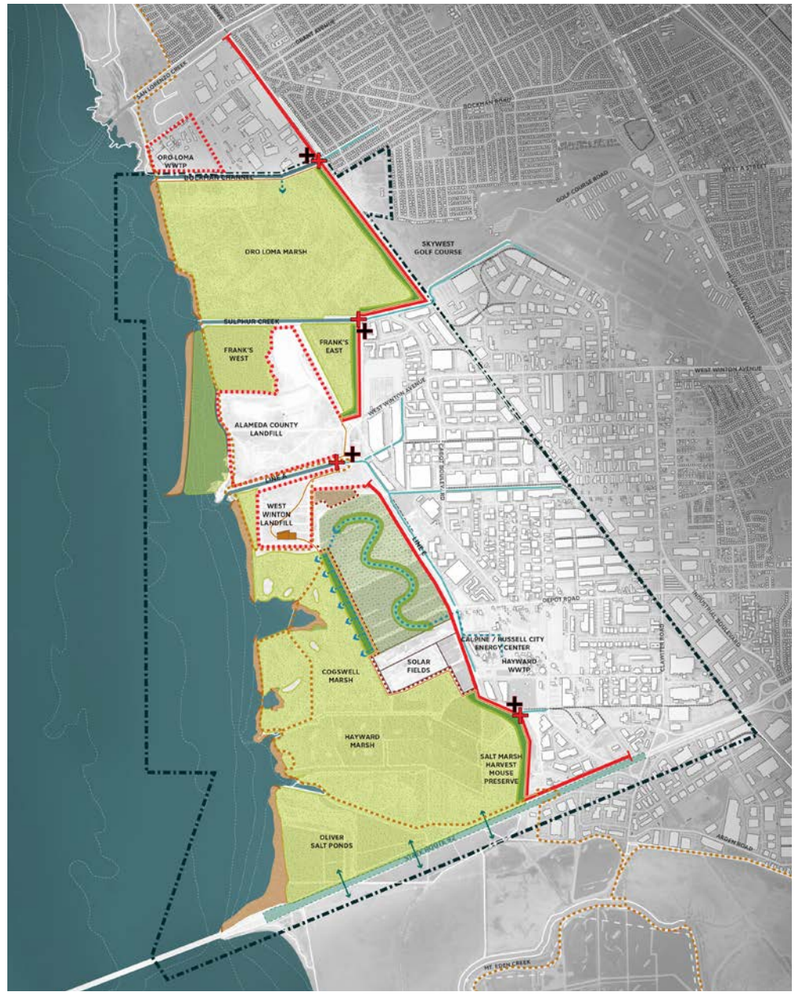


3. Further Inland



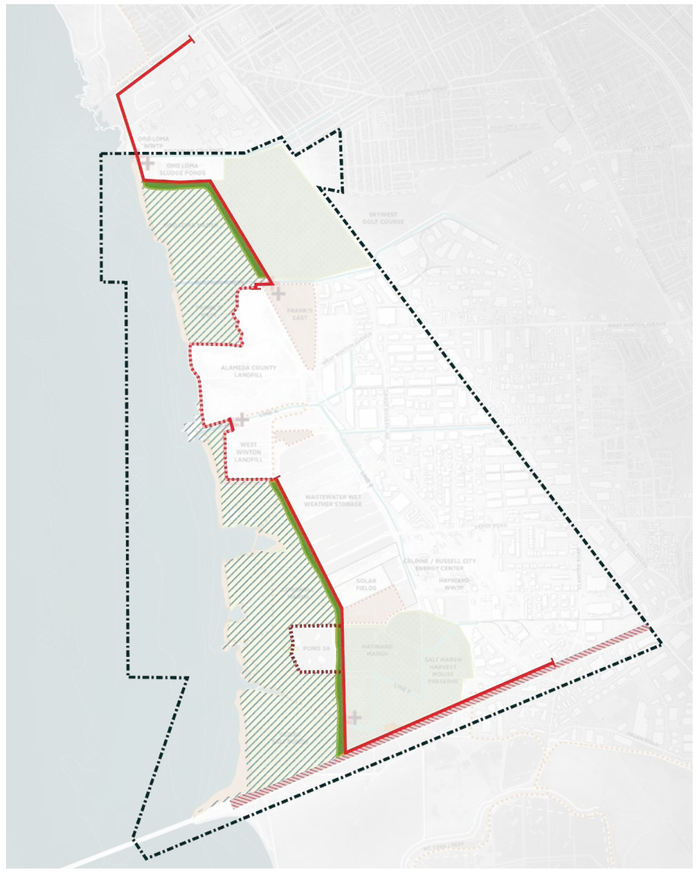
PRELIMINARY COST ESTIMATE

COST ESTIMATE ASSUMPTIONS

- Precedent projects selected based on similarities and available cost data
- Emphasis on SF Bay region. Other projects selected to fill specific gaps
- Focus on easily understandable units (linear feet of berm, etc)
- 50% contingency was added to all alternatives
    - appropriate at this stage of planning
    - design and engineering calculations, quantities, and methods not yet identified

PRELIMINARY COST ESTIMATE: LINE OF PROTECTION

1. Closer to the Bay



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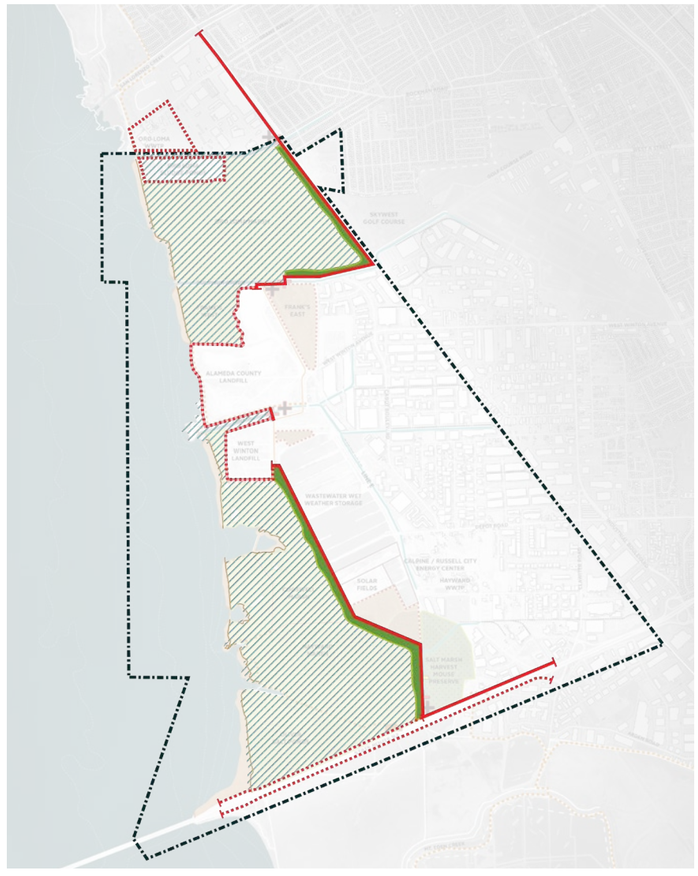

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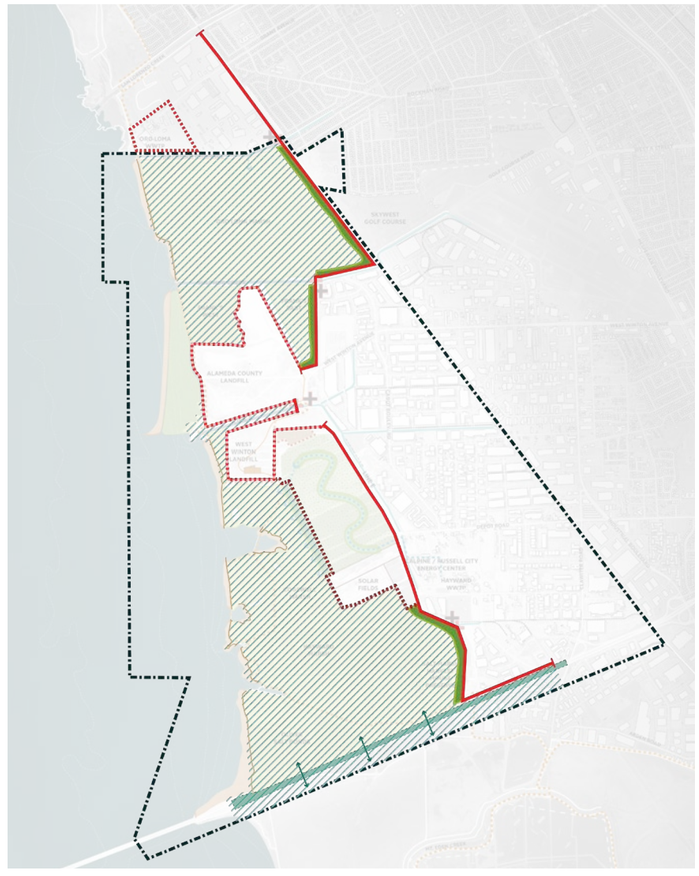
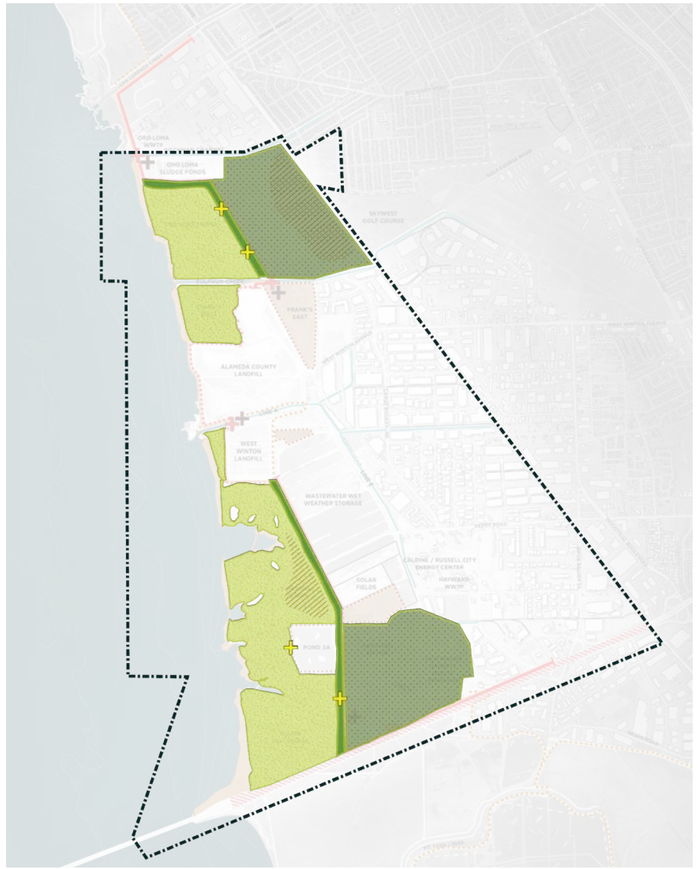


