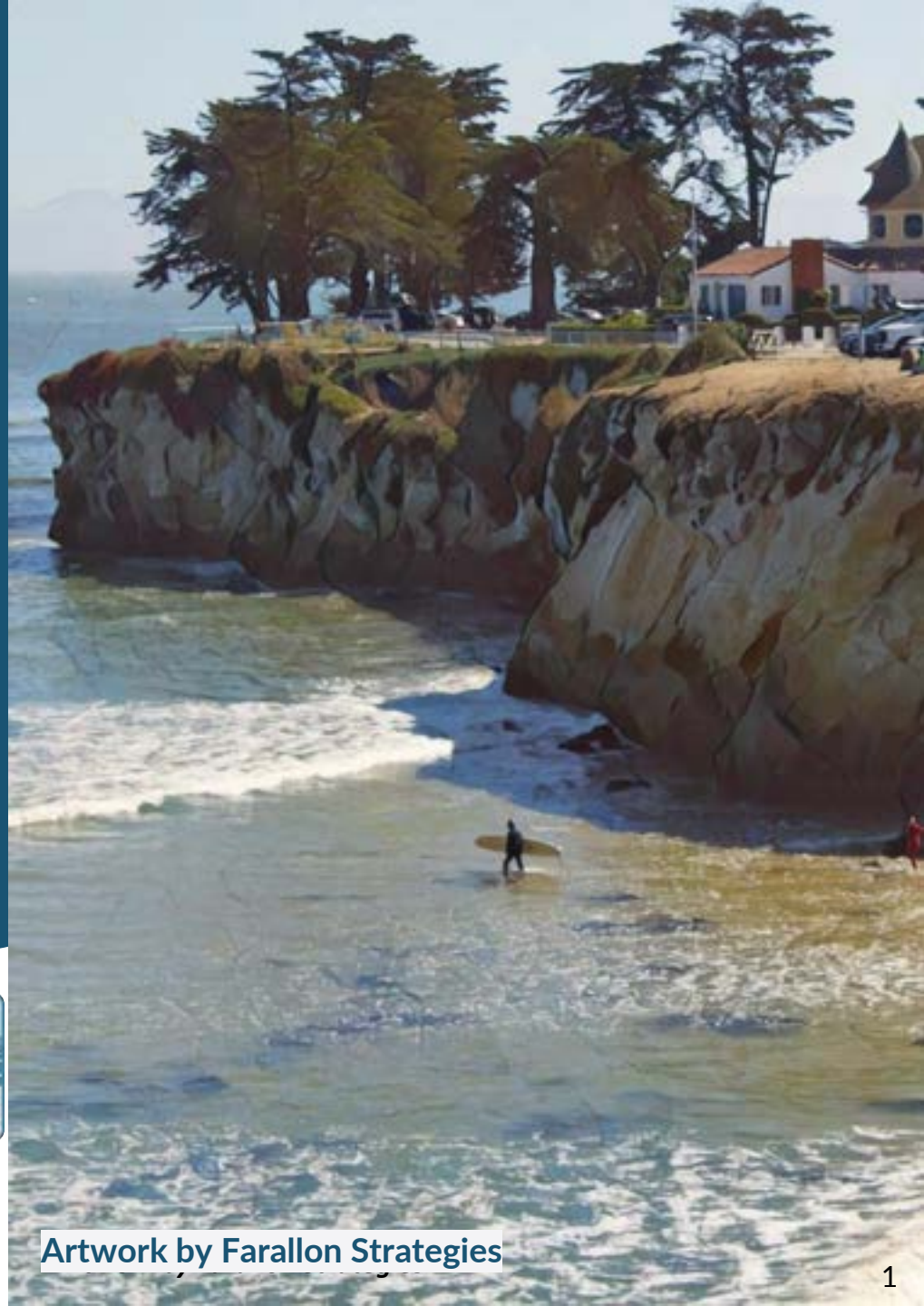
Living Shorelines, Nature-Based Solutions, and Sand Management Feasibility Study

