LONG BEACH

LA 402L Sea Level Rise Strategy Report
2017

Cal Poly Pomona Landscape Architecture

LA402L Long Beach Studio

BSLA students from California State Polytechnic University, Pomona collaborated with AHBE Landscape Architects to develop strategies and tactics for the waterfront of Long Beach, CA and communities along the Lower Los Angeles River to adapt to rising sea levels, storm surges, urban flooding, and tsunamis.

From tactics to schematics, these projects developed site specific soft infrastructure typologies suitable for wide-scale deployment around Southern California to sustain our ports and vibrant waterfronts.

Prof. Barry Lehrman ASLA +

- Elise Ahn
- Adrian Arevalo
- Julia Baek
- Hazel Casquino
- Estevan Castaneda
- Khael Castanedes
- Jorge Colmenero
- Tony De Jesus
- Ernesto Esquer
- Amanda Flores
- Ryan Lawson
- Andres Raygada
- Fernanda Suarez
- Iliana Valenzuela
- Alexander Wade
- Tong Xue

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Studio Sponsor

AHBE Landscape Architects

The pursuit of the greater good drives AHBE Landscape Architects. AHBE begins each project as an exploration about how the site is ecologically connected to the larger network of natural lands, open spaces and other landscapes.

Seeing landscapes through the lens of infrastructure, AHBE's designers take a holistic approach to solving design problems. A commitment to sustainable design guides them to ask questions, explore new ideas and think innovatively. Out of this process, beauty and performance emerge from the landscape.

AHBE is an award-winning professional service corporation. Collectively, AHBE has extensive experience in the technical development of design aesthetics and constructibility that are hallmarks of the firm's work.

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LANDSCAPE ARCHITECTS

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LONG BEACH

LA402L Sea Level Rise Strategies

LA402L Advanced Landscape Studio & Prof. Barry Lehrman
Cal Poly Pomona Landscape Architecture

Studio Sponsor:
AHBE Landscape Architects

LA402L wishes to thank:

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Evan Mather
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Wendy Chan
Jennifer Salazaar - AHBE LAB Editor
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Carrie Metzgar
Tracie Fitzharris
Fern Nueno

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Dr. Juliette Finzi Hart – U.S. Geological Survey | Pacific Coastal & Marine Science Center

Carrie Wolfe & Adriana Stowell – Southern California Marine Institute

Rosa Soria - BSLA '15 & CSULB GIS Grad Student

Fernando Cázares – Trust for Public Land, California Manager, Climate-Smart Cities

Prof. Andrew Wilcox – Chair, Department of Landscape Architecture, Cal Poly Pomona

And all our fellow *Bravely Curious* BSLA classmates at Cal Poly Pomona!

Final Presentation Guest Reviewers:

Calvin Abe
Duane Border
Avideh Haghighi
Ken Nakaba
& AHBE staff

Report Editors:

Andres Raygada
Barry Lehrman

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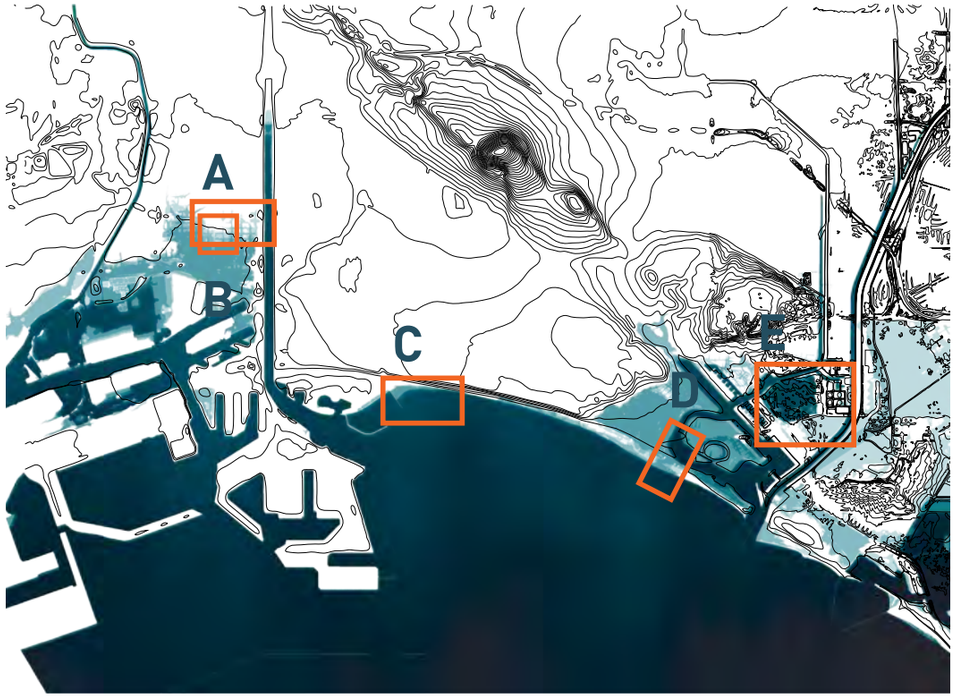
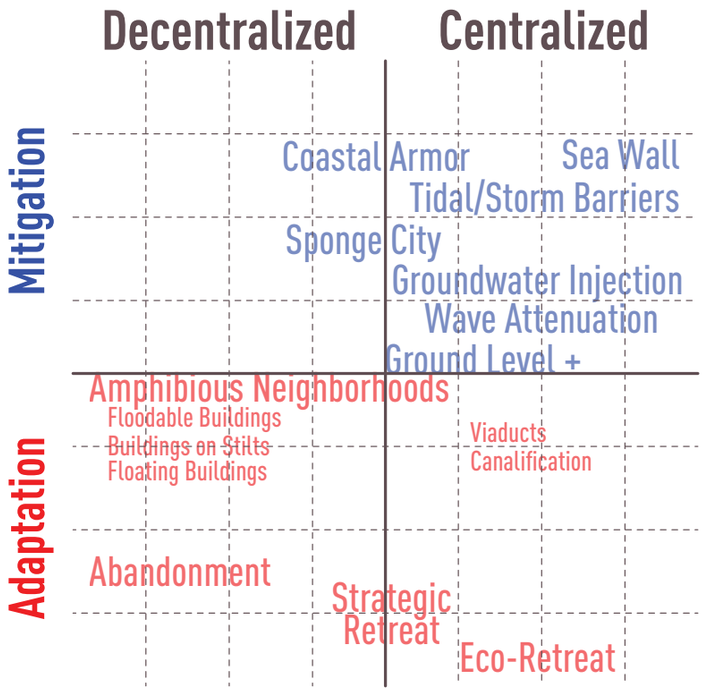
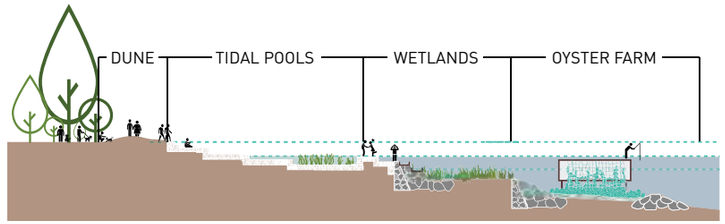
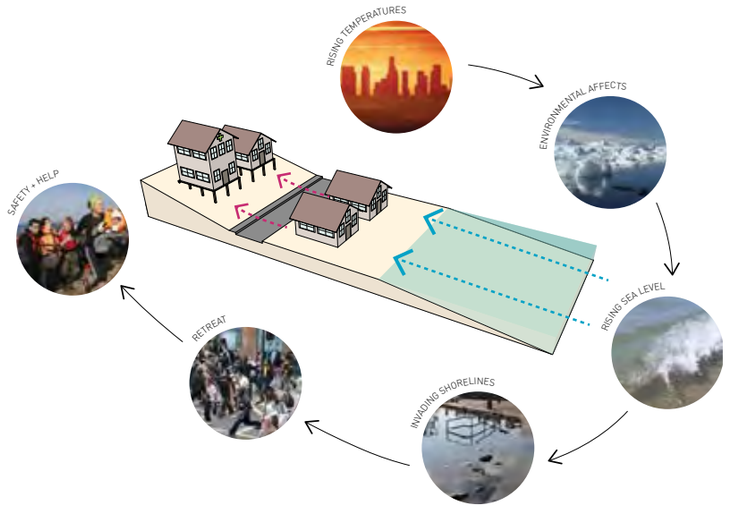
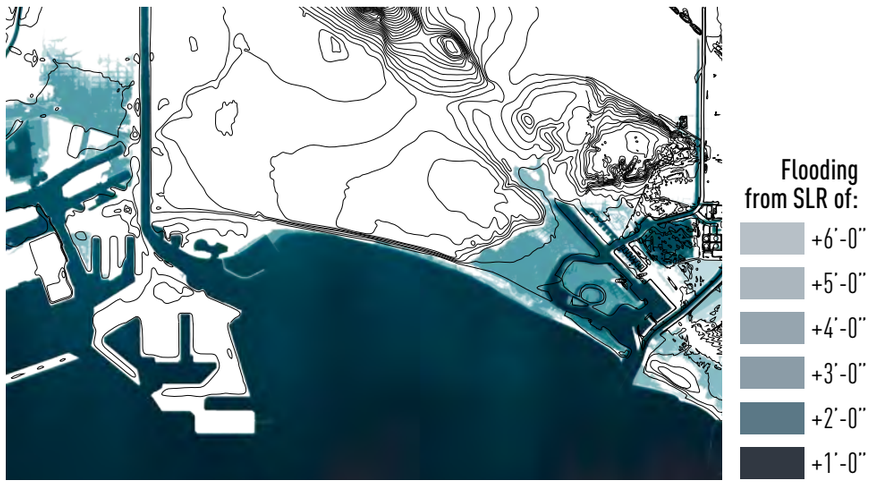