COST ITEM	ALT 1	ALT 2	ALT 3
Flood Protection Levee	$54,888,000	$38,536,000	$43,865,000
Ecotone Levee	$11,141,000	$6,439,000	$4,522,020
Levee Raising (outboard of the LOP)	$6,746,000	$8,921,000	$22,189,000
Levee Raising (inland of the LOP)	$10,920,000	$12,499,000	$1,157,000
SUBTOTAL**	**$83,696,000**	**$66,395,000**	**$71,731,800**

DOES NOT ACCOUNT FOR DESIGN, MOBILIZATION, OR CONTINGENCY

PRELIMINARY COST ESTIMATE: TIDAL HABITAT

1. Closer to the Bay



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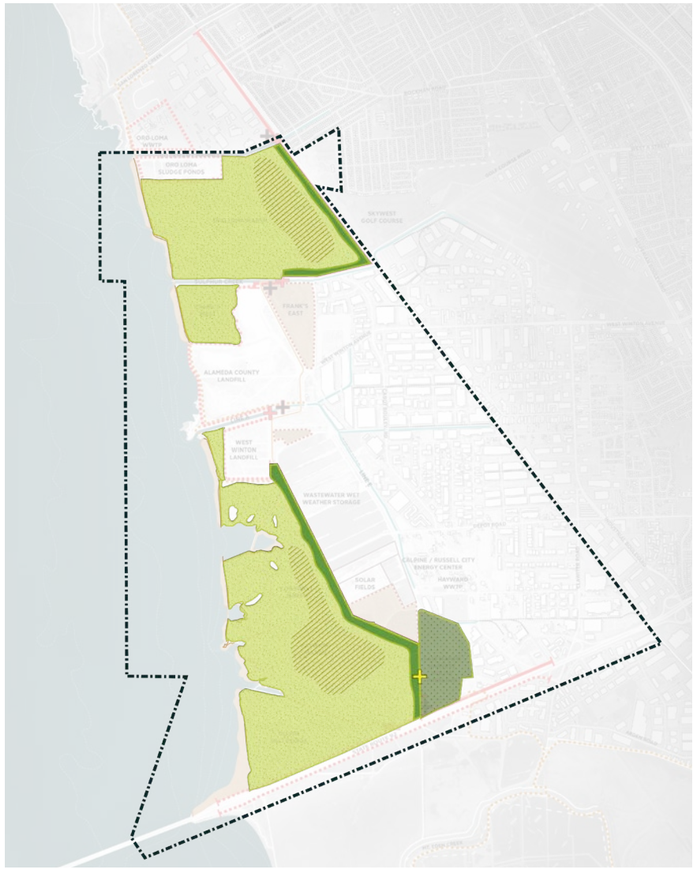

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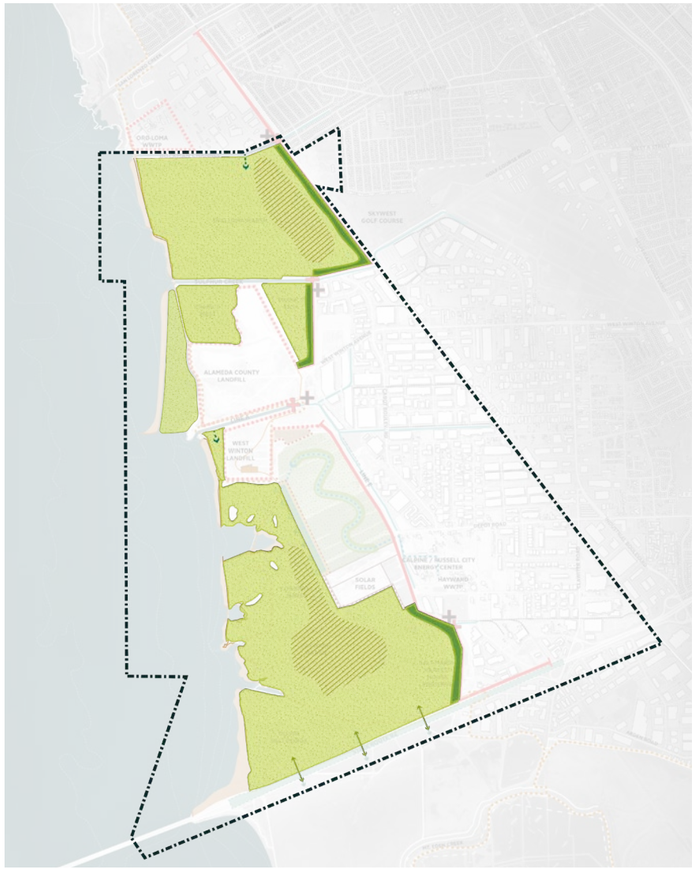
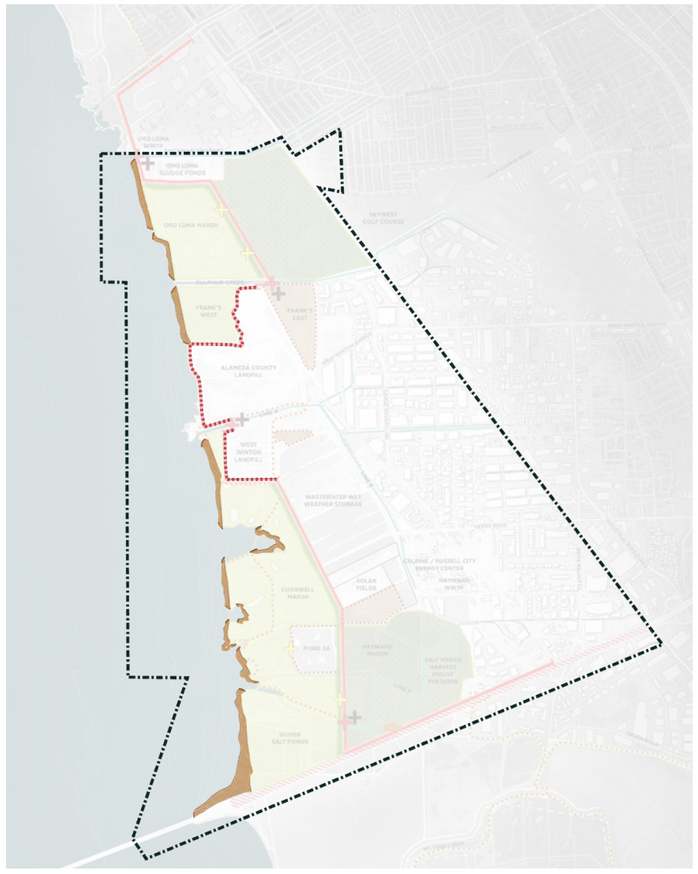


COST ITEM	ALT 1	ALT 2	ALT 3
Tidal Marsh Restoration	$15,509,000	$27,042,000	$33,380,000
Muted Tidal Marsh Restoration	$12,435,000	$2,102,000	$-
New Muted Marsh Tide Gate	$1,090,000	$273,000	$-
Relocating Sediment	$50,000,000	$50,000,000	$50,000,000
SUBTOTAL**	**$79,034,000**	**$79,416,000**	**$83,380,000**

DOES NOT ACCOUNT FOR DESIGN, MOBILIZATION, OR CONTINGENCY

PRELIMINARY COST ESTIMATE: EROSION CONTROL

1. Closer to the Bay



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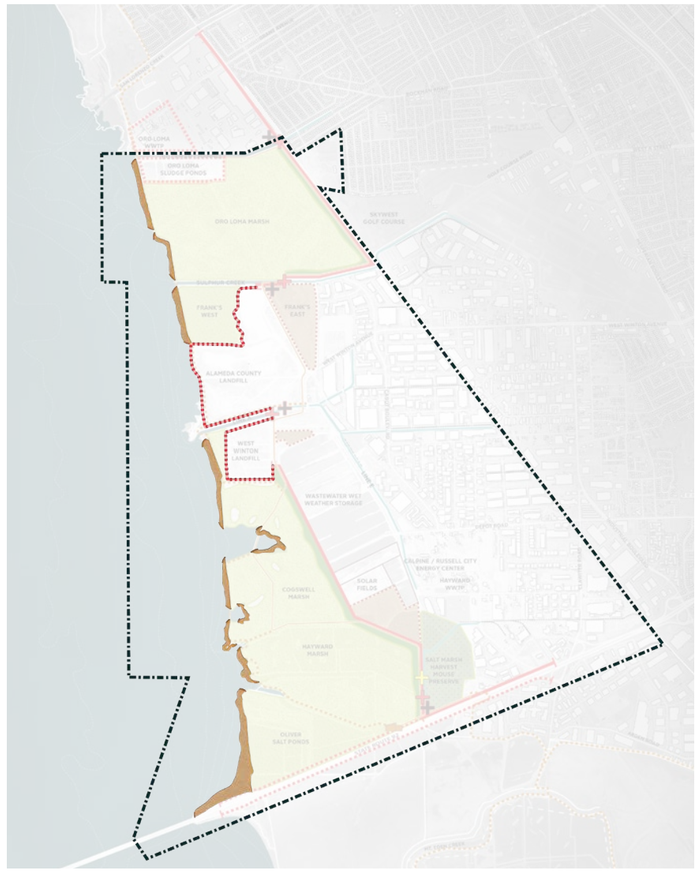