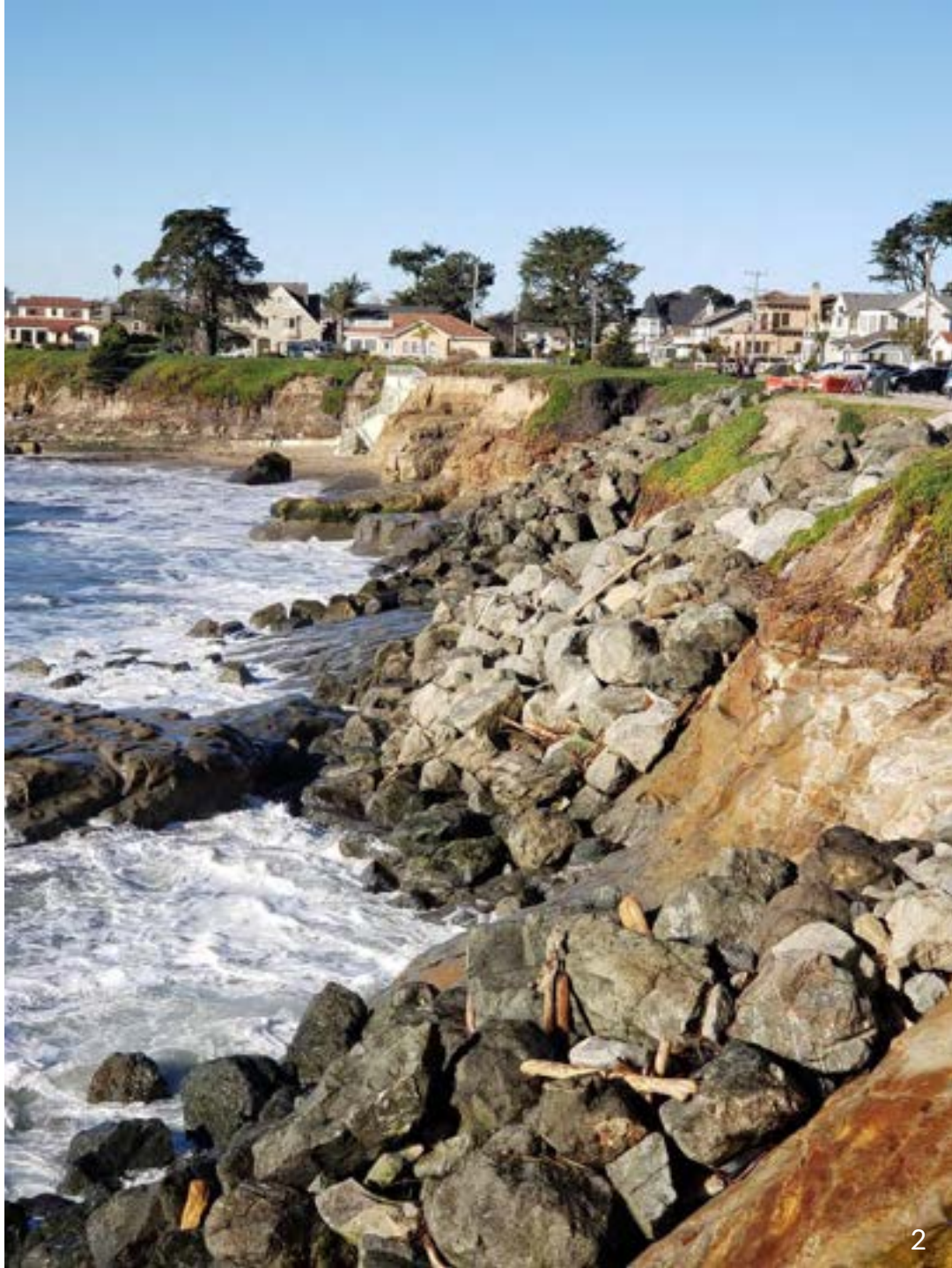
CSBPA Santa Cruz
May 11, 2026



Artwork by Farallon Strategies

Outline

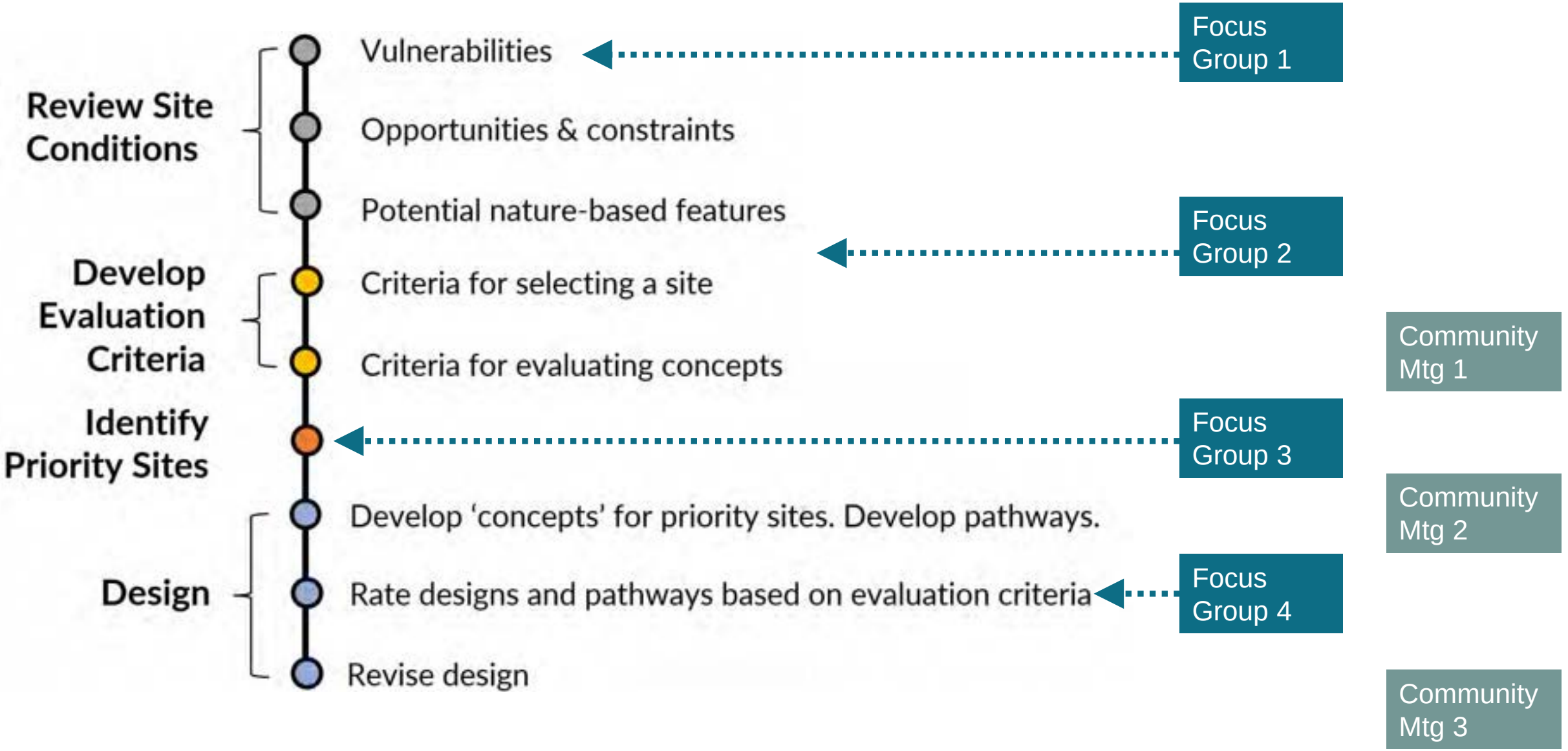
- Project Scope, Process
- Trajectory of the shoreline
- Site Selection and Concept Development
- Future Directions