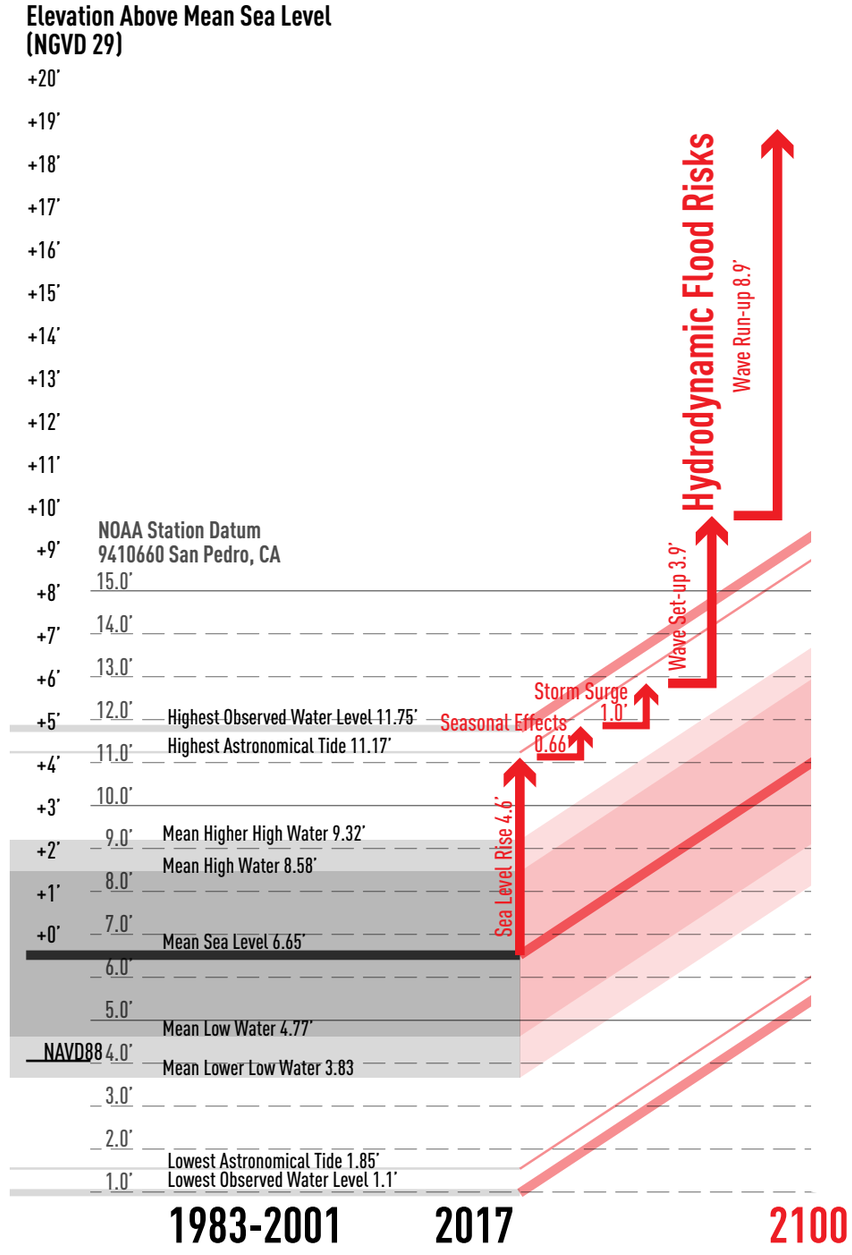
UPPER LEFT: Mitigation/Adaptation and Centralized/Decentralized (DCxMA) Sea Level Rise (SLR) strategies for Long Beach, CA

LOWER LEFT: Predicted flooding in Long Beach from SLR by 2100.