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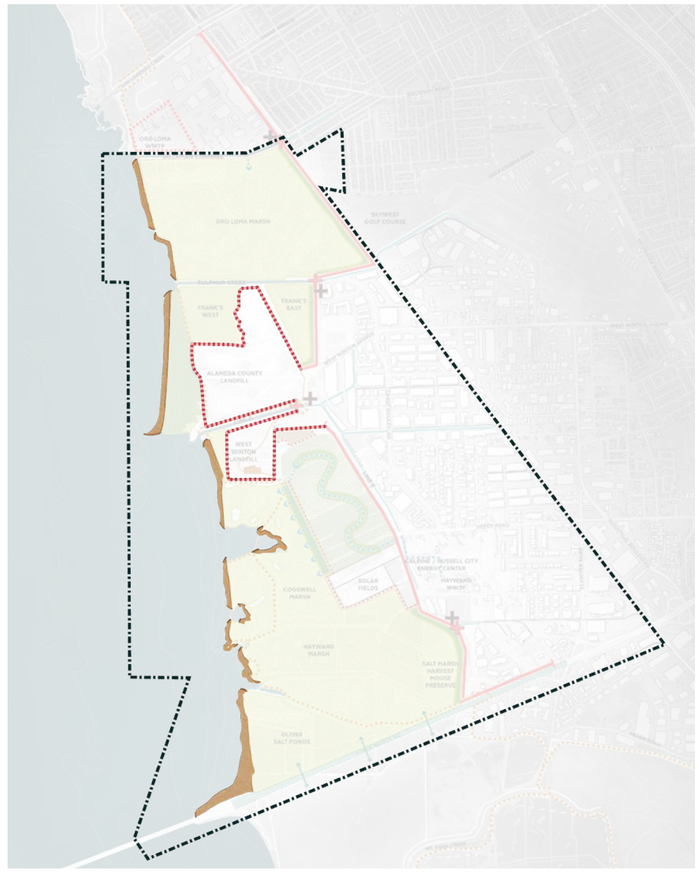
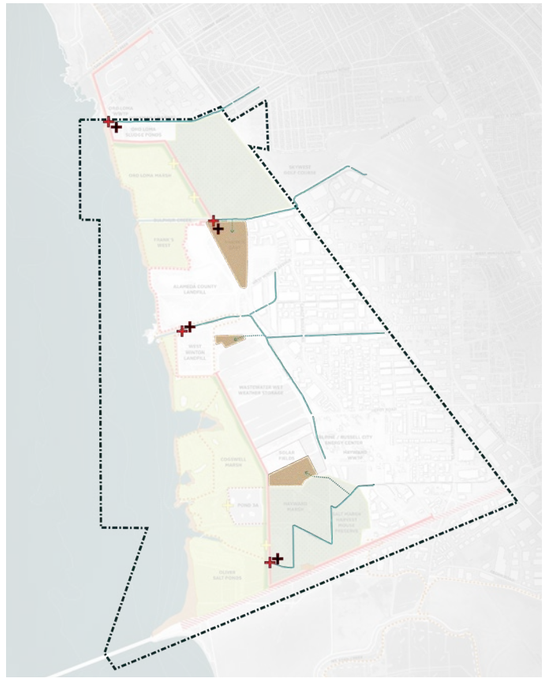


COST ITEM	ALT 1	ALT 2	ALT 3
Revetments	$32,480,000	$41,402,000	$62,850,000
Gravel Beach w/ headlands	$9,896,000	$9,896,000	$10,779,000
SUBTOTAL**	**$42,376,000**	**$51,298,000**	**$73,628,000**

DOES NOT ACCOUNT FOR DESIGN, MOBILIZATION, OR CONTINGENCY

PRELIMINARY COST ESTIMATE: STORMWATER MANAGEMENT

1. Closer to the Bay



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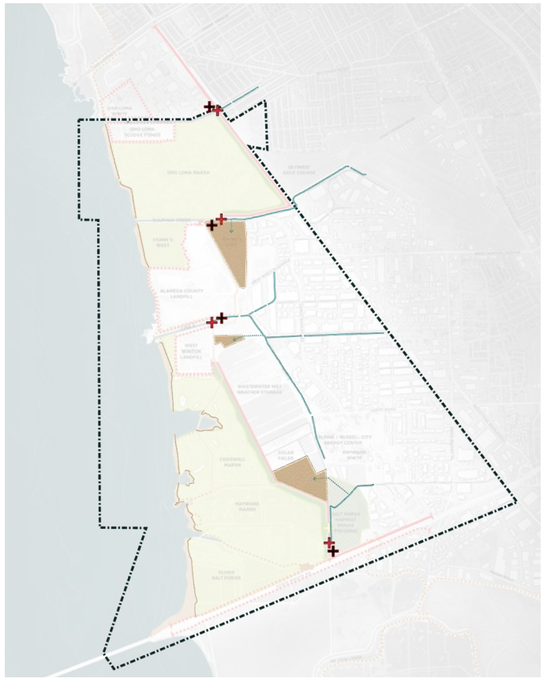

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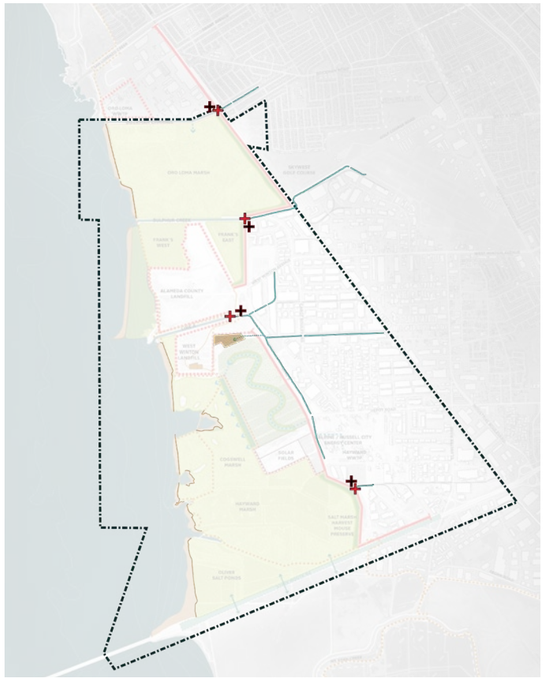
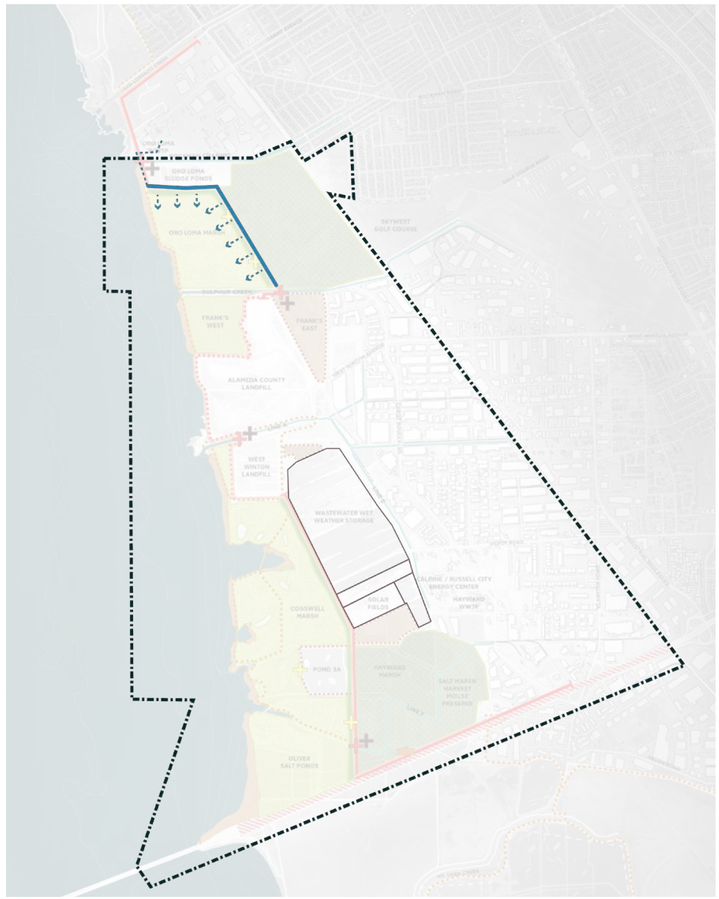


COST ITEM	ALT 1	ALT 2	ALT 3
New Tide Gate	$3,946,000	$3,946,000	$3,946,000
Pump Station Bockman Channel	$43,148,000	$87,944,000	$87,944,000
Pump Station Sulfur Creek	$43,148,000	$67,816,000	$87,944,000
Pump Station Line A	$87,944,000	$87,944,000	$87,944,000
Pump Station Line F	$16,295,000	$43,972,000	$43,972,000
Salt Pond/ Stormwater Retention	$14,851,000	$17,163,000	$1,558,000
Groundwater Management	$814,000	$814,000	$815,000
SUBTOTAL**	**$210,145,000**	**$283,302,000**	**$314,120,000**