Scope of Project

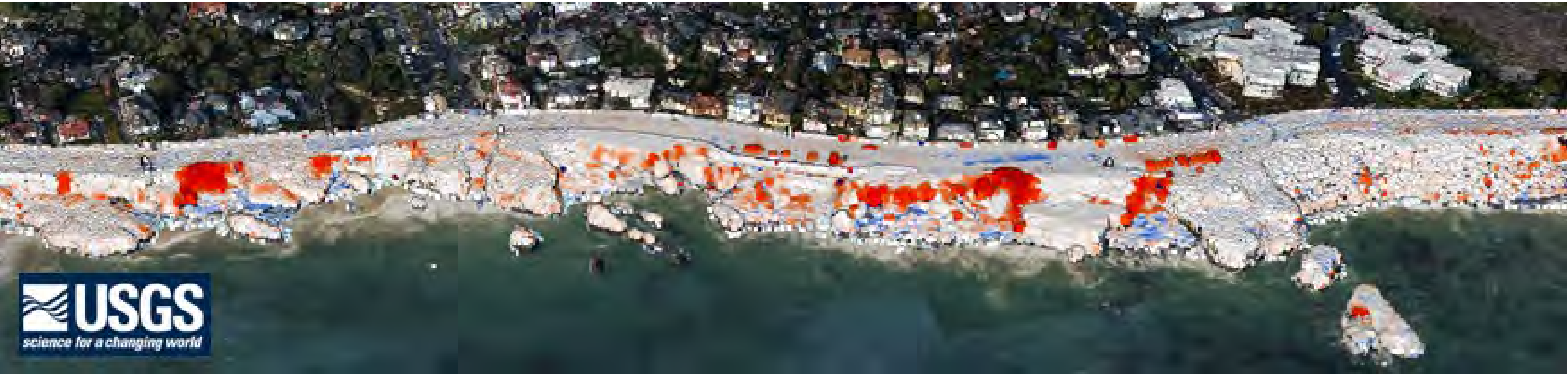
- Assess feasibility of Nature Based Solutions
- Develop conceptual 30% designs for up to 3 sites
- Work with a 20-person focus group through 4 meetings and engage in 3 community conversations

