test scenarios

chapter V

purpose

These Test scenarios were developed to explore a range of possible interventions at Ocean Beach and model their outcomes through the year 2100, based on the best available current understanding of climate change, sea level rise, and coastal dynamics at Ocean Beach. The Test Scenarios represent “extreme cases” with the intent of illustrating sketching the broadest possible range of outcomes. They are not proposals or alternatives.

The Test Scenarios served to organize technical work by the project team’s coastal and civil engineers and economist. They were also intended to examine the wide range of ideas and proposals expressed by the public and stakeholders. Testing very different directions allowed the team to illustrate the ramifications of various single-objective approaches whose outcomes fall short in some areas, encouraging an understanding of tradeoffs and a balanced approach.

The Test Scenarios were presented at Public Workshop #2. Participants were then invited to assemble a hybrid scenario drawing from their preferred elements of the Test Scenarios. While not all of the hybrid scenarios were feasible, the exercise revealed a great deal about the tradeoffs involved and the effects of near-term actions over a long time horizon.

test scenarios

methodology

Test Scenarios were developed by the project team by assembling packages of interventions drawn from public and stakeholder suggestions and grouping them according to key priorities, such as maximizing access or allowing a naturally eroding coastline. Many interventions were related to the placement and selection of amenities like roads, trails, restrooms, and parking lots, but the most critical actions related to the management of coastal dynamics and hazards such as beach nourishment, the relocation of infrastructure, of the placement of seawalls or other hard structures.

These actions provided the basis for physical modeling of the evolving coastline at several time periods through 2100. Four coastal cross-sections, or profiles, showing the location of the water's edge, and the width, position, and elevation of the beach, dunes, and hard structures, were altered , or 'transgressed' according to historical erosion rates projected forward and coupled with the likely impacts of sea level rise. The effects of hard structures like seawalls and the placement of sand were incorporated as dictated by each scenario, and the resulting profiles showed the evolving beach and dune width over time. Beach and dune width provide proxies for both recreational and ecological value, both of which are compromised as these erode.

Scenarios have been developed by the SPUR Team with input from the Management and Advisory Committees. These are described in documents produced by AECOM, attached (110506Scenarios Board PAC mtg.pdf and 110509Evaluation Criteria revisions mtg.pdf). The scenarios have different responses at different triggers, which will result in different outcomes.

There are four scenarios:

A. Maximum Habitat;

B. Maximum Recreation;

C. Maximum Green Infrastructure;

D. Maximum Infrastructure.

The scenarios include treatments at four time periods:

0 Years (2010);

20 years (2030);

40 years (2050);

90 years (2100).

The scenarios are divided into three shore reaches (Figure 1):

- North Ocean Beach (NOB) from Point Lobos¬Cliff House south to Lincoln Boulevard;
- Middle Ocean Beach (MOB) from Lincoln Boulevard to Sloat Boulevard;
- South Ocean Beach (SOB) from Sloat Boulevard to Fort Funston.

The above results in approximately 48 permutations (four scenarios x four time periods x three reaches). Detailed methodology are in Appendix X, ppXX.

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test scenario A : maximum habitat

This Test Scenario is intended to explore the possibilities of an ambitious and comprehensive program of managed retreat, to allow a natural, wild coastline to develop and persist into the future, including wide sandy beaches, an extensive native dune system, and the improved habitat and ecological function these elements suggest Visitor services are limited and emphasize wildlife experience. This is the only Test Scenario in which the inland project boundary is removed, and space is converted from urban to natural uses, including the removal and relocation of infrastructure, the gradual acquisition of private property in the coastal hazard zone, and the restoration of Golden Gate Park to native conditions.