TOP CENTER: Mitigation strategies to attenuate coastal erosion from waves include creating oyster reefs, wetlands, and dunes.

CENTER: Unmitigated SLR impacts cascade towards requiring coastal residents to retreat if they are unable to adapt.

RIGHT: Timeline of SLR for Long Beach, CA.



Executive Summary

Over ten weeks in the winter of 2017, sixteen BSLA students in Prof. Barry Lehrman's LA402L Advanced Landscape Architecture Studio at California State Polytechnic University, in collaboration with AHBE Landscape Architects (Los Angeles), developed site-specific strategies and tactics to assist the City of Long Beach's efforts to plan for sea level rise (SLR). These tactics and strategies are suitable for deployment across Southern California to sustain our coastline and vibrant waterfronts.

In the next 100 years, low lying communities in Long Beach within +/- 10 feet of mean sea level (per the 2017 USGS CoSMoS 3.0 study), will experience increasing inundation and coastal erosion during storms, king tides, and El Nino events.

This report shares the studio's designs and green infrastructure strategies and tactics for SLR. Green infrastructure strategies utilize ecosystem services to provide similar (or enhanced) performance compared to traditional infrastructure approaches - while also providing ecological habitats, plus recreational and aesthetic amenities for the community at similar or lower construction costs.

SLR strategies identified by the LA402L studio provide a range of short-term mitigation tactics and/or long-term adaptation opportunities for the community and waterfront. These strategies can be categorized as:

Centralized strategies are defined by top-down policies or regulations, neighborhood or community-wide deployment, and reliance on public funding.

Decentralized strategies can be implemented and funded by property owners and occupants to a single parcel or block, though may require changes to zoning or building code.

Together this classification of strategies as Mitigation/Adaptation and Centralized/ Decentralized are referred to in this report as "DCxMA".

Mitigation Strategies:

- Wave attenuation: living breakwater, sandbars, oyster reefs
- Coastal armor
- Tidal/Storm barriers
- Groundwater injection

Adaptation Strategies:

- Amphibious neighborhoods, canalification, floodable buildings, raised buildings, and floating buildings
- Strategic retreat, eco-retreat
- Abandonment (leaving all structures standing, removal of the above ground structures, or removal of all structures/foundations/paving)

This report features projects located in neighborhoods with diverse socio-economic conditions.

Long Beach (and other coastal communities around the world), face difficulty with environmental and social justice policy decisions over the next several decades on how to best allocate funds for SLR mitigation, resilience, and adaptation.

L O N G B E A C

33-46

33-45

118-14

118-13

118-12

118-11

C I F I C

U.S.

COAST SURVEY

Benjamin Peirce Superintendent

SECX.

COAST EAST OF SAN PEDRO BAY

CAL

SCALE 10,000.

Surveyed in Jan & Feby

1872 — 1887

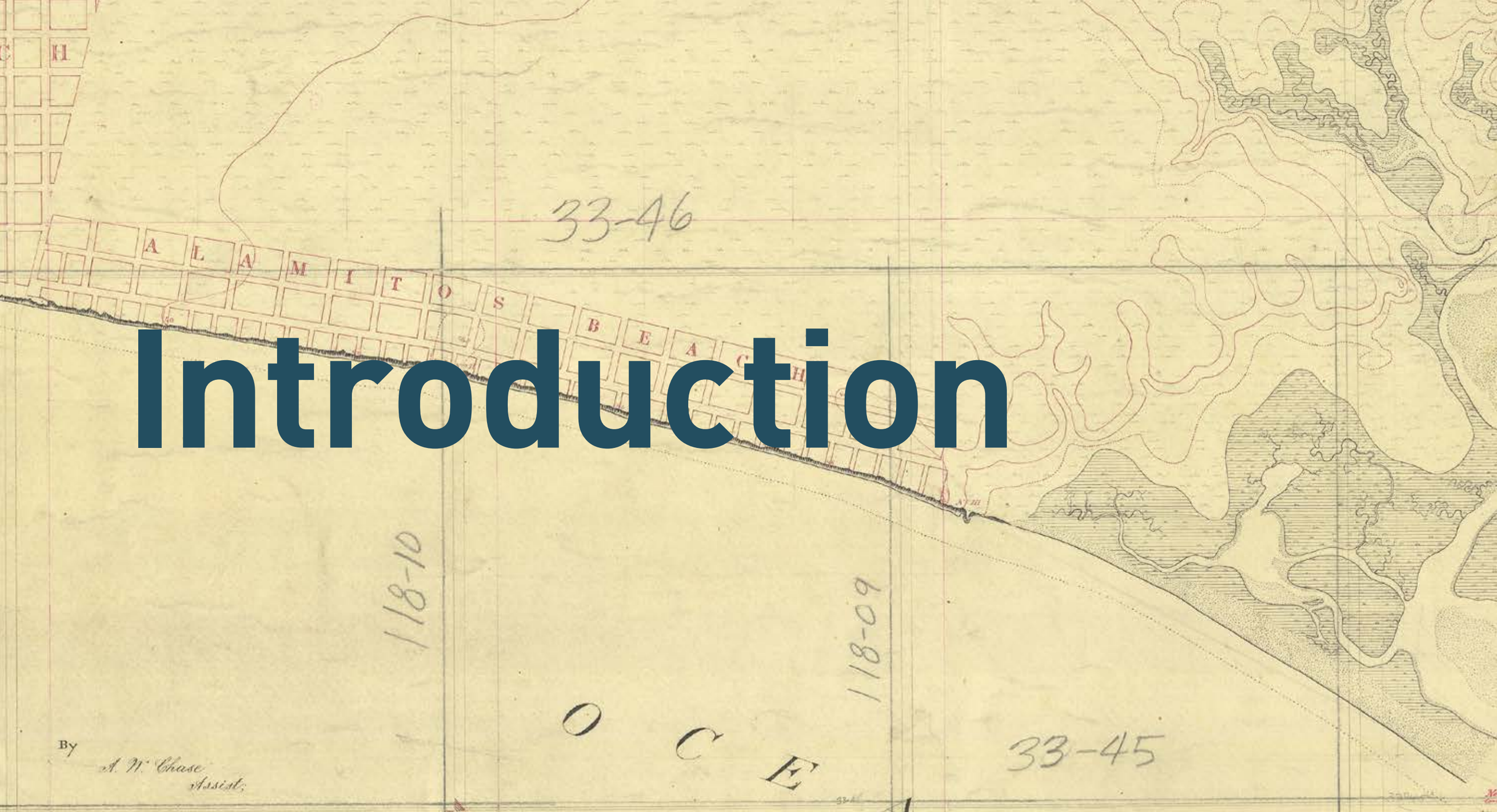
Area in sq miles	16.20
General Coast	10.80
Shore Line Hydrography	40.00
Roads	1.90
Roads	12.80

N.A. 1927 Datum

Register №1283.