Process


Review Site Conditions
Develop Evaluation Criteria
Identify Priority Sites
Design
Vulnerabilities
Opportunities & constraints
Potential nature-based features
Criteria for selecting a site
Criteria for evaluating concepts
Develop 'concepts' for priority sites. Develop pathways.
Rate designs and pathways based on evaluation criteria
Revise design
Focus Group 1
Focus Group 2
Focus Group 3
Focus Group 4
Community Mtg 1
Community Mtg 2
Community Mtg 3

January 2023

Shoreline change tracked by USGS



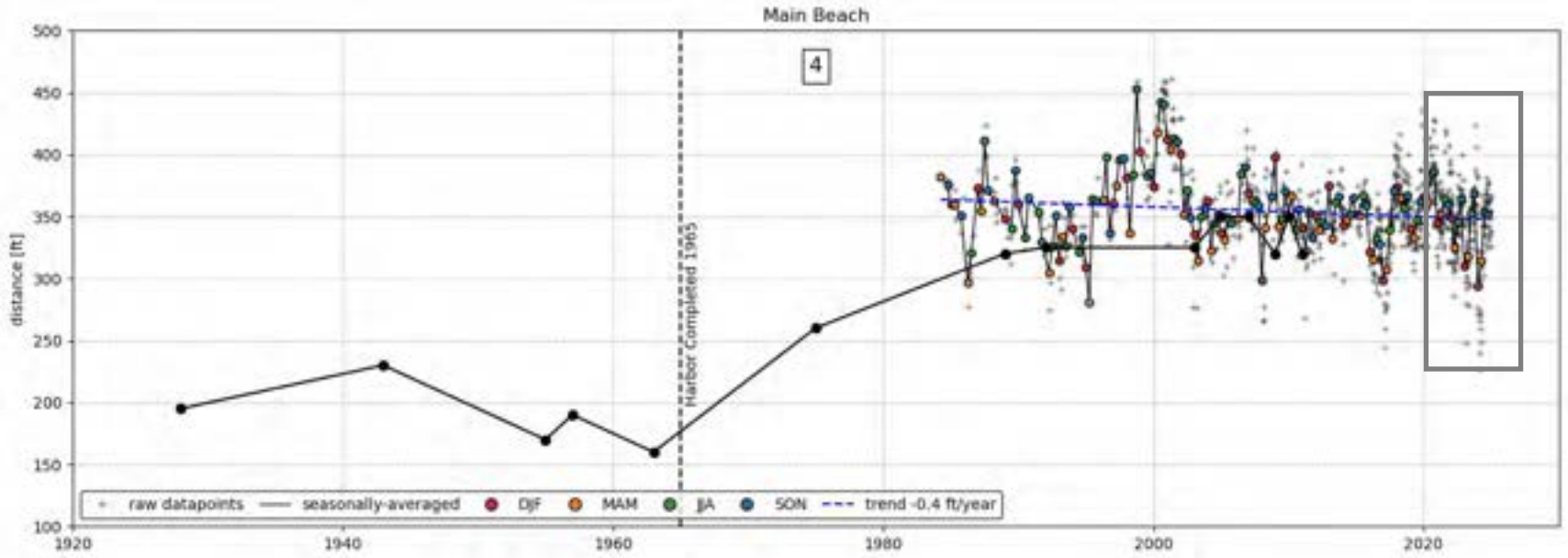
Historical Context

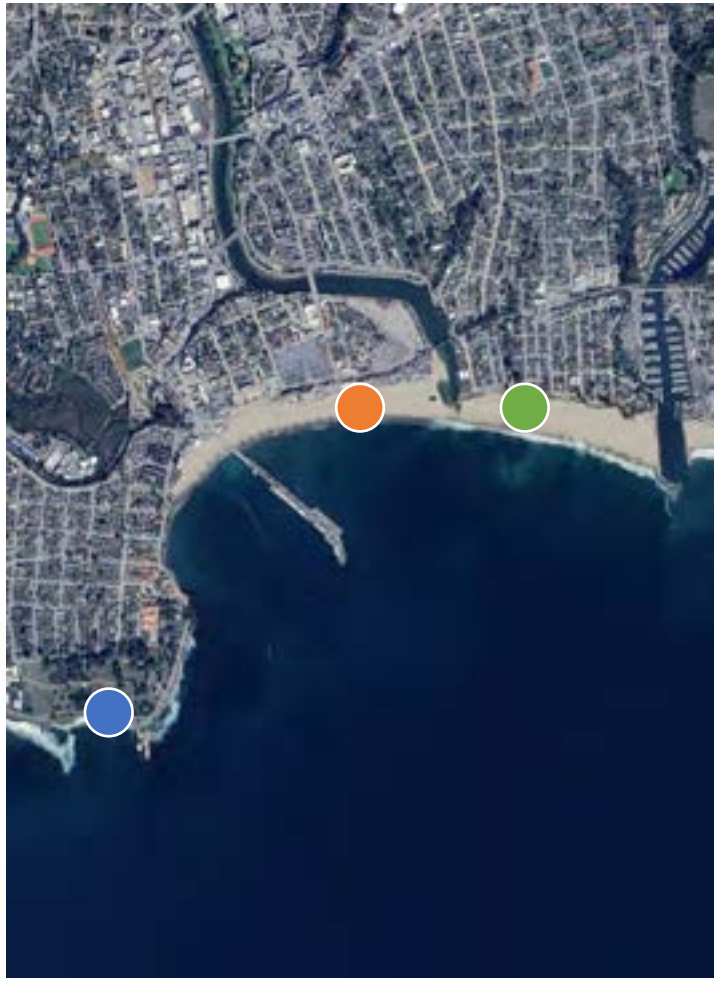
Image: Santa Cruz County Historic Photograph Collection