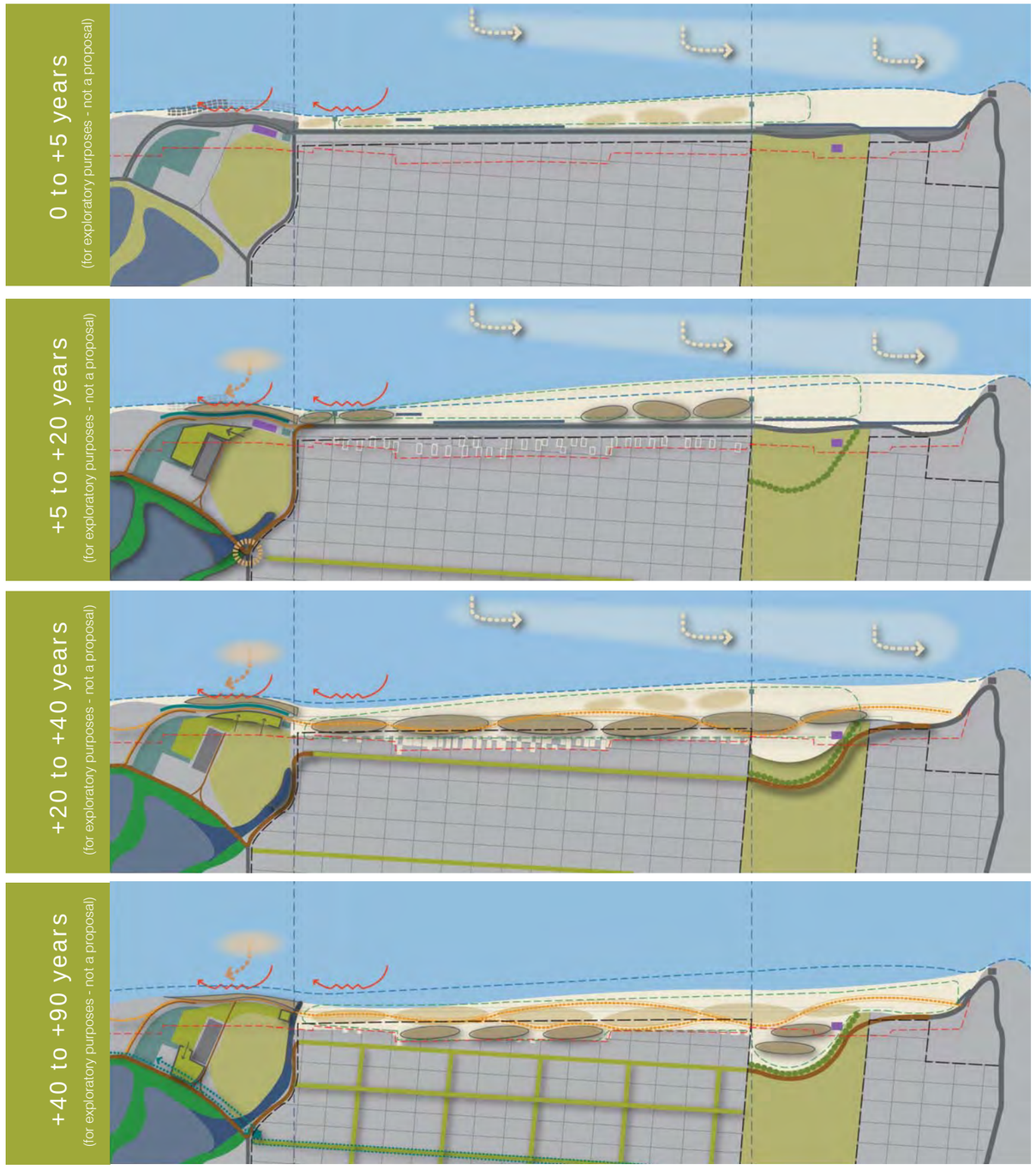
why?

/ *to increase biodiversity and ecological function at Ocean Beach*

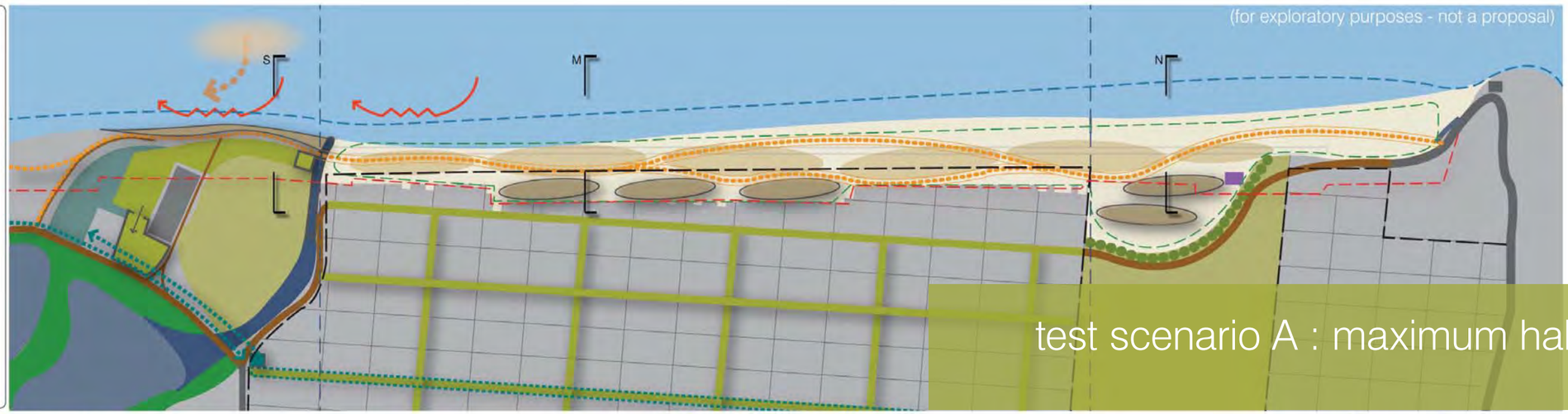
/ *to allow natural coastal processes to proceed*

how?

/ *maximize habitat restoration and comprehensive managed retreat*

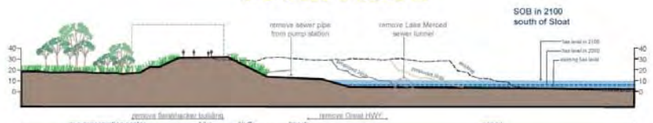


ocean beach at 2100



test scenario A : maximum habitat

south reach



mid reach

north reach

outcomes

- Lake Merced connected to the ocean as an ecological corridor
- Zoo is reconfigured to higher elevation
- Bank swallow habitat may be limited by bluff erosion
- Lake Merced tunnel is rerouted inland of treatment plant, Great Highway eliminated.
- Natural bluff morphology develops up to treatment plant
- Beyond 2100 - Oceanside Treatment Plan will be exposed to coastal hazards and need to be armored or relocated.