1872 (rev. 1887) U.S. Coastal Survey, sheet 1283, NOAA Historical Surveys, NOAA.gov

Introduction



The Future of our Coastal Communities

Adaptation

/adapˈtāSH(ə)n/ noun

- Responding to and accommodate changing conditions.
- To acclimatize to changes.

Mitigation

/midəˈgāSH(ə)n/ noun

- Reducing the severity or intensity of a negative condition or risk, such as pollution, climate change, poverty, or an anticipated disaster.
- Climate change mitigation attempts to slow, reverse, or reduce the impacts related to the build-up of green-house gases in the atmosphere.

Resilience

/rəˈzilyəns/ noun

- The capacity of a system to recover from disturbances and changing conditions.
- Elasticity.

As the levels of Carbon Dioxide increase in the atmosphere, together with other greenhouse gases, the warming climate will increasingly impact our oceans and coastal communities. Several related effects of climate change are contributing to Sea Level Rise (SLR) and coastal flooding:

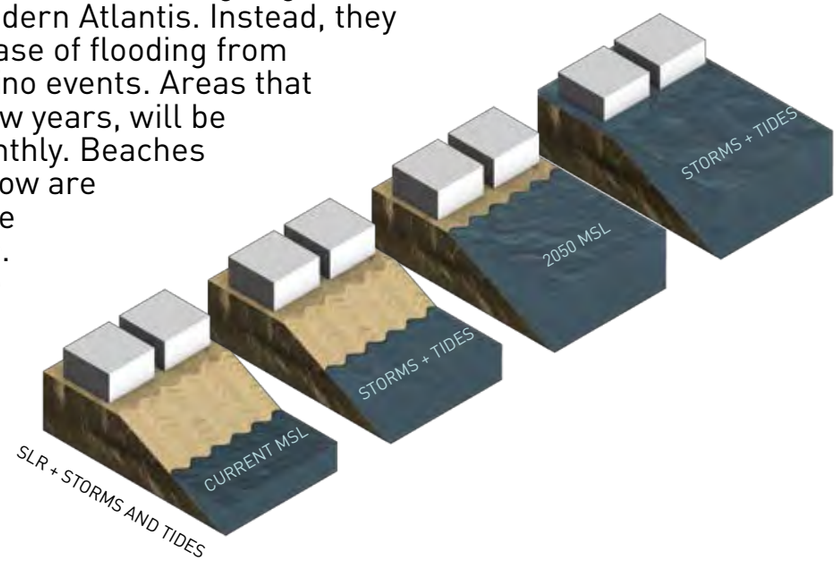
The volume of our oceans is increasing, because:

- Melting polar glaciers on Greenland and Antarctica are contributing huge quantities of melt-water to the oceans.
- Water expands as it warms.

Warming oceans increase the intensity and frequency of storms, which:

- Generate larger waves that contribute to coastal flooding and erosion.
- Storm intensity is connected to lower atmospheric pressure and higher storm surges.
- Higher onshore precipitation produces more runoff and higher discharge from our rivers.

Higher sea levels will ebb and flow with periods of higher water becoming more frequent. Our coastal communities are not going to sink beneath the waves like a modern Atlantis. Instead, they will experience a slow increase of flooding from storms, king tides, and El Nino events. Areas that experience flooding every few years, will be flooded every year, then monthly. Beaches and marshes that are only now are inundated at high tide, will be submerged most of the time. Exposed coastlines will face larger and larger waves on top of higher tides.



Sea Level Rise, Storm Surges, Tsunami Risk, and Urban Flooding

Beyond the shifting tide of global trade, Long Beach and the entire coast of Southern California is challenged by rising sea levels, seismically unstable soils, ground subsidence caused by oil extraction, salt-water intrusion into the aquifers, and a range of other environmental issues. The South Bay/Harbor area is also one of the most polluted regions in Southern California, with several cancer clusters and a myriad of other health impacts to the surrounding residential neighborhoods caused by air and water emissions from transportation, petroleum refineries, and heavy industry.

LA402L utilized the USGS Coastal Storm Modeling System (CoSMoS) 3rd generation hydrodynamic models for Southern California as our data set to identify areas at risk for inundation and interpolated the timeline in consultation with Dr. Juliette Hart.

SEA LEVEL RISE IN CALIFORNIA

TIME PERIOD	"LOW"	"MID"	"HIGH"
2000-2030	0.16'	0.5'	1.0'
2000-2050	0.4'	0.92'	2.0'
2000-2100	1.4'	3.1'	5.5'

SOURCES:
National Oceanic and Atmospheric Administration, data & figures Tide Station 9410660, San Pedro, CA
Grifman, Hart, Ladwig, Newton Mann, Schulhof. 2013. *Sea Level Rise Vulnerability Study for the City of Los Angeles*: USCSG-TR-05-2013. Page 25. Figure 3.
USGS CoSMoS 3.0 data, https://walrus.wr.usgs.gov/coastal_processes/cosmos/:

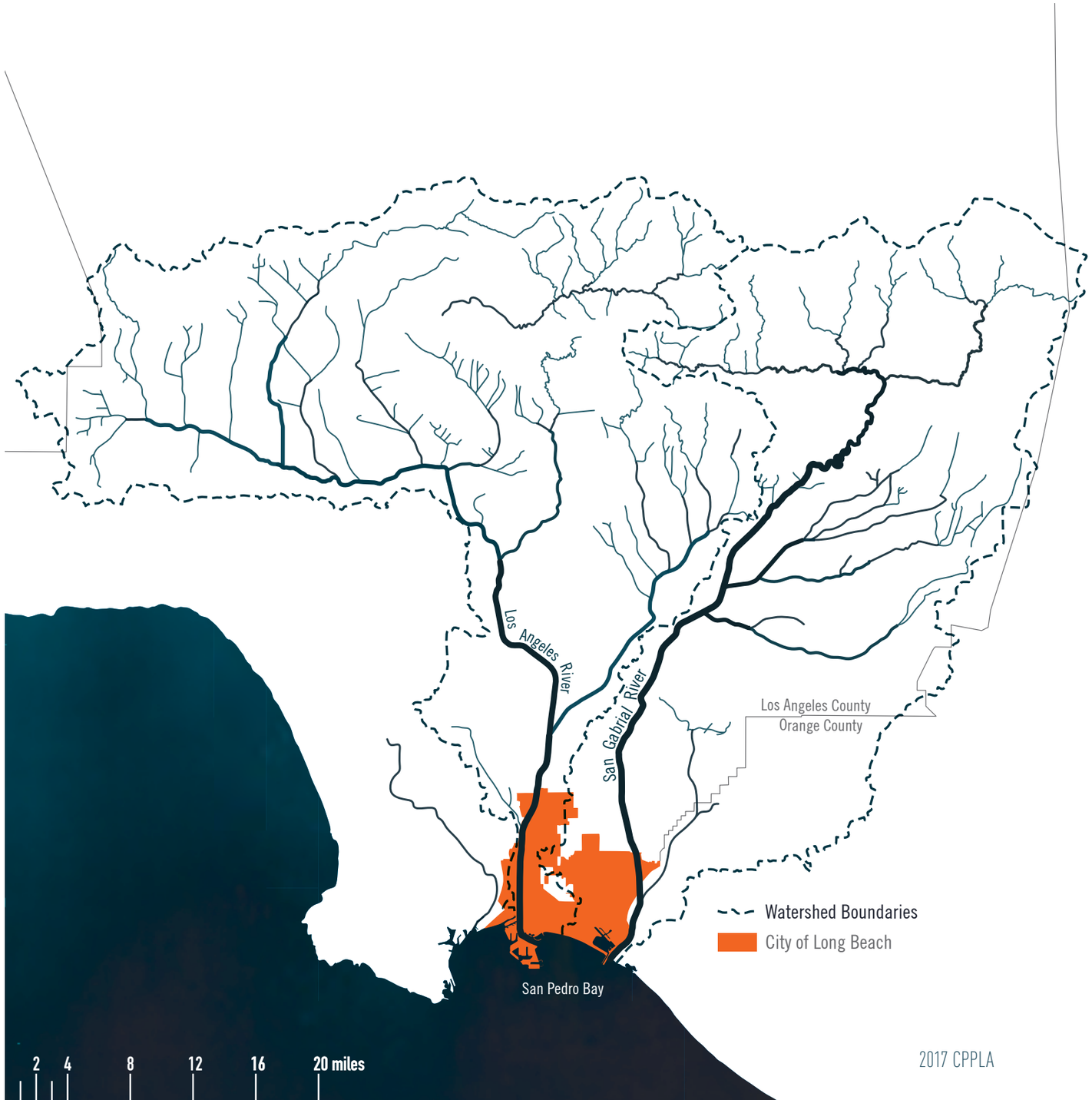
+6.5' King Tide at Marine Stadium, Spring 2017, Long Beach. Photo by: Jenni Zell

Site: Long Beach, CA

Long Beach faces significant risks from sea level rise (SLR), increased flooding from changing precipitation patterns, plus various seismic and tsunami risks. Situated at the bottom of two major Southern California watersheds (the Los Angeles River and the San Gabriel River), much of Long Beach is built on filled marshlands or barrier islands, which exacerbate the risks from SLR.

San Pedro Bay and the waterfront of Long Beach is now home to diverse residential neighborhoods, well utilized recreation amenities, popular tourism facilities, commercial districts, and the industrial Port of Long Beach (PoLB) and Port of Los Angeles (PoLA). Their 20th century dominance of inter-modal shipping is threatened by the 2014 Panama Canal expansion that allows post-Panamax container ships (up to 12,600 TEU) to easily reach East Coast ports. Even with major investments in upgrading multi-modal infrastructure, including dredging the main channels to 76' deep, the harbor is operating at near capacity. With the recent implementation of strict emission regulations for ships, trucks, and trains, the costs for shippers is increasing, further undermining their dominance as the port of entry for most pacific trade into the US.

Environmentally, Long Beach's waterfront is significantly degraded by the concentration of heavy industry (chemicals, recycling, manufacturing, petroleum refining and oil extraction), emissions from supporting logistics/freight operations, and urban runoff from the Los Angeles River and San Gabriel River watersheds.



Long Beach, CA is located in the southeast corner of Los Angeles County, at the bottom of the watersheds of the Los Angeles and San Gabriel Rivers.
SOURCES: City of Long Beach, City of Los Angeles, Los Angeles County, USACE, and USGS.

Projects

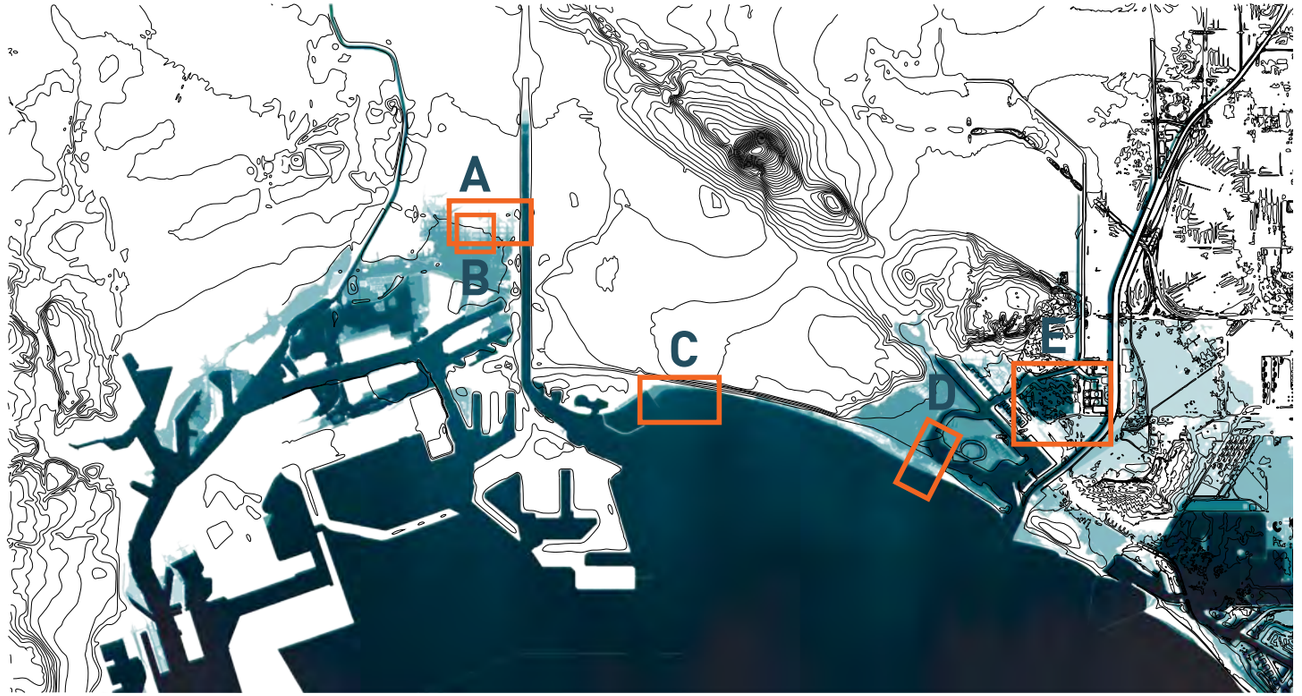
A. Blue Yonder
Amanda Flores, Elise Ahn, & Illiana Valenzuala