Figure 5b. Its Beach during El Niño winter of 1983. Image: Gary Griggs

Image: Gary Griggs

Historical Context





Future Trajectory

Future Trajectory

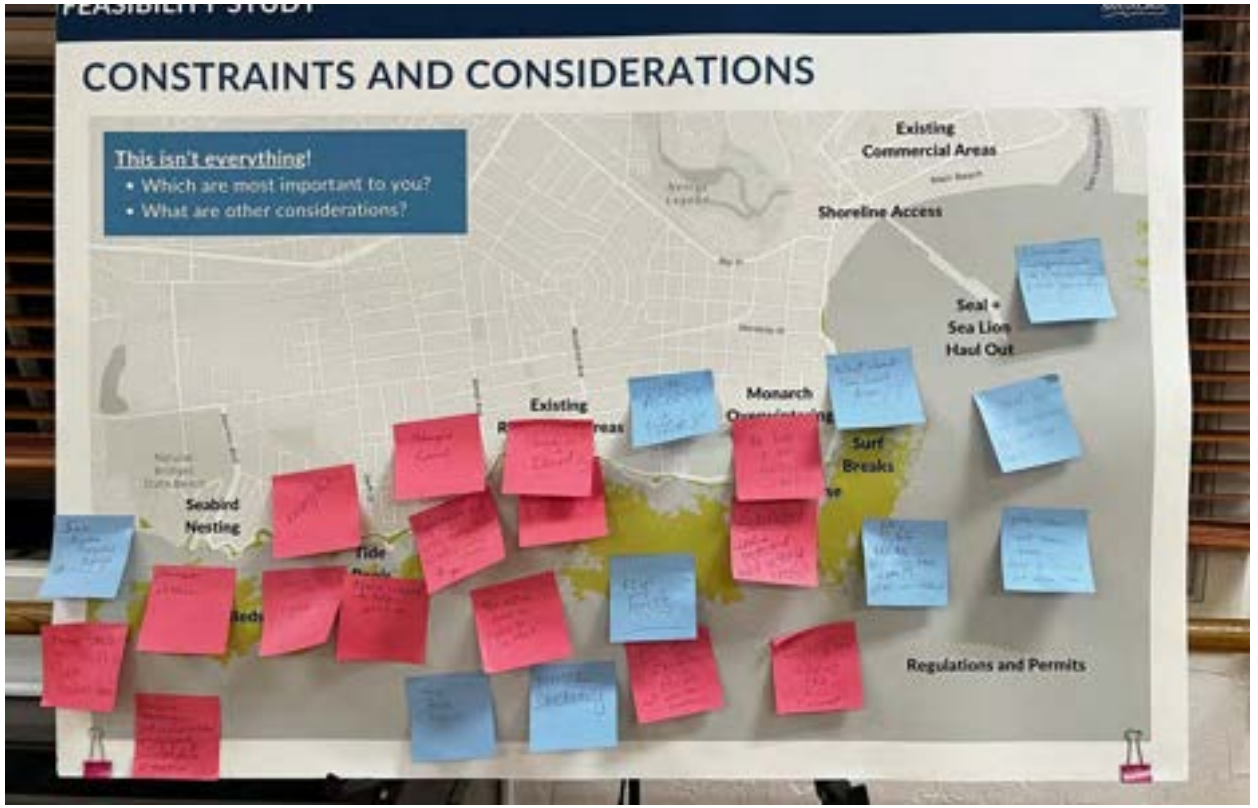
Feasible NBS Options

Image: Pathways Climate Institute

Considered technical feasibility of an array of NBS options:

- Green-gray options
- Native plantings
- Stormwater management
- Artificial reefs
- Cobble berms
- Sand management
- Sand retention with headlands
- Dunes

Site Selection



- **Vulnerability**
- **Number of viable NBS options**