- City has purchased hundreds of homes along western most blocks to allow for coastal retreat
- Westside Transport Box and pump station is reconstructed inland (38th Avenue or Sunset Boulevard)
- Native dune system is restored and expanded into coastal retreat area
- New Great Highway reconstructed inland
- Habitat protection areas are expanded and recreational uses are limited to minimize impacts.

- Great Highway rerouted using existing Golden Gate Park road system
- Native dune system allowed to expand into the park toward a new windbreak
- The Beach Chalet is now directly on the beach

test scenario B : maximum recreation

Test Scenario B emphasizes Ocean Beach's function as a park and open space for people, with considerable improvements made to access and amenities, and coastal management geared toward maintaining the beach in place to the extent possible. Natural features are protected as a visitor amenity, but wholesale restoration is limited. South Ocean Beach is protected with an artificial reef designed as a surfing break.

why?

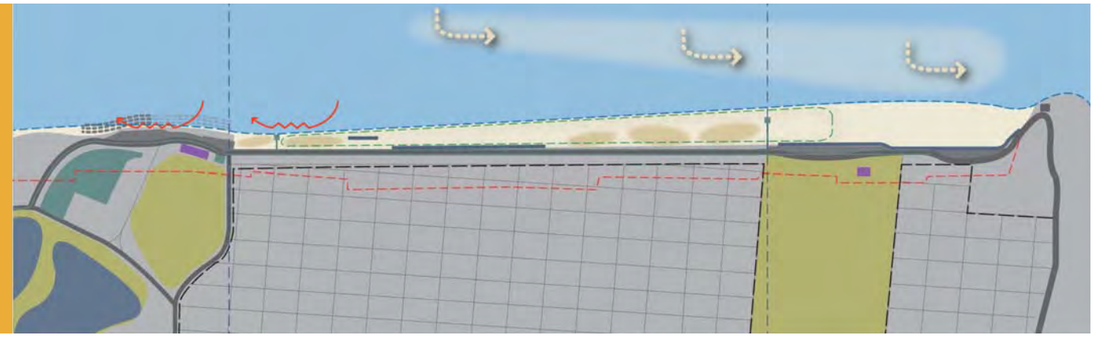
/ *to offer a great experience for the broadest spectrum of visitors*

/ *to celebrate and embrace the many facets of ocean beach*

how?

/ *protect and enhance the natural character of ocean beach while providing visitor amenities*

0 to +5 years
(for exploratory purposes - not a proposal)



+5 to +20 years
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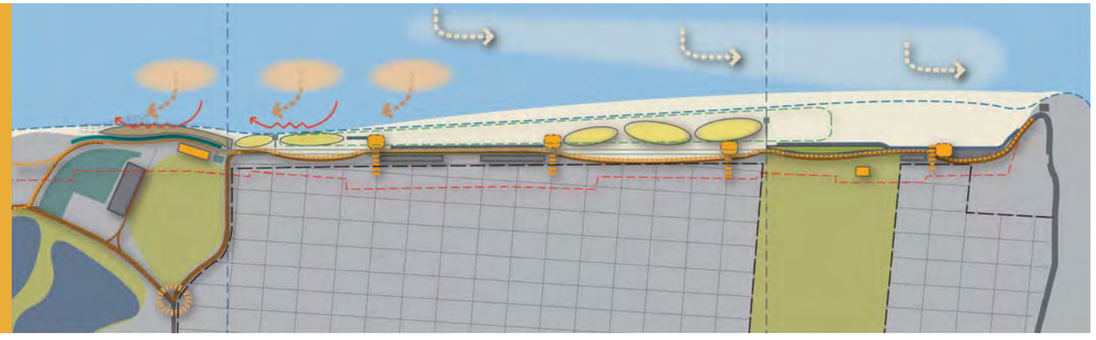