DOES NOT ACCOUNT FOR DESIGN, MOBILIZATION, OR CONTINGENCY

PRELIMINARY COST ESTIMATE: WASTEWATER TREATMENT

1. Closer to the Bay



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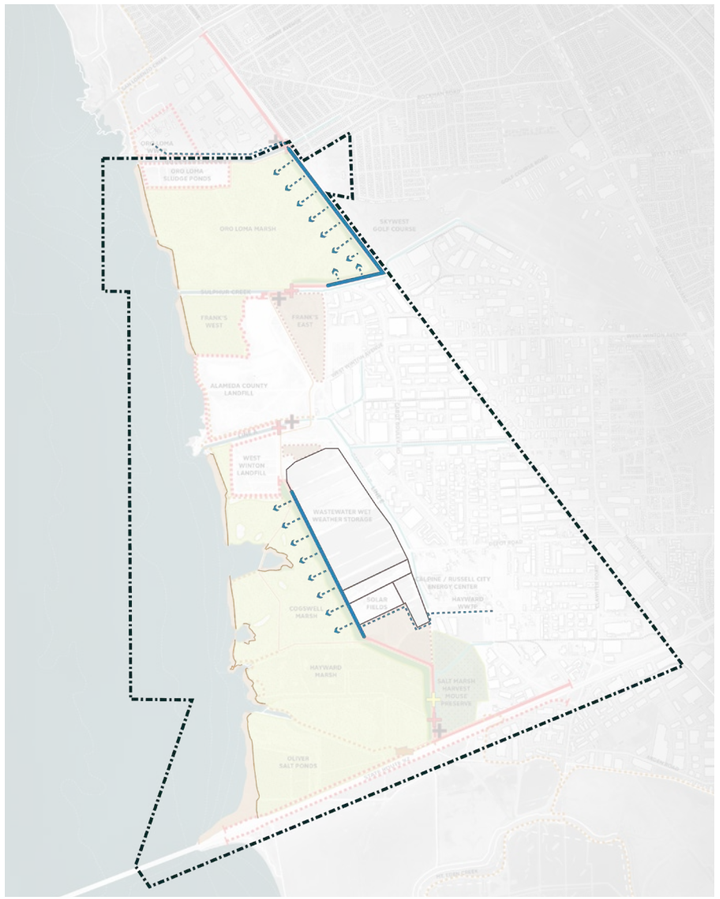

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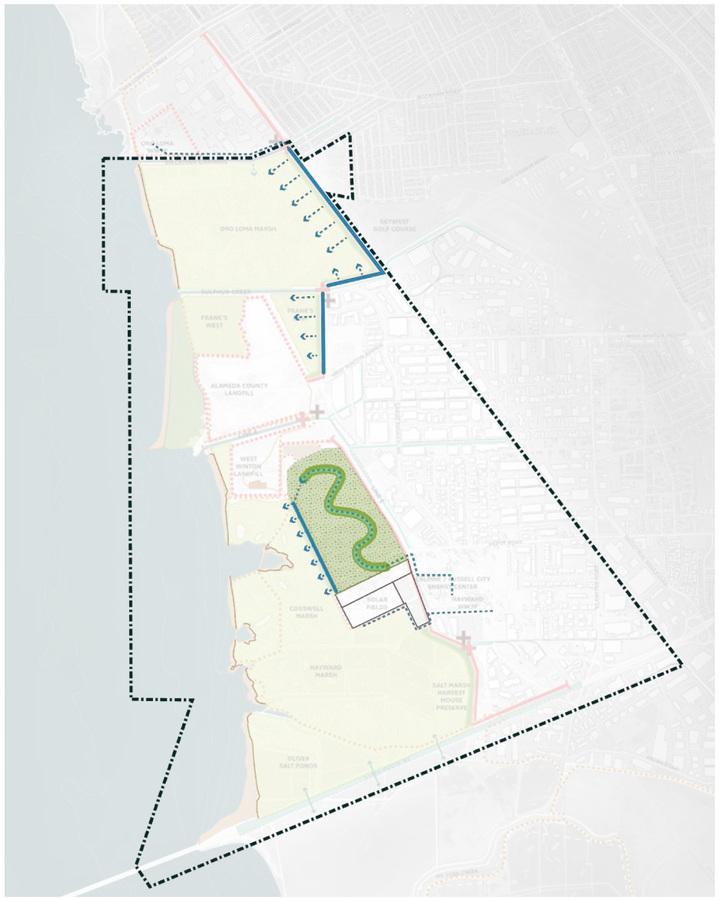
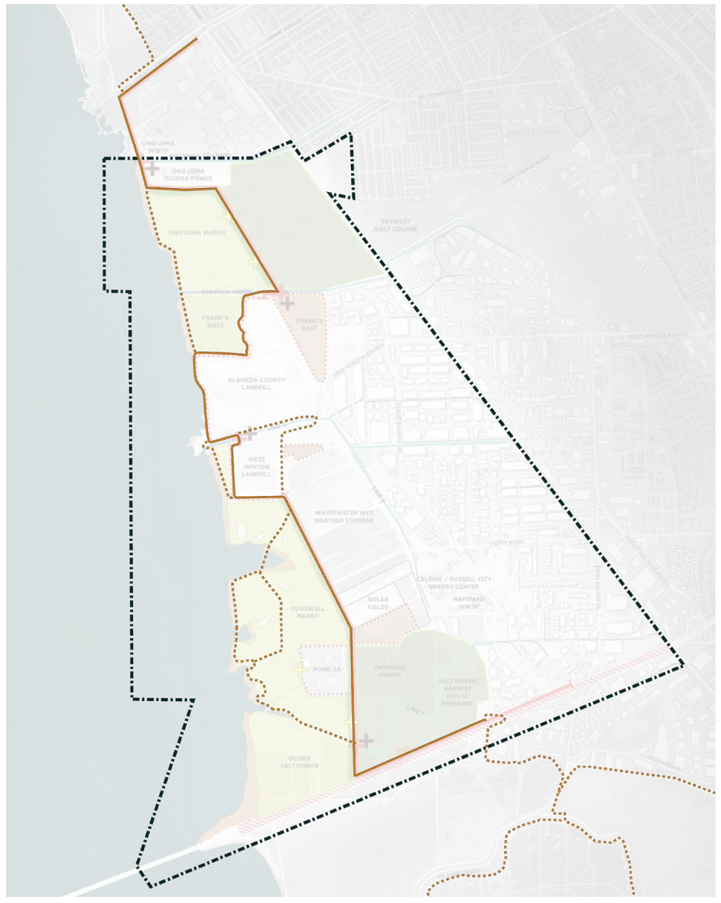


COST ITEM	ALT 1	ALT 2	ALT 3
Horizontal Levee	$16,923,000	$35,032,000	$36,764,000
Freshwater Treatment Marsh	$-	$-	$10,890,000
SUBTOTAL**	**$16,923,000**	**$35,032,000**	**$47,654,000**

****DOES NOT ACCOUNT FOR DESIGN, MOBILIZATION, OR CONTINGENCY***

PRELIMINARY COST ESTIMATE: BAY TRAIL

1. Closer to the Bay



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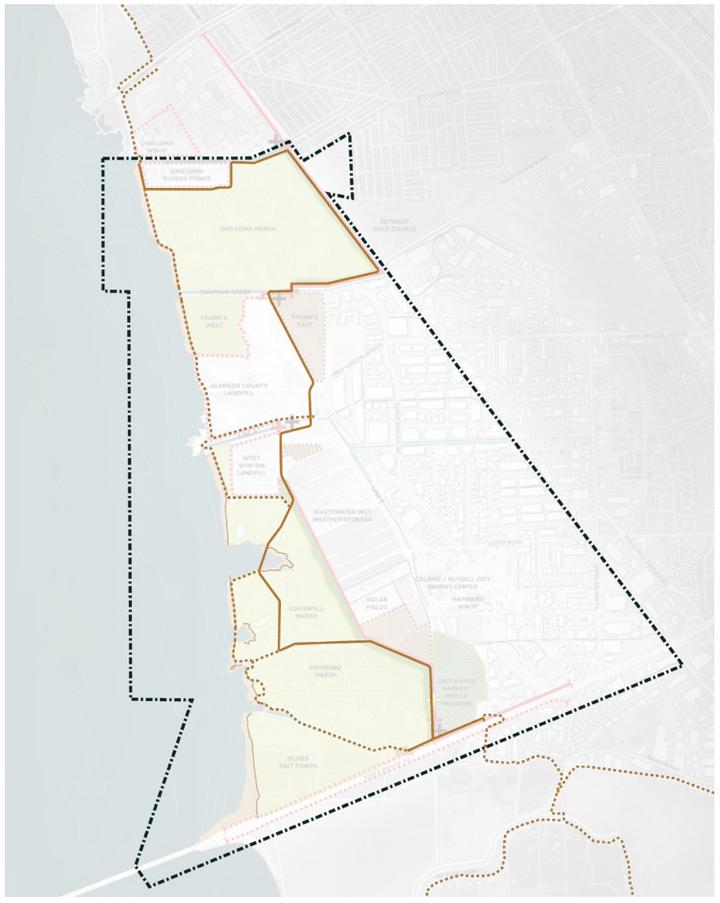