- **Likelihood for Project Success**

→

- likelihood for near-term project construction
- Economic benefit
- Potential for reducing vulnerabilities

Site Selection

1. Main Beach
2. West of Its Beach
3. Mitchell's Cove

Evaluation Criteria applied to NBS concepts

What will the outcomes be?

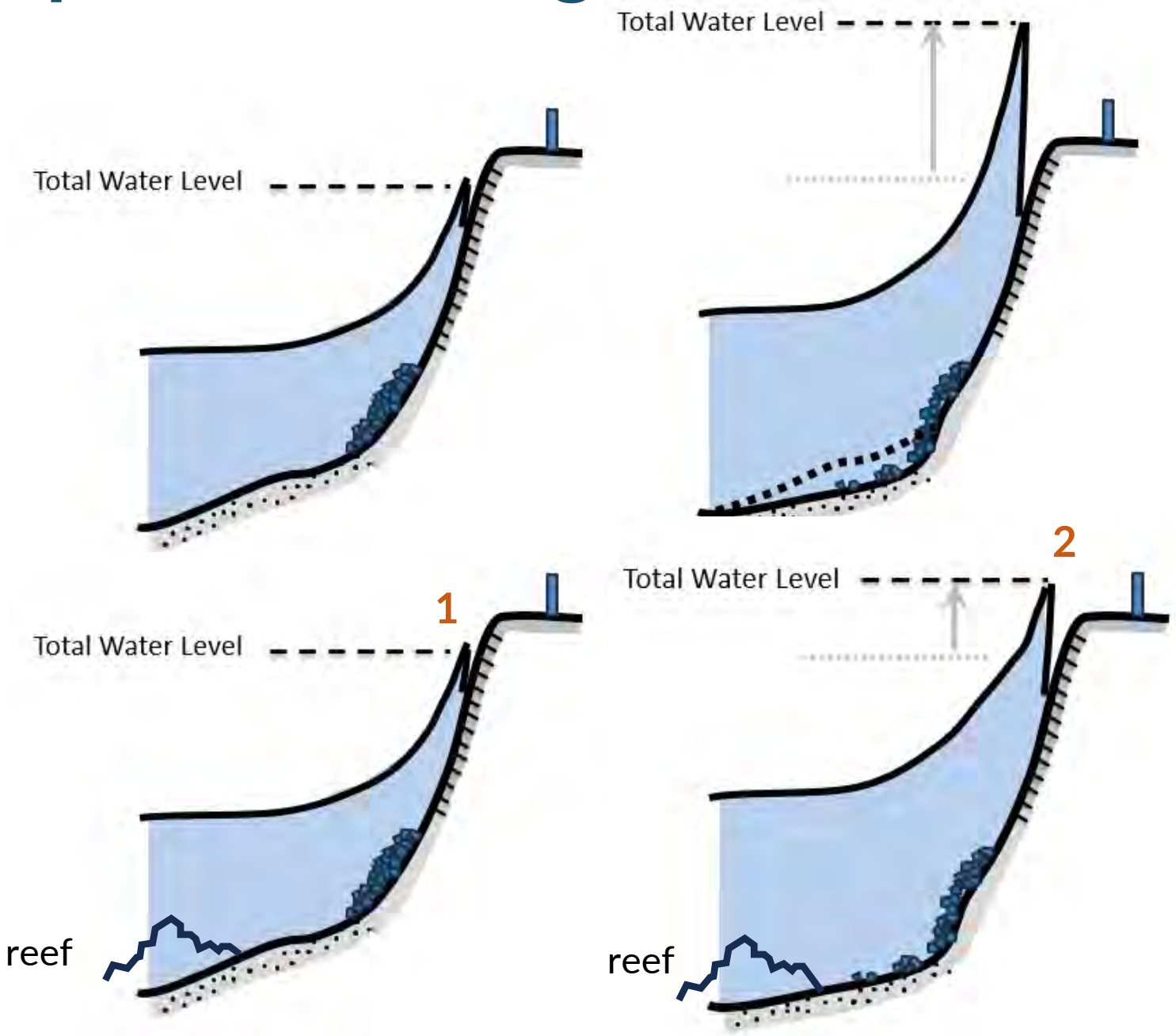
- **Coastal Management and Resources** –flooding, erosion
- **Ecosystems and Habitats** – marine and terrestrial
- **Access and Recreation** –pedestrian and bike access, surf, beaches, marine harvest