+20 to +40 years
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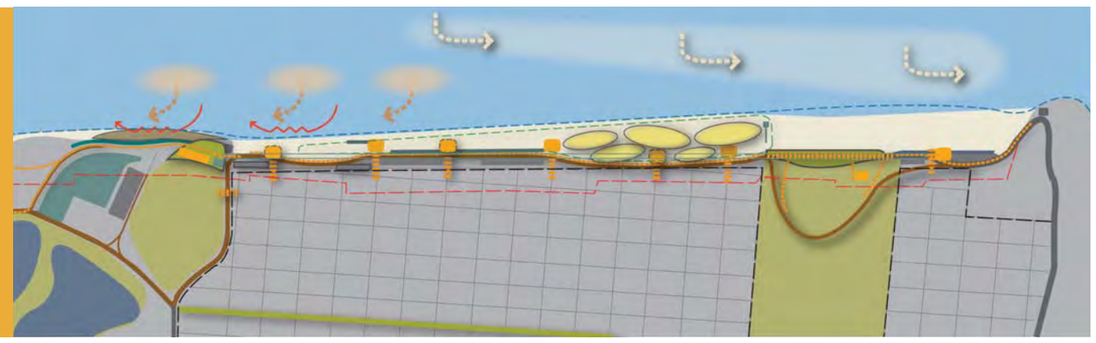
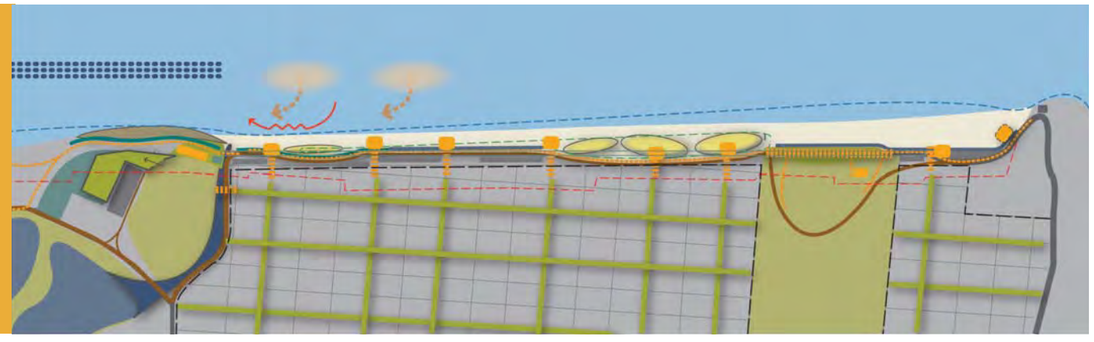
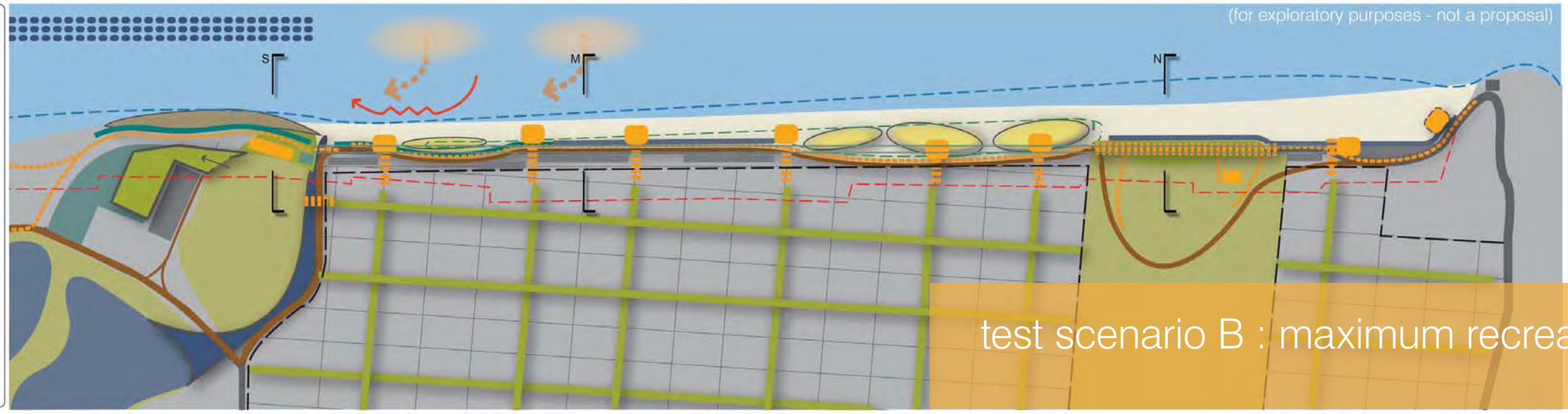


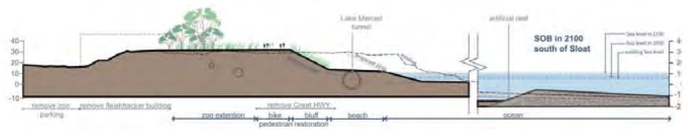
+40 to +90 years
(for exploratory purposes - not a proposal)





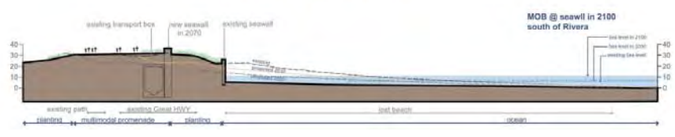
test scenario B : maximum recreation

south reach



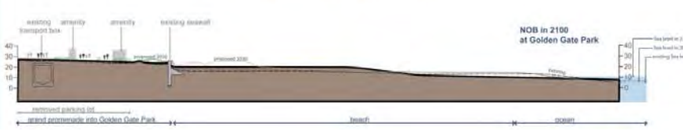
- Lake Merced is connected to the ocean as a new zoo feature and trail connection
- Zoo is reconfigured to Treatment Plant's green roof
- South Great Hwy rerouted inland, leaving trail corridor
- Artificial reef protects bluffs, creates surfing opportunity
- Fleishhacker Poolhouse restored as restaurant/interpretive center