B. Coastal Migration
Adrian Arevalo, & Estevan Castañeda

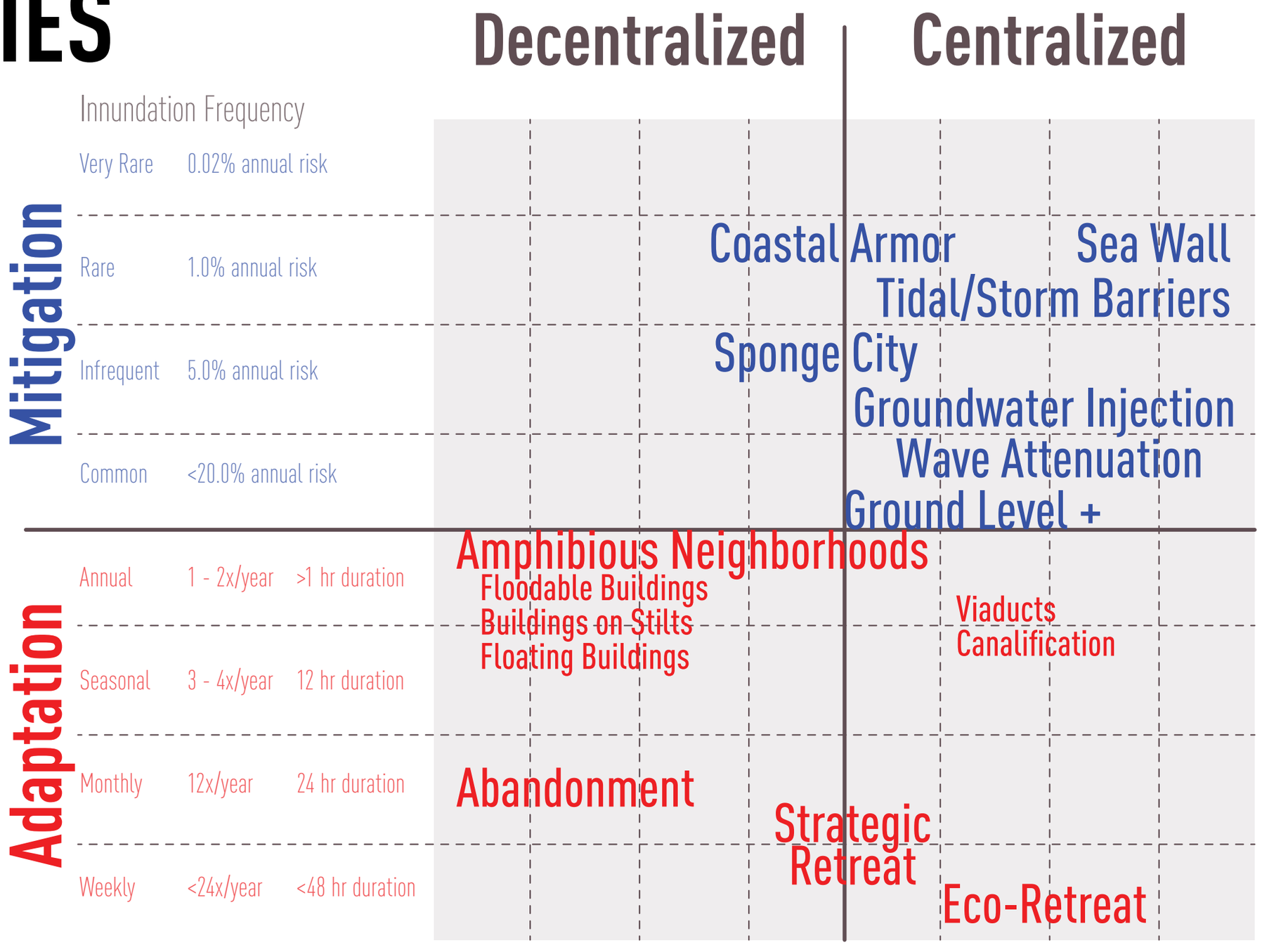
C. Coastal Typologies
Antonio De Jesus, & Andres Raygada

D. Conditional Adaptation
Ernesto Esquer, & Tong Xue

E. Sea Coastuary
Julia Baek, Khael Castanedes, Jorge Colmenero, Ryan Lawson, & Alex Wade



STRATEGIES


Decentralized
Centralized
Innundation Frequency
Very Rare 0.02% annual risk
Rare 1.0% annual risk
Infrequent 5.0% annual risk
Common <20.0% annual risk
Annual 1 - 2x/year >1 hr duration
Seasonal 3 - 4x/year 12 hr duration
Monthly 12x/year 24 hr duration
Weekly <24x/year <48 hr duration
Mitigation
Adaptation
Coastal Armor
Sea Wall
Tidal/Storm Barriers
Sponge City
Groundwater Injection
Wave Attenuation
Ground Level +
Amphibious Neighborhoods
Floodable Buildings
Buildings on Stilts
Floating Buildings
Viaducts
Canalification
Abandonment
Strategic Retreat
Eco-Retreat

Green Infrastructure

Green infrastructure is another term for utilizing ecological processes to replace or augment engineered technical systems. That brings us to ecosystem services, which are the benefits provided by natural processes for society.

Green infrastructure strategies utilize ecosystem services to provide similar (or enhanced) performance compared to traditional infrastructure approaches - while also providing ecological habitats, recreational and aesthetic amenities for the community at similar or lower construction costs.

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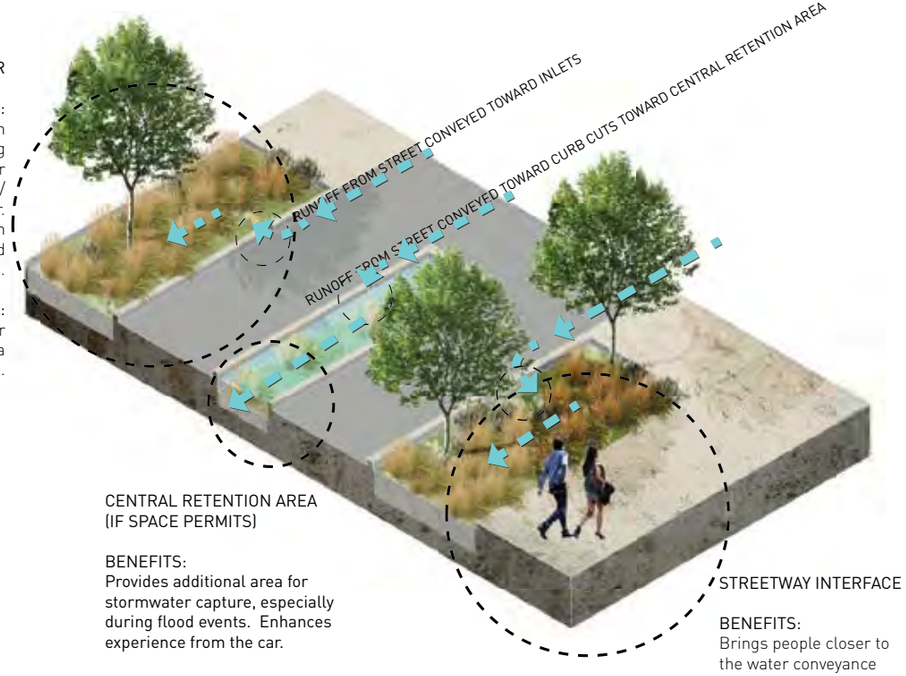

LA402L Pedagogy

Students in LA402L were given the freedom to define their own focus on adaptation and mitigation, to select the specific mix of strategies and tactics, and to develop site – specific projects for locations of their choosing.