Can we do it?

- **Technical and Costs** – capital cost, operations and management costs
- **Policy and Equity** – regulation and permitting, tribal priorities

Comparison to present-day conditions: 1 = worse; 2 = similar; 3 = better

Example: Evaluating for Flood Benefit



Without Reef

With 1 foot of sea level rise, 3-foot increase in wave runup along backshore for Jan 2023 event

With Reef

Reduction in flooding relative to baseline

Concept Development: West Cliff

Green stormwater infrastructure:
Improve outfalls and use ponds to slow runoff

Green-Grey Option A:
Modify existing rock

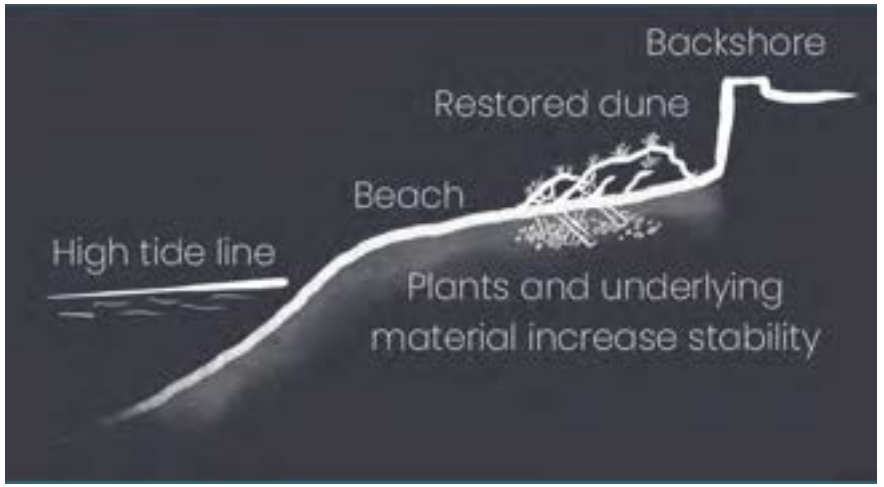
Green-Grey Option B:
Remove rock, add setback wall, add tide pools

Small Pilot Reef:
Sand retention and wave tripping with hard substrate

These concepts can be combined for this site. Beach nourishment is also being considered as a long-term option.

Concept Development: Main/Cowell Beach

Vegetated Dune:
Modular series of dunes with different substrates. Applying lessons learned from Seabright, Rio Del Mar



Local Example at Seabright State Beach

Concept Evaluation: Example

	No Action	Green-Grey 1	Green-Grey 2	Green-Grey 3	Reef	Sand Mgmt
Coastal Mgmt and Resources	1.3	1.7	1.7	2.7	2.7	2.3
Ecosystems and Habitats	1.6	2.6	2.6	3	2.5	2.8
Access and Recreation	1	2	2.2	2.6	2.4	2.2
Technical	1.5	2.5	2	2	1.5	2
Costs	1	1.7	1.7	2	2	1.3
Policy	1	2	2	2	1	2
Tribal Priorities						
Average	1.2	2.1	2.0	2.4	2.0	2.1