mid reach



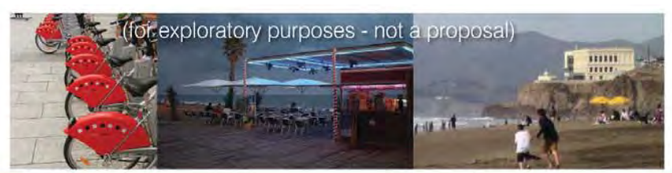
- Great Hwy narrowed to create a multi-modal promenade along the beach
- Access improvements, restrooms, and concessions built at key intersections
- Transport box reinforced with seawall, largely concealed by ongoing nourishment
- Dunes revegetated and improved, accessible via trails
- Beyond 2100, a seawall or artificial offshore reef will likely be needed to protect low-lying areas from storm surge flooding

north reach



- At Golden Gate Park, the Great Hwy is re-routed through park to allow for a great beach-park connection.
- Attractions, concessions, and public realm improvements create an urban "sea strand" along Golden Gate Park and promenade.

outcomes



test scenario C :
maximum green infrastructure

This Test Scenario maximizes the stormwater management potential of the watershed in order to take pressure off the combine sewer-stormwater system to protect water quality and allow some modification to elements exposed to coastal hazards. This was somewhat problematic as a distinct scenario, as the key concepts could be layered onto any of the other scenarios, and were by many workshop participants.

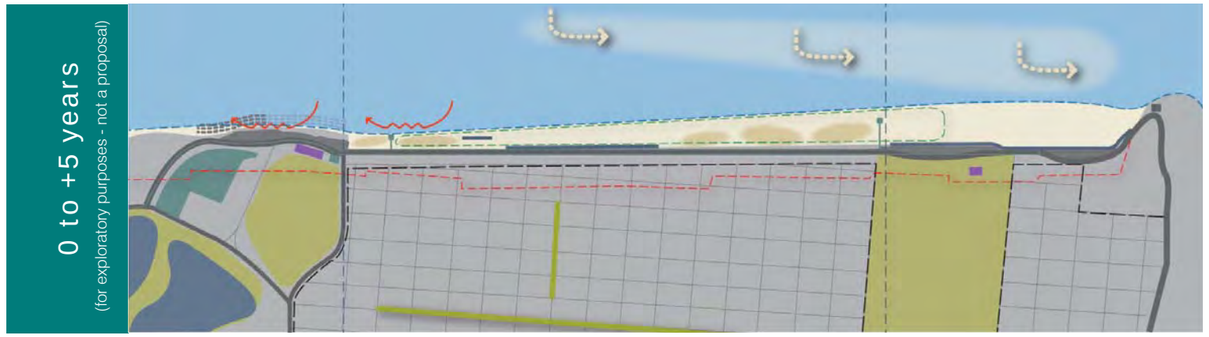
why?

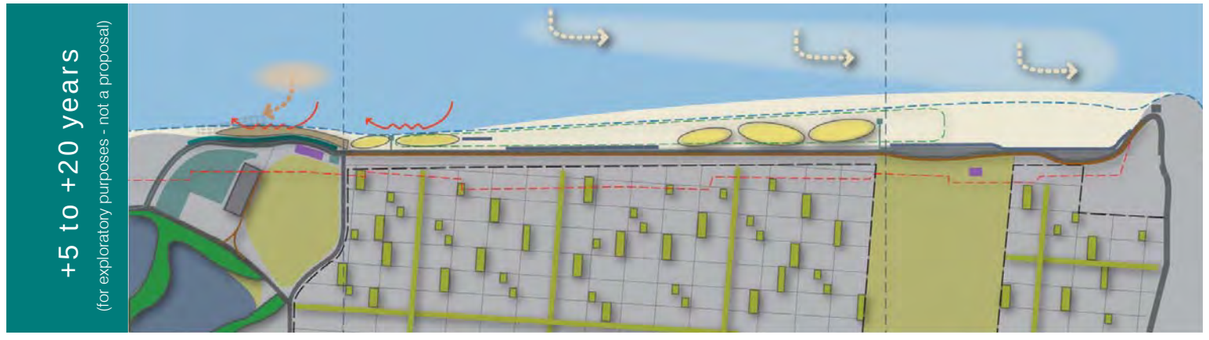
/ *more resilient, sustainable wastewater / stormwater system*

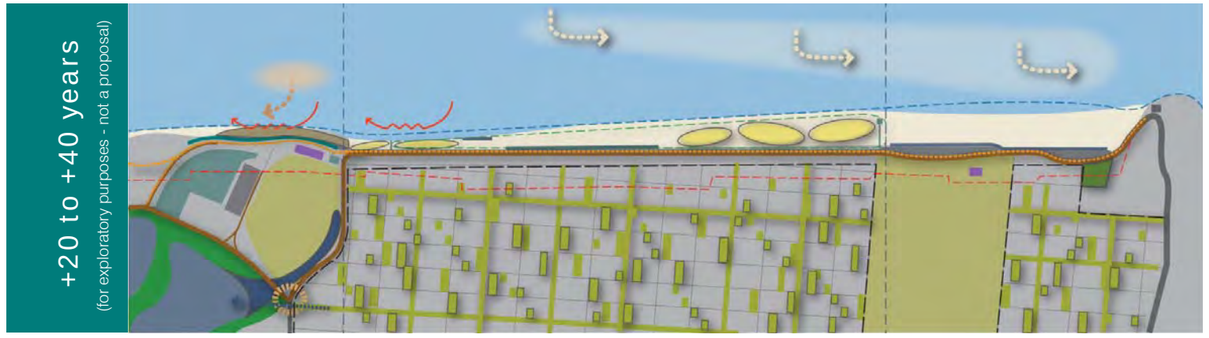
/ *to support the health and function of the watershed*