Their projects bridge the landscape between the upland and shore landscape, and the littoral realm of Long Beach.

Projects will be on land, above the water, floating on the water, and/or below the water surface. This presents the opportunity to explore the challenges of adapting to rising sea level, addressing water quality and coastal habitat restoration, maritime safety and navigation, and of course, tourism and recreation.

This studio is built on system theory and design practices as the foundation for creating poetic expressions of eco-technical systems that enhance the cultural valuation of that place, and using landscape systems to increase the sustainability and resilience of our cities within the infrastructural terrain. Embracing temporal rhythms and landscape flows provides a richer graphic palette to base your design on, and also enables designing in 4 dimensions, not just 2D or 3D.

LA402L was organized by Prof. Lehrman into a series of projects (each with a specific set of deliverables) that provided an iterative learn-by-doing design pedagogical framework to support the student's professional growth.

Project 1: Case Study (Individual)

A) Research into notable sea level adaptation projects from around the world.

Project 2: Research (Individual + Collective)

A) Inventory of the regional and local landscape, by compiling relevant geospatial, ecological, and cultural data into a collective base map and library.

B) Evaluation of the landscape conditions for the risks, values, and potential/opportunities.

Project 3: Strategy Studies (Collective)

A) Research and evaluation of the potential sea level rise mitigation and adaptation strategies.

B) Identifying the suitability criteria for each strategy.

C) Mapping the suitability of the strategies to waterfront and low-lying communities in Long Beach.

Project 4: Tactical Typologies (Team)

A) Selecting specific project sites (10 to 100 acres), and conducting fine-grain site inventory to supplement the collective mapping.

B) Developing a customized mix of strategies to apply to the site.

C) Translating the strategies into specific design tactics (landforms, ecological processes/habitat/species matrix, and cultural amenities) – the kit of parts.

Project 5: Schematic Developments (Team)

A) Refining the tactics into site-specific design concepts, frameworks, and multi-functional typologies.

B) Schematic development of earthworks, drainage/hydrology, planting schemes, inhabitable spaces, and circulation systems.

Project 6: Publication (Individual + Team + Collective)

A) Compiling, curating, and formatting the site analysis, strategy evaluation, site-specific tactics and typologies into this report for public distribution.

Team Organization

To complete specific tasks for the projects, students were formed into ad hoc 'working groups' based on their personal interests, skill set or availability. Working groups were formed to conduct the site inventory and analysis, and the strategy definitions.

For the design projects, students formed teams based on similar interests and goals.

Several students took on leadership roles that lasted the entire course: Ernesto developed the graphic standards, Tony was our GIS lead, Hazel was the lead writer and copy editor, and Andres led producing the final report.

Field Work

The class spent three days in Long Beach verifying conditions, collecting additional data, documenting conditions, and meeting with experts. Highlights of the field trip include:

- A 4-hour off-shore excursion on the Southern California Marine Institute's R/V Yellowfin (http://www.scmi.net/rv-yellowfin/), collecting bottom sediment samples, water quality readings, and towing a rented side-scan sonar unit to map the sea floor.
- Touring Willow Spring Park with Larry Rich and other Long Beach Sustainability Staff.
- Learning about Golden Shore Wetland from Dr. Whitcraft.

Presentations

Projects 2 and 3 were presented together for the mid-term review.

Projects 3 and 4 were the basis for the final presentation.

TOP: Students taking water quality readings aboard the RV Yellowfin.
MIDDLE: Hazel and Ryan presenting at the mid-review.
BOTTOM: Final review guests Calvin Abe and Duane Boarder

5143
Phil
Oct. 1886

WILMINGTON Prem.

AND

SAN PEDRO HARBORS

CALIFORNIA

Scale 40,000

1886

Issued October 1886 F M THORN, Superintendent
Verified: B A Colonna, Assistant in charge of Office

POINT VINCENTE

10 Fathoms

Portuguese Bank
(Whaling Station)

San Pedro Hill
1475

SAN PEDRO

1886 Navigation Chart 5143 Wilmington and San Pedro Harbors, NOAA Historical Surveys, NOAA.gov

Topography by A.W Chase, Assistant and W.M Johnson, Sub-Assistant between 1853 and 1874
Hydrography by Lieutenants F.H.C.Leutze and H.C.Taylor U.S.N. Assistants in 1876 and 1878
Astronomical observations at San Pedro by G.Davidson, Assistant in 1853
Magnetic observations by Lieutenant W.P. Trowbridge U.S.A. Assistant in 1853
Verification of Hydrography by Lieut. Commander W.H Brownson U.S.N. Inspector of Hydrography
The Harbor is from the plans of Lieut Col. G.H Mendell Corps of Engineers in charge of improvements 1883

Latitude	Longitude West from Greenwich	Character	Interval bet. Flashes	Color of Structure	Height above Sea	Visibility Nautical miles
33° 42' 13".8	118° 17' 41".0	7h 53m 10s.7	Flashing every 3 minutes	0m 10s	Buff	156 ft	19½

every 20 feet difference of level. The hundred shown by heavier lines. The heights are

Los Cerritos

Road to Anaheim Landing

Sen. Gabriel River

Drum Barracks

WILMINGTON

Southern Pacific R. R.

WILMINGTON LAGOON

Rattlesnake Island

SAN PEDRO BAY

Assessment

Sea Level Rise

The issues of climate change are putting the populations at risk. Sea level rise is a factor that could contaminate our cities in salt water and cause detrimental affects to our living environments and essentials. Our atmosphere acquires C02 particles from various factors (cars, factories, fossil fuels, burning of matter, etc.). These particles absorb thermal heat from the sun, cohesively generating a warmer planet. The rise of temperature within the atmosphere cause ice lands and snow fields to melt and seep into the ocean. The warmer climates also cause the bodies of water (specifically the ocean) to increase in temperature, causing thermal expansion, where water molecules absorb the heat/energy from the atmosphere. This energy then causes the molecules to circulate more actively throughout the ocean, taking up more space and forcing the ocean to expand in size. Our environment is at risk of flooding, which could diminish property values, ecological habitats, and water sanitation, which would present disease to the locales.