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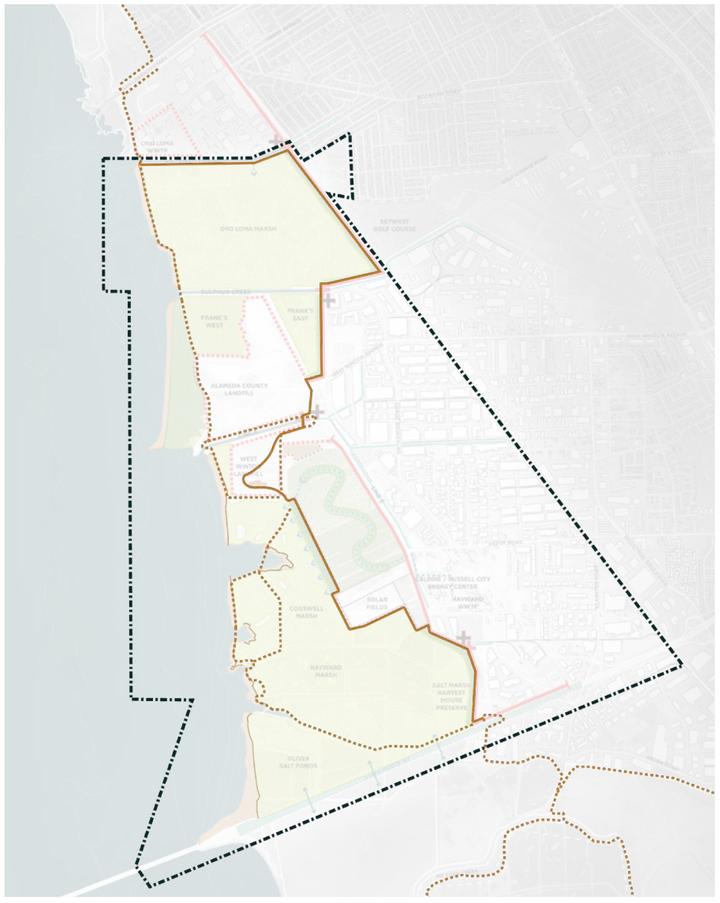
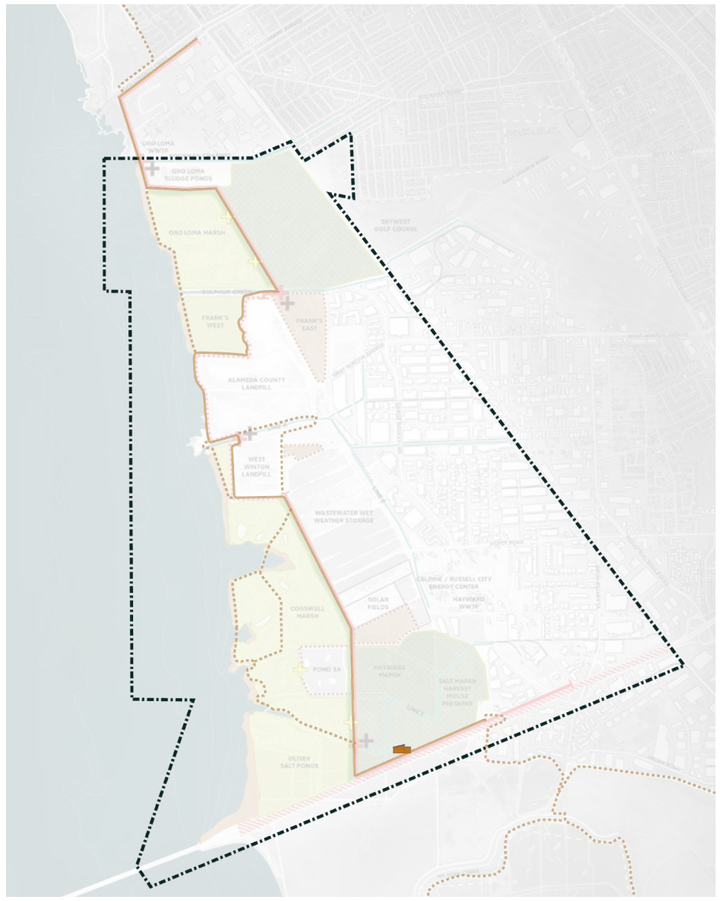


COST ITEM	ALT 1	ALT 2	ALT 3
New Bay Trail (terrestrial)	$-	$713,000	$636,000
New Bay Trail	$957,000	$-	$-
New Bay Trail- bridge on piles	$-	$20,244,000	$-
SUBTOTAL**	**$957,000**	**$20,957,000**	**$636,000**

DOES NOT ACCOUNT FOR DESIGN, MOBILIZATION, OR CONTINGENCY

PRELIMINARY COST ESTIMATE: INTERPRETIVE CENTER

1. Closer to the Bay



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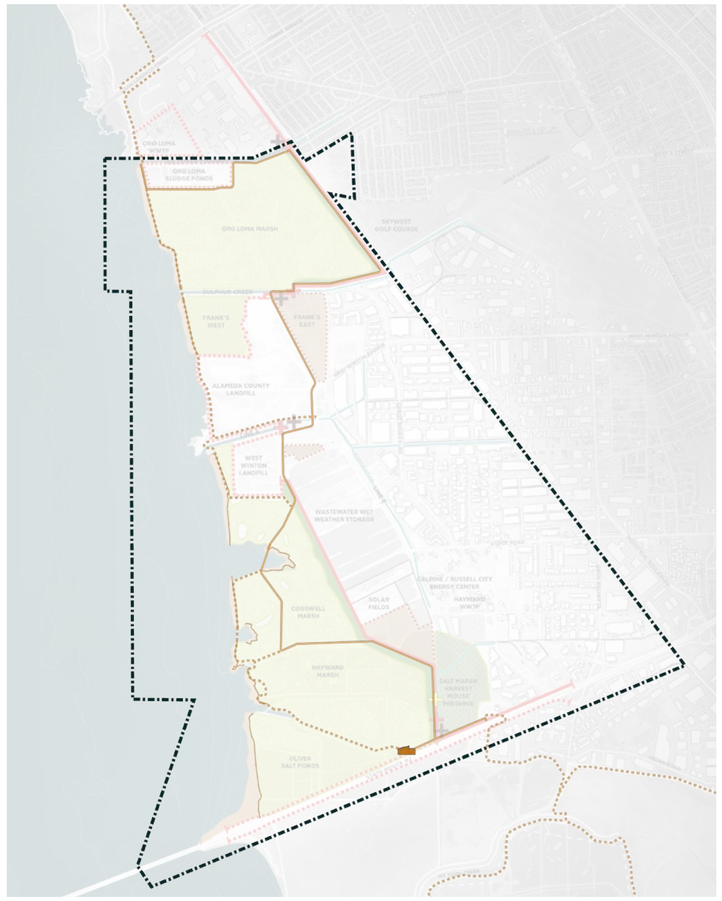

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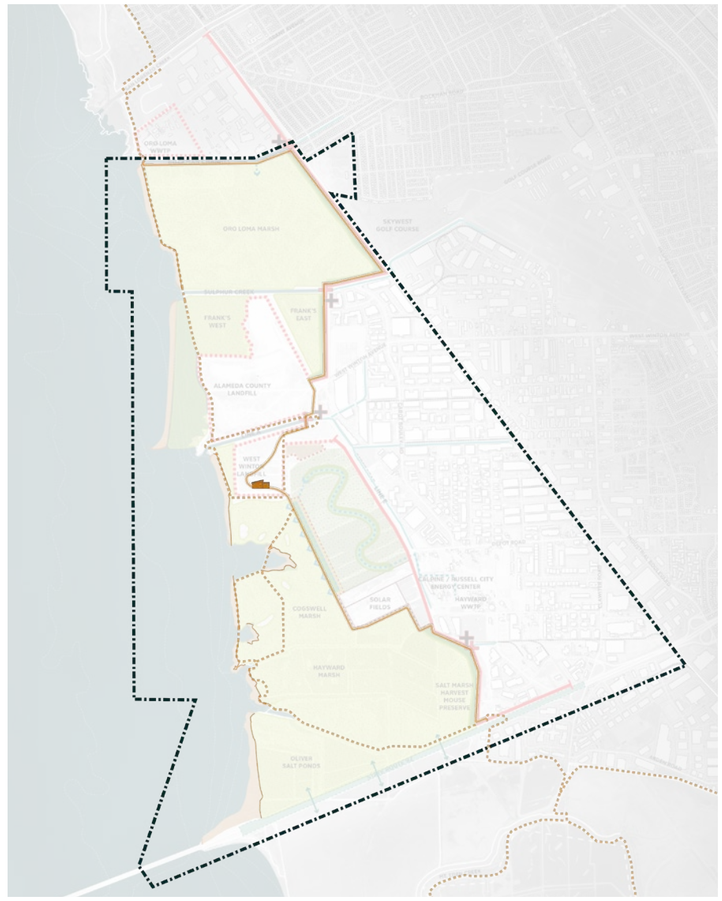
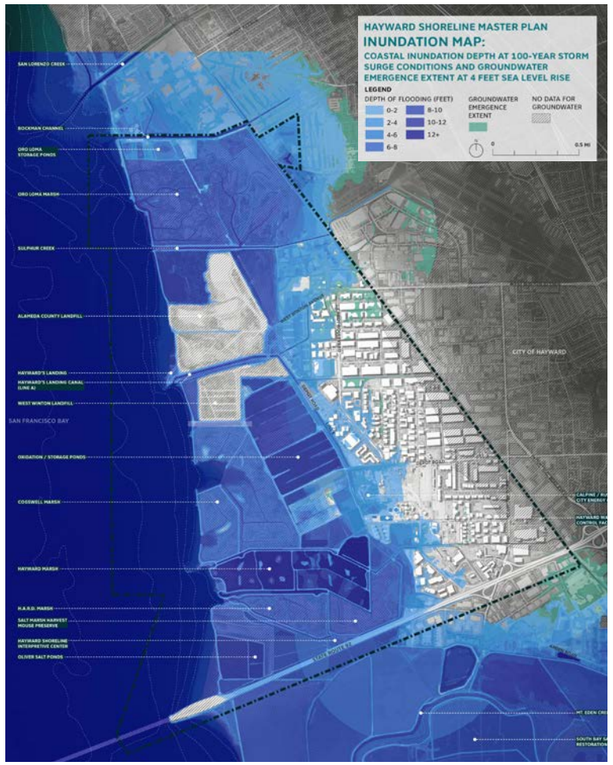


COST ITEM	ALT 1	ALT 2	ALT 3
Renovations Needed	$1,750,000	$1,750,000	$-
Protected in Place	$1,430,000	$-	$-
Current Center on Pilings	$-	$3,000,000	$-
Relocation to Landfill	$-	$-	$5,000,000
SUBTOTAL**	**$3,180,000**	**$4,750,000**	**$5,000,000**