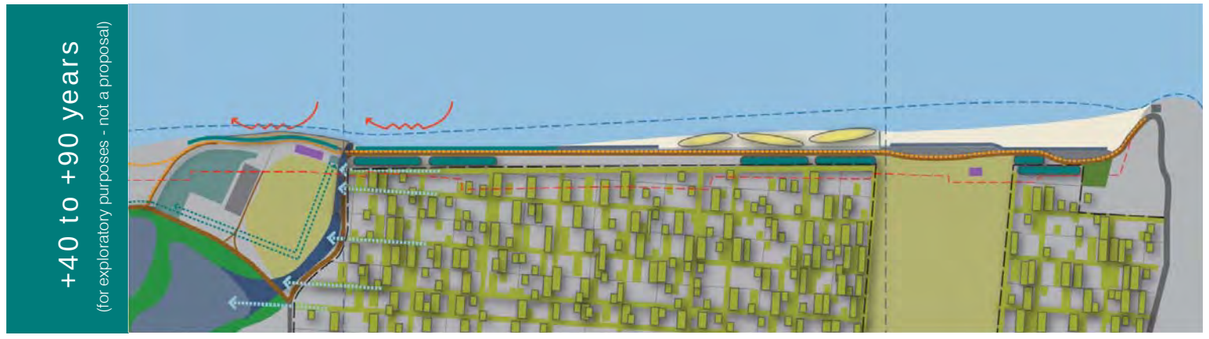
how?

/ *implement green infrastructure to replace existing infrastructure*

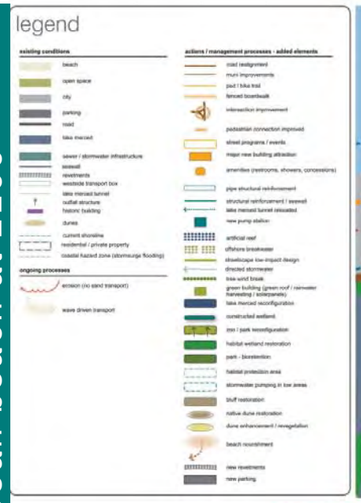


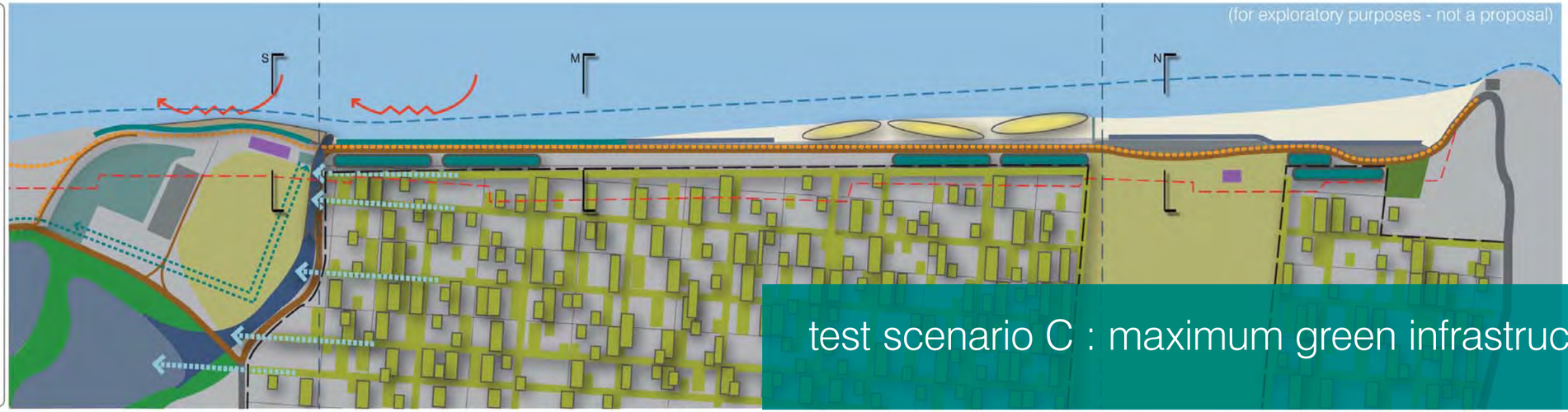






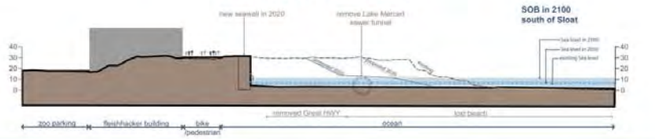
ocean beach at 2100





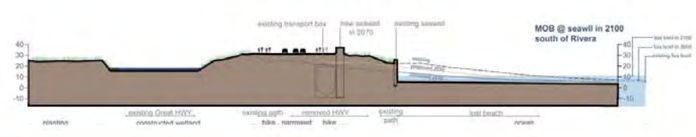
test scenario C : maximum green infrastructure