Comparison to present-day conditions: 1 = worse; 2 = similar; 3 = better

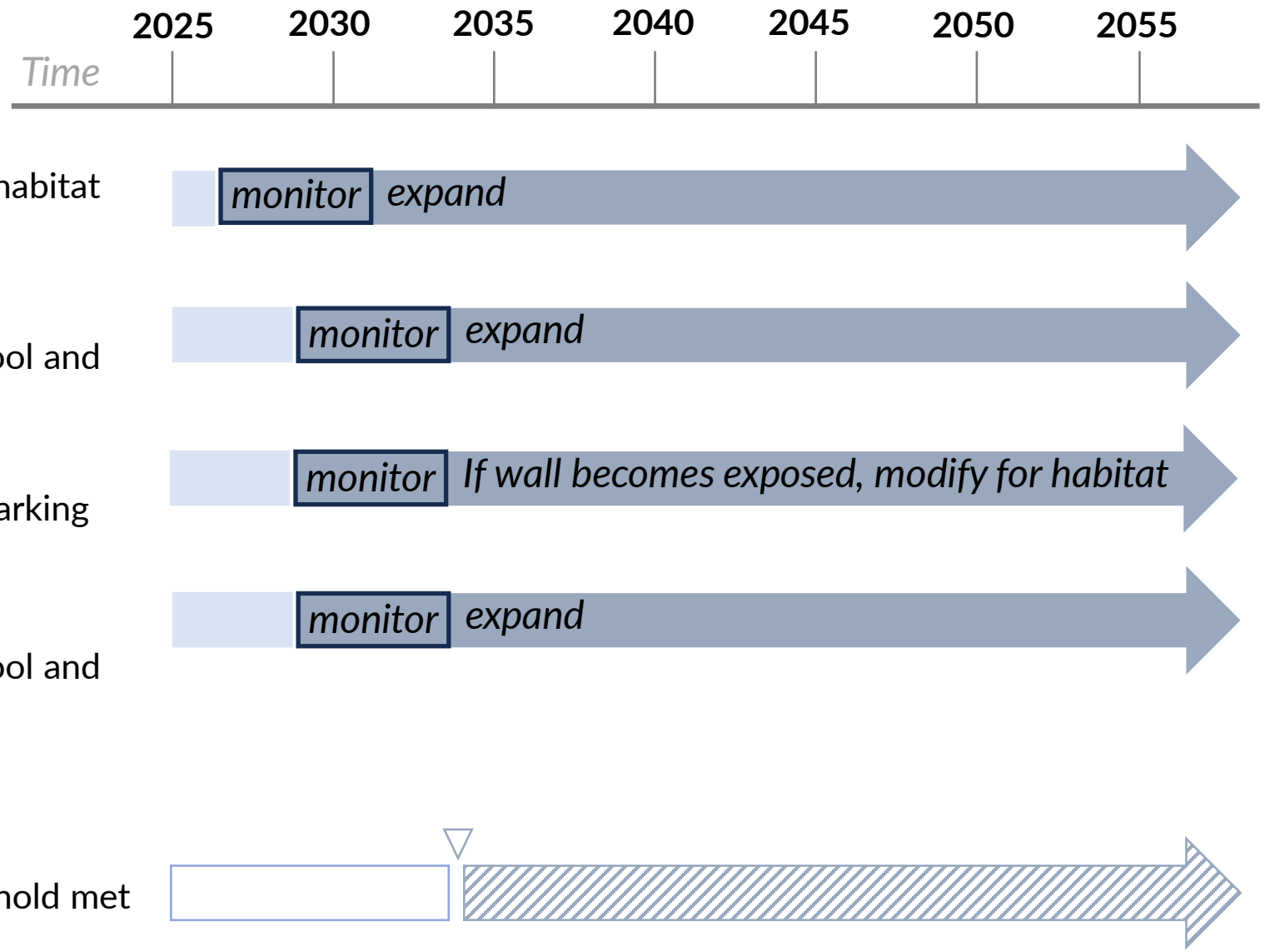
Summary and Future Directions

Options available for the City to explore further:

- Even small scale ecological benefits are meaningful
- Permitting pathways exist for small scale projects that could be expanded
- Recreational benefits
- Build on strengths: UCSC, and engaged community

Spare Slides

Site 3: Mitchell's Cove



Site 2: West of Its Beach

Green Stormwater Infrastructure

Concept Development: West Cliff

Green-Grey Option A:
Modify existing rock

Green-Grey Option B:
Remove rock, add setback wall, add tide pools

Intertidal Reef:
Improve outfalls and use ponds to slow runoff

All of these concepts can be combined for this site. Beach nourishment is also being considered as a long-term option.

What is a nature-based solution (aka NBS)?

Año Nuevo State Park (Kenneth and Gabrielle Adelman)

- Incorporates natural features and processes to protect, conserve, restore and manage coastline and its ecosystems
- Builds on lessons learned from nature