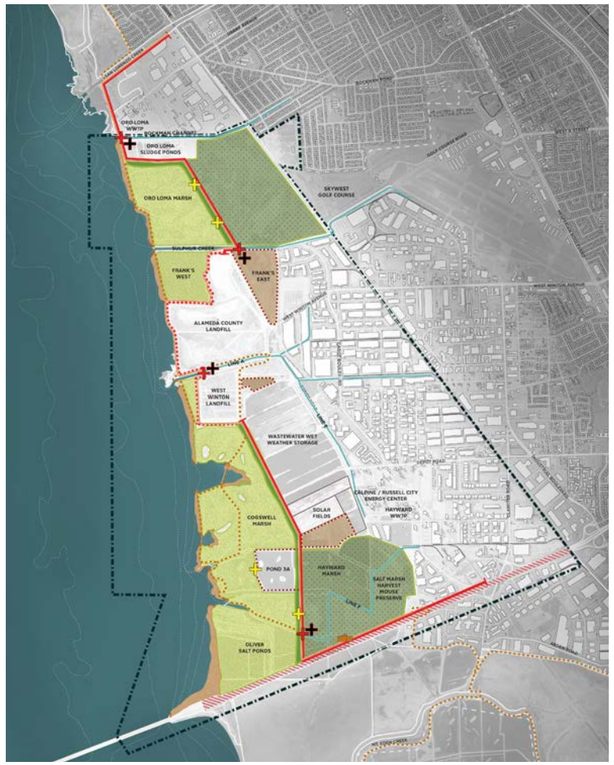
DOES NOT ACCOUNT FOR DESIGN, MOBILIZATION, OR CONTINGENCY

PRELIMINARY COST ESTIMATE: TOTAL

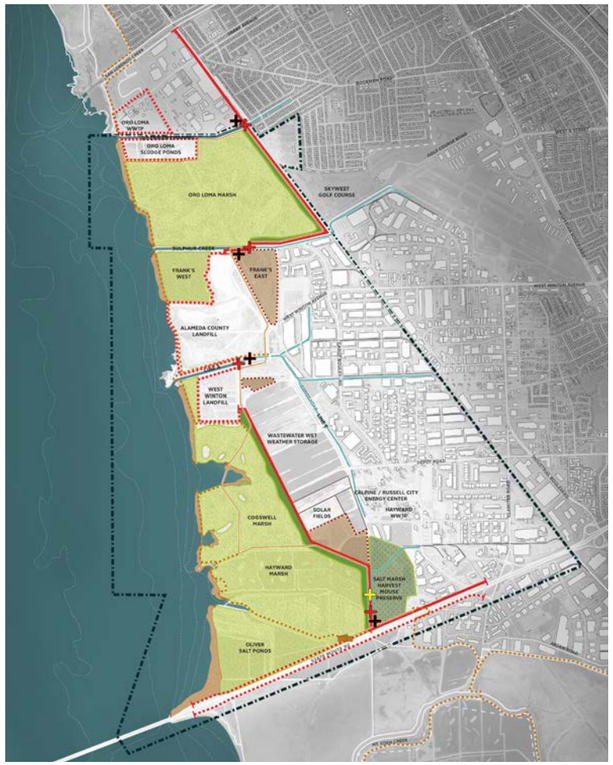
No Action



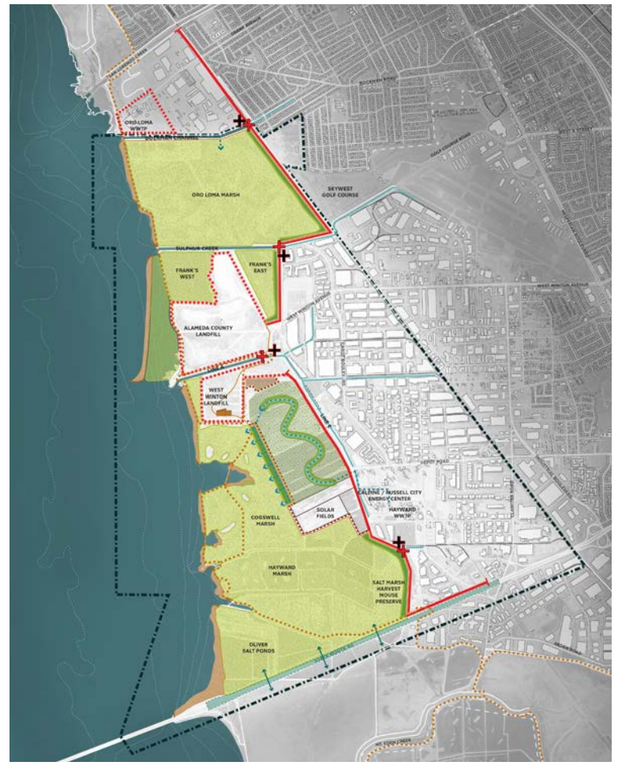
1. Closer to the Bay



2. Down the Middle



3. Further Inland



4' SLR + 100 YEAR STORM

COST ITEM	ALT 1	ALT 2	ALT 3
SUBTOTAL	**$436,310,000**	**$541,149,000**	**$596,150,000**
DESIGN (10%)	$43,631,000	$54,115,000	$59,615,000
MOBILIZATION (7%)	$30,542,000	$37,880,000	$41,730,000
TOTAL	**$510,482,000**	**$633,145,000**	**$697,495,000**
CONTINGENCY (50%)	$255,241,000	$316,572,000	$348,748,000
TOTAL (WITH CONTINGENCY)	**$765,723,000**	**$949,717,000**	**$1,046,243,000**

THANK YOU!

ADDITIONAL INFORMATION

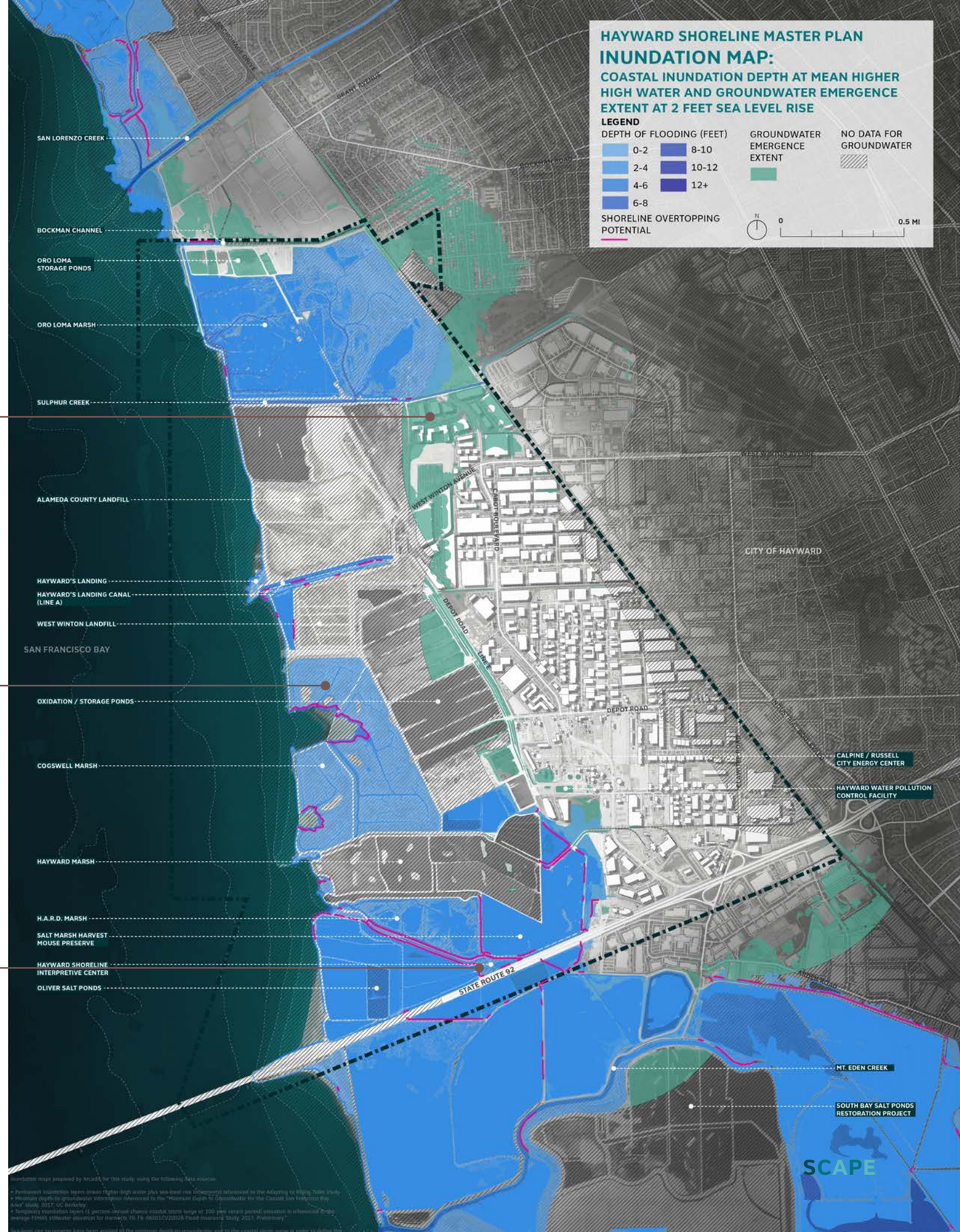
SEA LEVEL RISE MAPS

2′ SLR & GROUNDWATER EMERGENCE

Northern industrial neighborhood are impacted by groundwater before SLR inundation