south reach



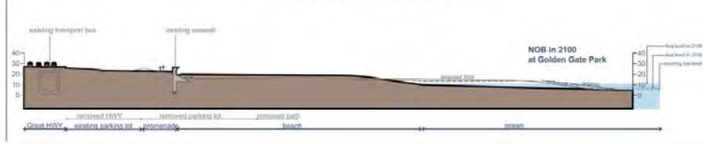
- Reduced stormwater load on utility infrastructure
- Lake Merced Tunnel rerouted inland, possibly smaller
- South Great Hwy rerouted inland, leaving coastal trail corridor
- Bluffs continue to erode
- Lake Merced integrated into watershed, fed by stormwater, and connected to the ocean via constructed wetland.
- Beyond 2100 - Pump station, Zoo and Treatment Plant will be exposed to coastal hazards.

mid reach



- Extensive stormwater retention reduces or eliminates CSDs
- Throughout watershed: Improved public realm, biodiversity, temperatures
- Improved groundwater levels, water supplies
- Stable precipitation: Overflow structures removed
- Increased Precipitation: water quality maintained
- Transport Box reinforced by a seawall
- Constructed wetlands/lagoons store floodwaters in low-lying areas
- North of Sloat has limited or no beach

north reach



- Stormwater bio-retention basins incorporated into the west end of Golden Gate Park and Sutro Dunes
- *All reaches - groundwater and Lake Merced levels are raised; improved bio-diversity and beautification in public realm; stormwater is pre-treated for water quality and can be routed directly to Lake Merced*

outcomes

test scenario D : maximum infrastructure

This Test Scenario is organized around the protection of existing infrastructure, both for its pollution-control functions and for the stewardship of recent public investments. This replicates the recent pattern to a great extent, with revetments installed to armor the coast as needed in response to erosion events, and seawalls added in chronic trouble spots. Environmental and recreational considerations are secondary.

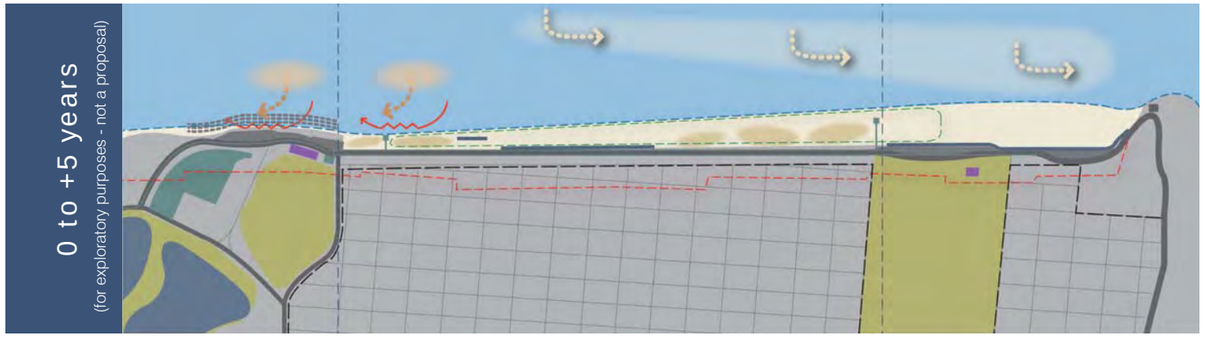
why?

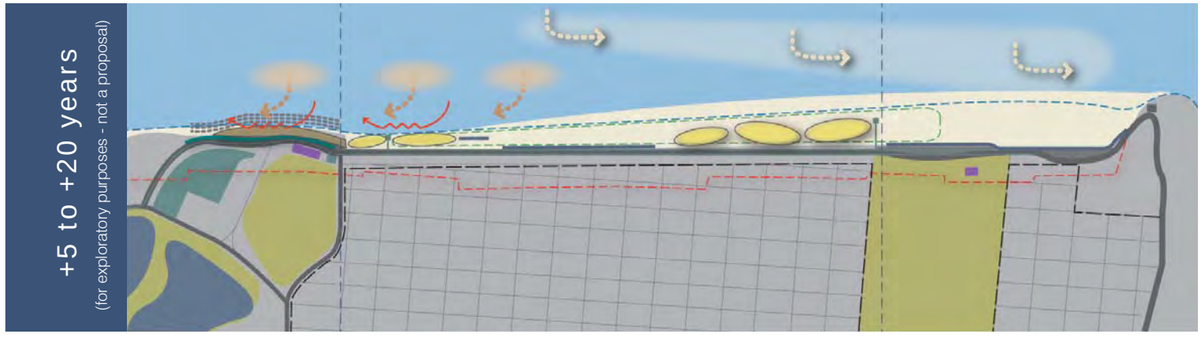
/ *to increase biodiversity and ecological function at Ocean Beach*