SLR impacts tidally influenced areas & Oliver Salt Ponds

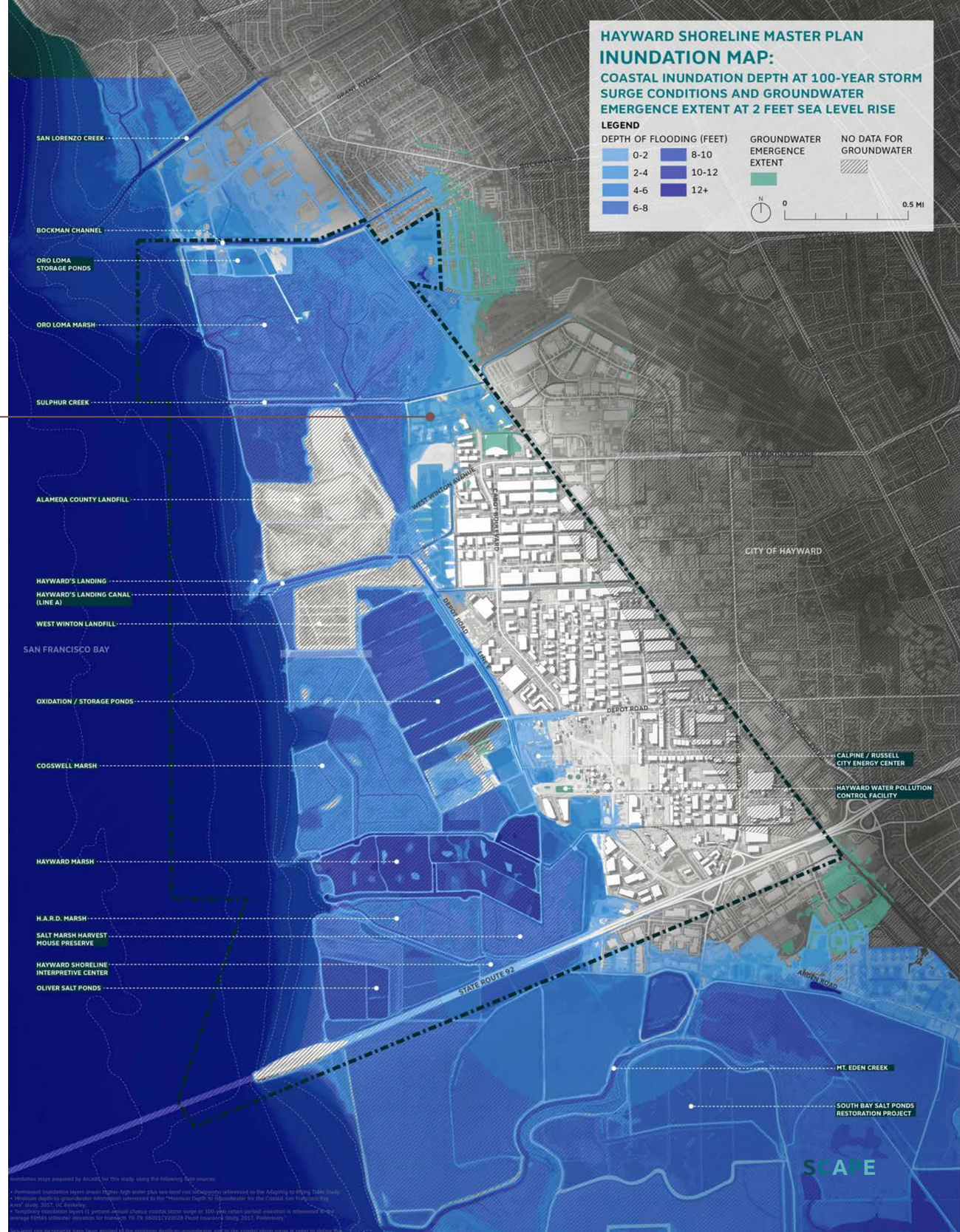
SLR impacts recreational resources include Bay Trail, Interpretive Center, and access points



HAYWARD SHORELINE MASTER PLAN
May 5, 2020

2′ SLR + 100-YEAR STORM

Areas of groundwater emergence roughly correlate with areas of 100-year flood risk



HAYWARD SHORELINE MASTER PLAN
May 5, 2020

4′ SLR & GROUNDWATER EMERGENCE

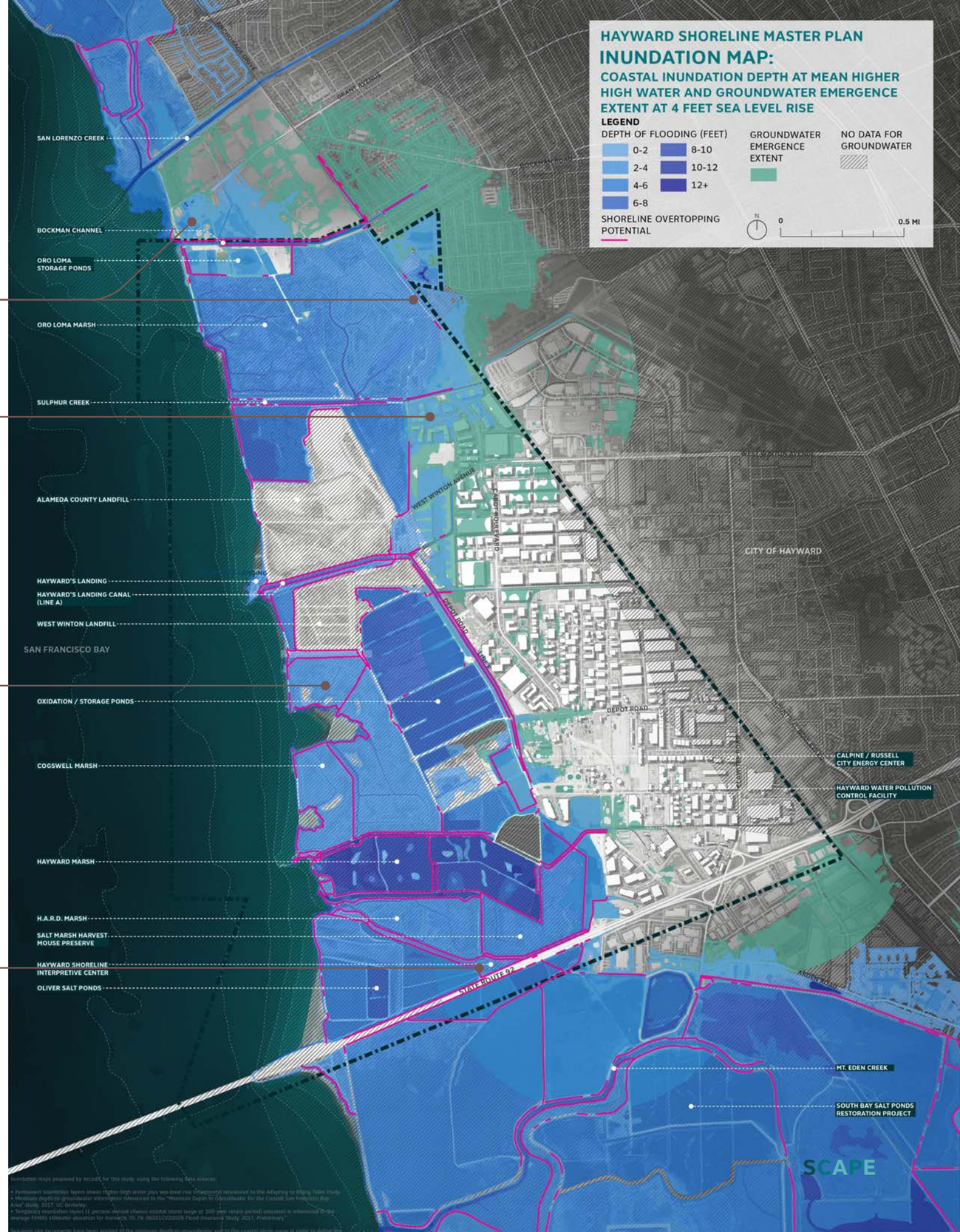
SLR directly impacts critical infrastructure (San Mateo, Oro Loma, railroad)

Many areas impacted by groundwater with 2′ of SLR are now impacted by SLR

Most natural features are impacted by SLR

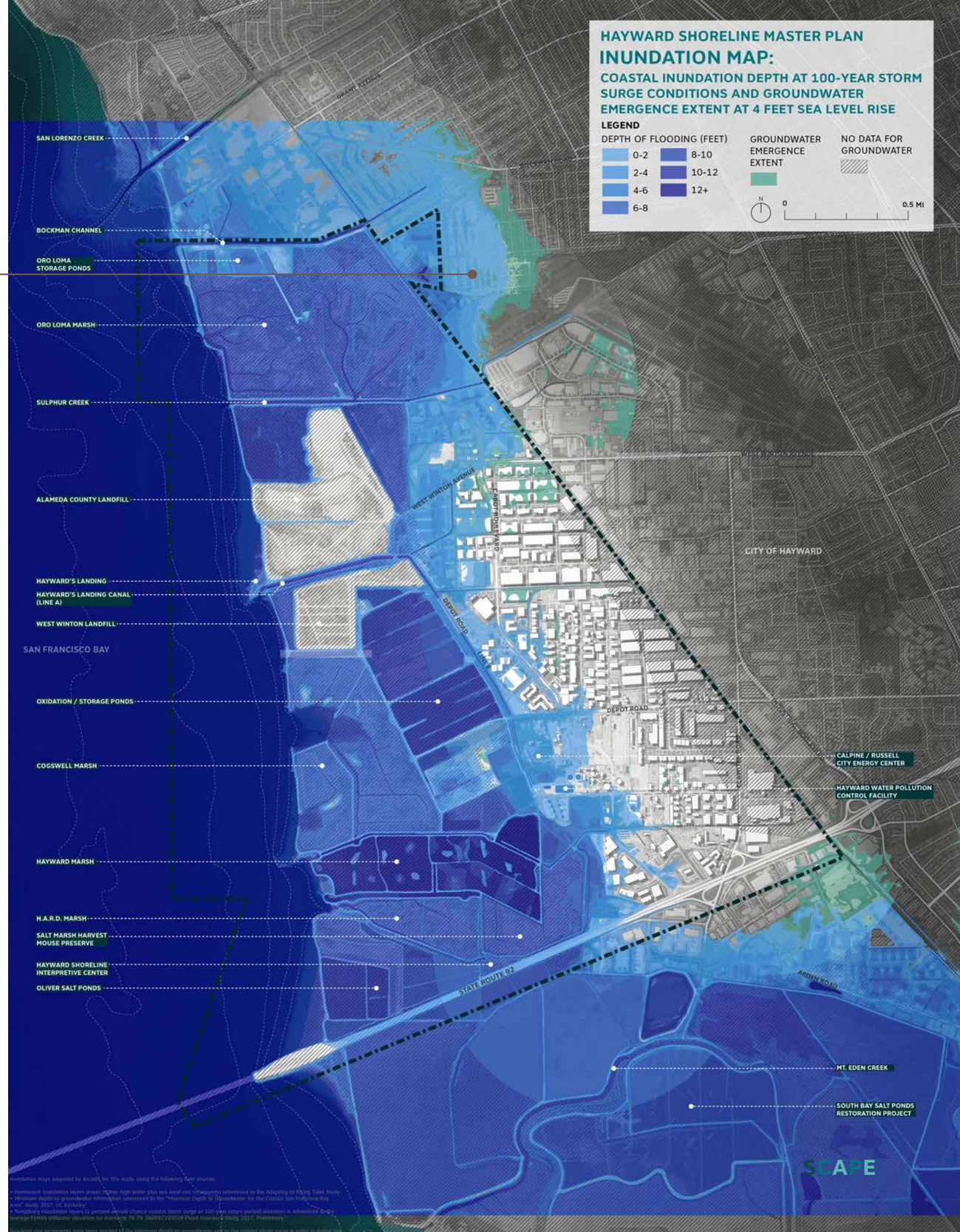
Major SLR impacts to recreational resources include Bay Trail, Interpretive Center, and access points