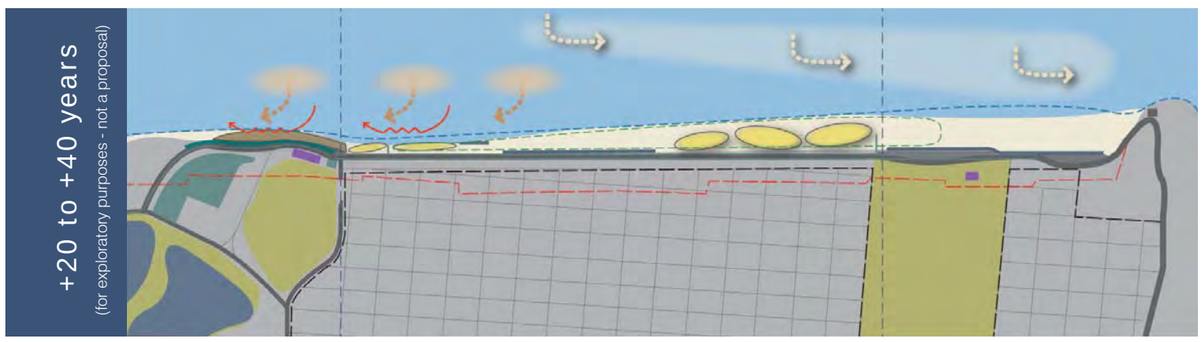
/ *to protect rate-payer investment*

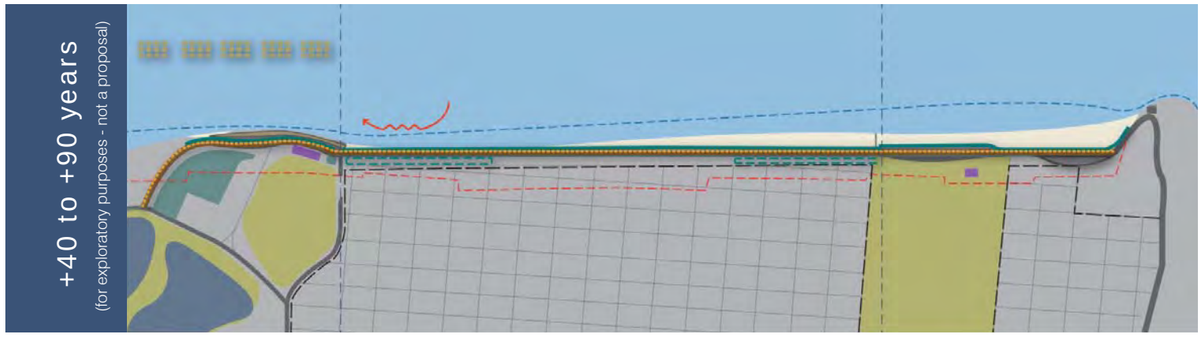
how?

/ *protect existing infrastructure*

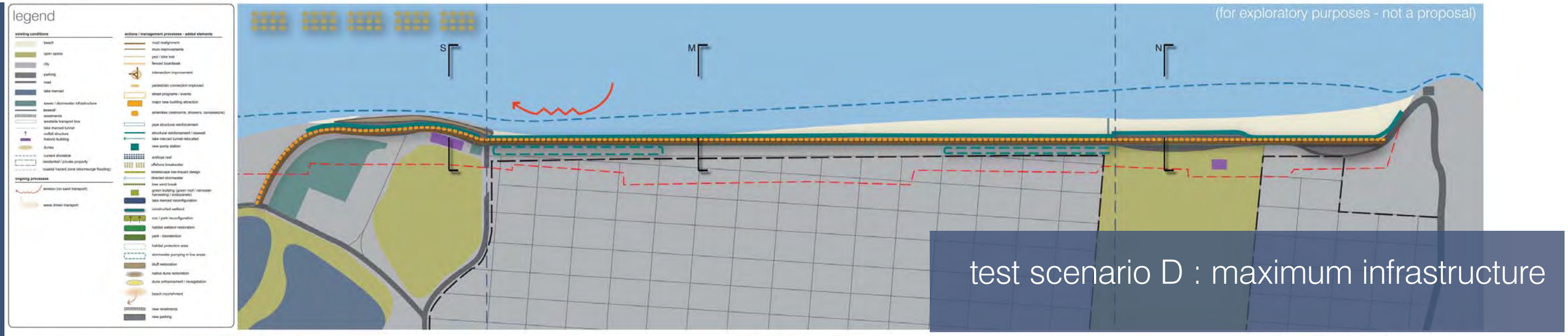








ocean beach at 2100



outcomes

- Limited or no beach
- Raised seawall topped with a promenade provides flooding and erosion protection for Treatment Plant, Zoo and Pump Station
- Off-shore breakwater further protects from storm surges
- Loss of bank swallow habitat in bluffs

- Great Highway is raised, reinforced with a seawall, and topped with a multi-modal promenade or boardwalk
- Limited or no beach North of Sloat
- Pumping required to mitigate coastal and stormwater flooding
- Private homes protected by transport box/seawall