HAYWARD SHORELINE MASTER PLAN
May 5, 2020



4’ SLR + 100-YEAR STORM

Areas of groundwater emergence roughly correlate with areas of 100-year flood risk



HAYWARD SHORELINE MASTER PLAN
May 5, 2020

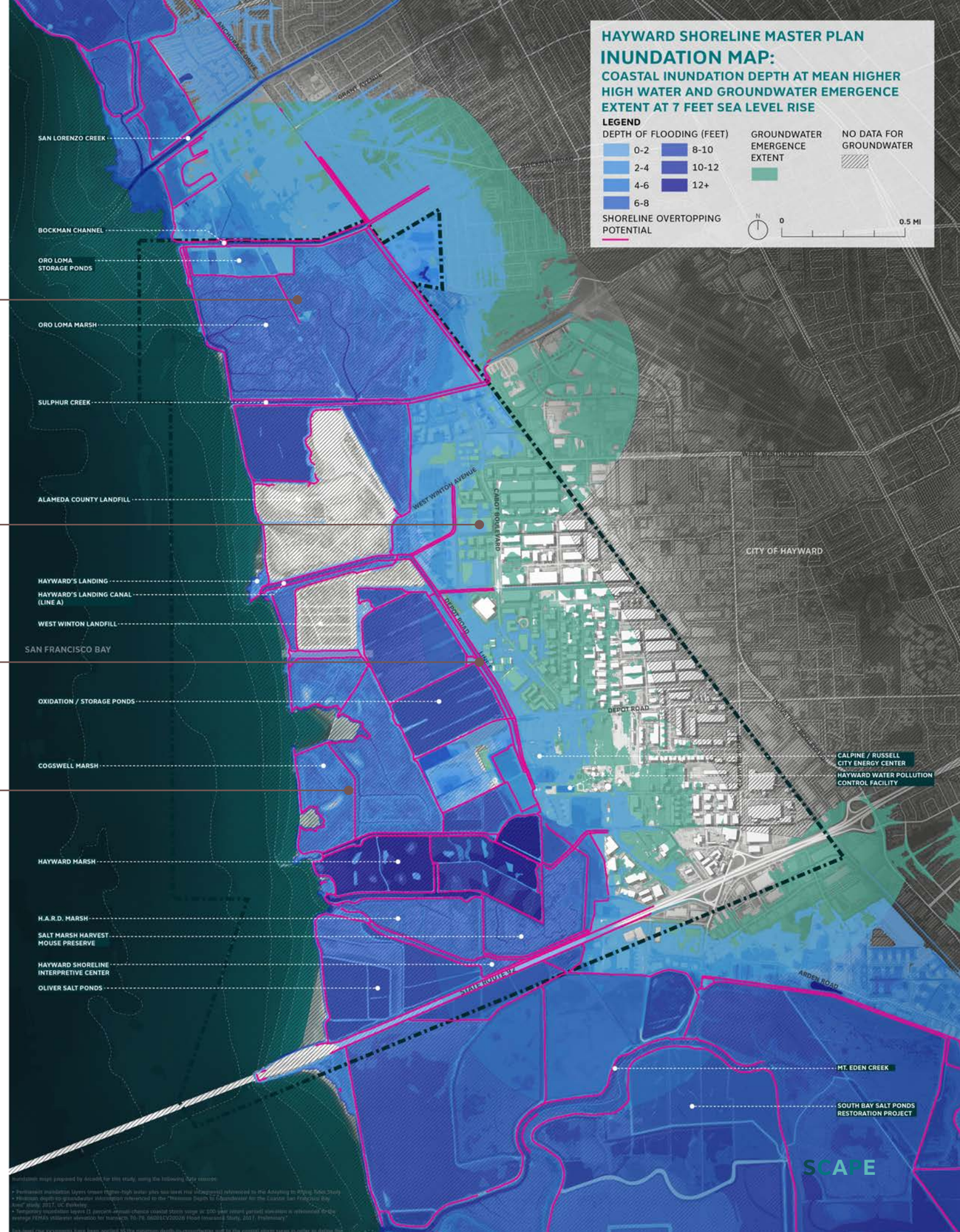
7’ SLR & GROUNDWATER EMERGENCE

Almost all critical infrastructure is impacted by SLR

Major SLR and groundwater impacts to all industrial neighborhoods

All stormwater and flood control channels experience significant backups

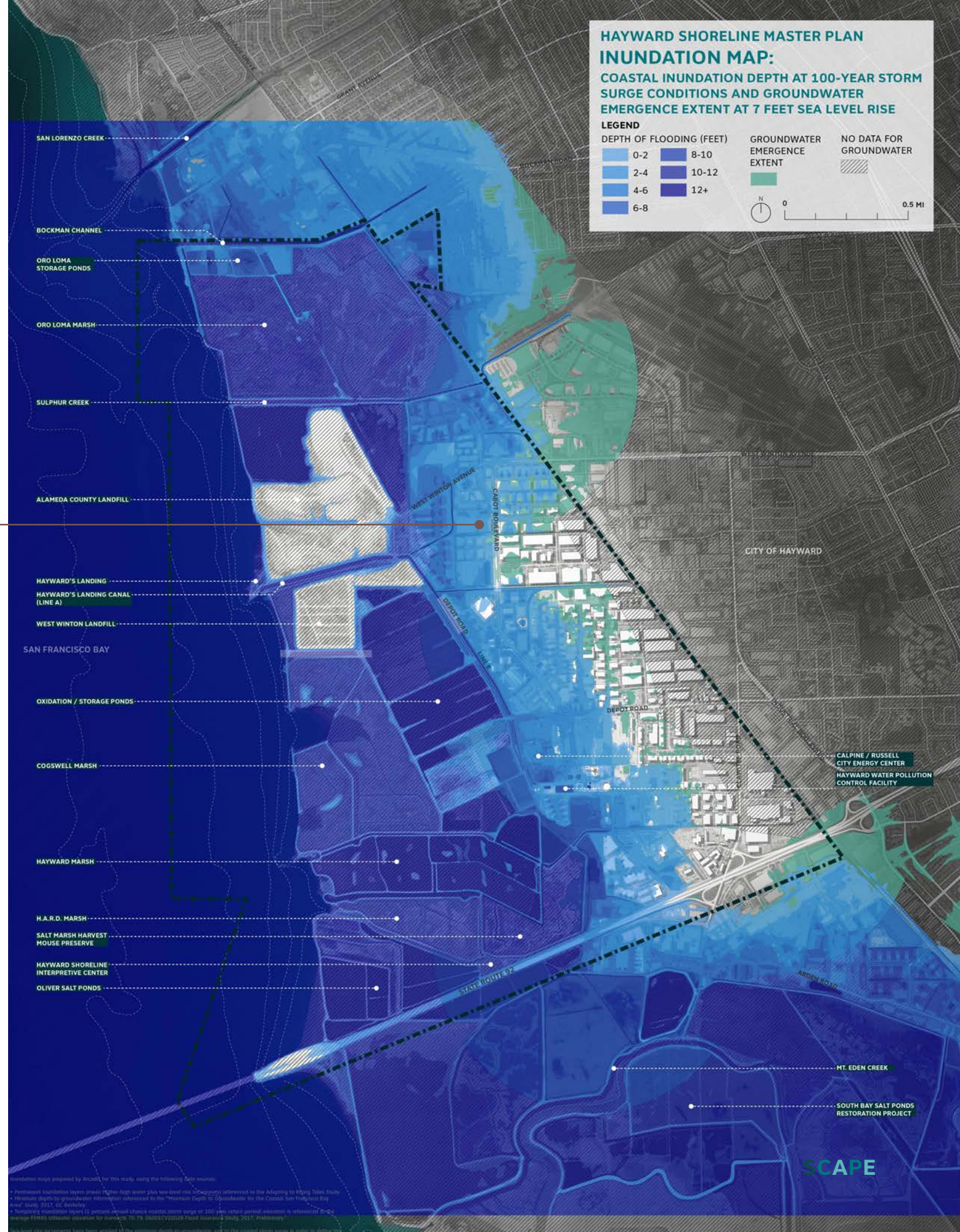
All natural and recreational features experience severe SLR inundation



HAYWARD SHORELINE MASTER PLAN
May 5, 2020

7’ SLR + 100-YEAR STORM

Areas of groundwater emergence roughly correlate with areas of 100-year flood risk



HAYWARD SHORELINE MASTER PLAN
May 5, 2020