Scientists expect sea level to rise at a rate of 2.3m for every 1°C. By assigning strategies to zones that are at risk, habitats and infrastructures can be preserved from flood events, and the ecosystem, along with human health, can be enhanced.

SEA LEVEL RISE IN CALIFORNIA

TIME PERIOD	"LOW"	"MID"	"HIGH"
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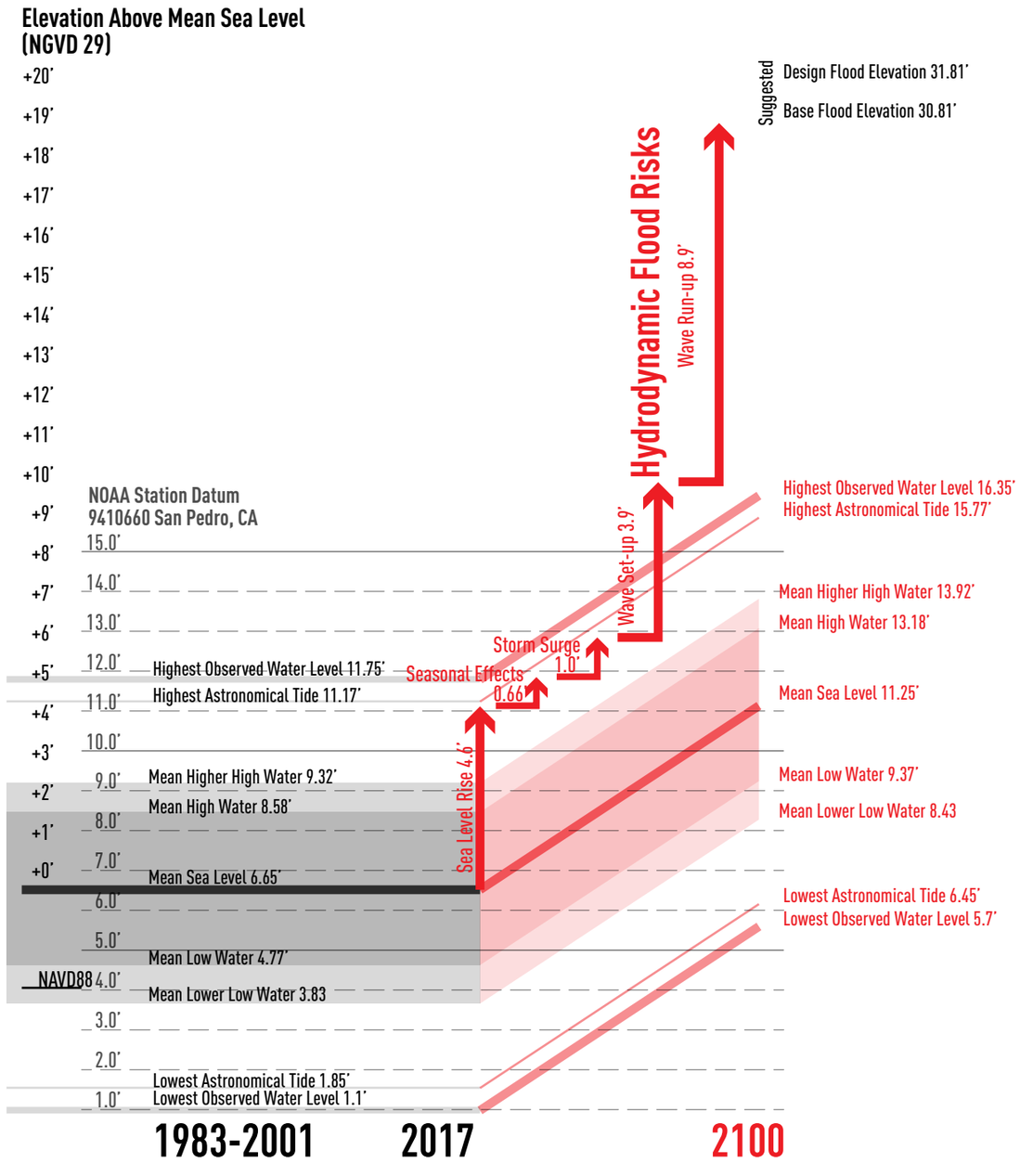


RISK

Flooded by SLR of:

- +6’-0”
- +5’-0”
- +4’-0”
- +3’-0”
- +2’-0”
- +1’-0”

Tsunami Zone

Humans

Pollution → **Thermal Absorption** → **Warmer Atmosphere**

C02

Sea Level Rise

Melting of Snow Fields/ Glaciers

Water Expansion

0 1 mile 2 miles 3 miles 4 miles 5 miles

History of Long Beach Port

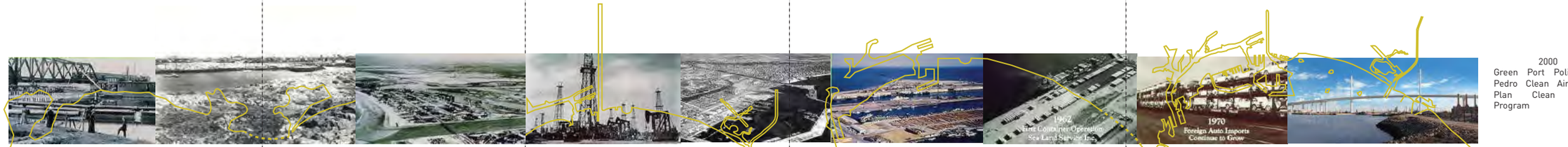
1888

1900

1935

1957

1981



1988

1900

1935

1957

1981

1890
Construction of the San Pedro Bay breakwater begins

1900
First industry in the Port of Long Beach.
Fastest growing city in US
June 30 - The sand bar between the ocean and the San Gabriel River washes out at high tide, making the ocean entrance to the newly dredged inner harbor reality.

1910
The Port of Long Beach was established

1920
Oil was discovered on Signal Hill.
Construction of the port begins along with additional piers, wharves, and facilities.

1930
The Federal River and Harbor Act authorizes construction of a 3.5 mile extension to the San Pedro Bay breakwater.

1940
The U.S. Naval Shipyard docks constructed for serving the ships.
Subsidence from oil extraction becomes a major concern. Dikes are build for flood control at high tide.
Engineers and geologists are assigned to study the problem.

1950
Subsidence worsens as a 16 square - mile area in the north.
Harbor sinks between 2' and 24'

1960
Operation "Big Squirt", a water injection program, halts subsidence.
Piers J and F are completed. 310 acres of landfill added to the Long Beach landscape.

1970
The city embarked on a 25-year-multi-billion dollar re-development program.

1980
Shoreline Village, the Downtown Shoreline Marina and Shoreline Park opened.
Site for four Olympic events.
Construction begins on a 147-acre landfill expansion of Pier J.

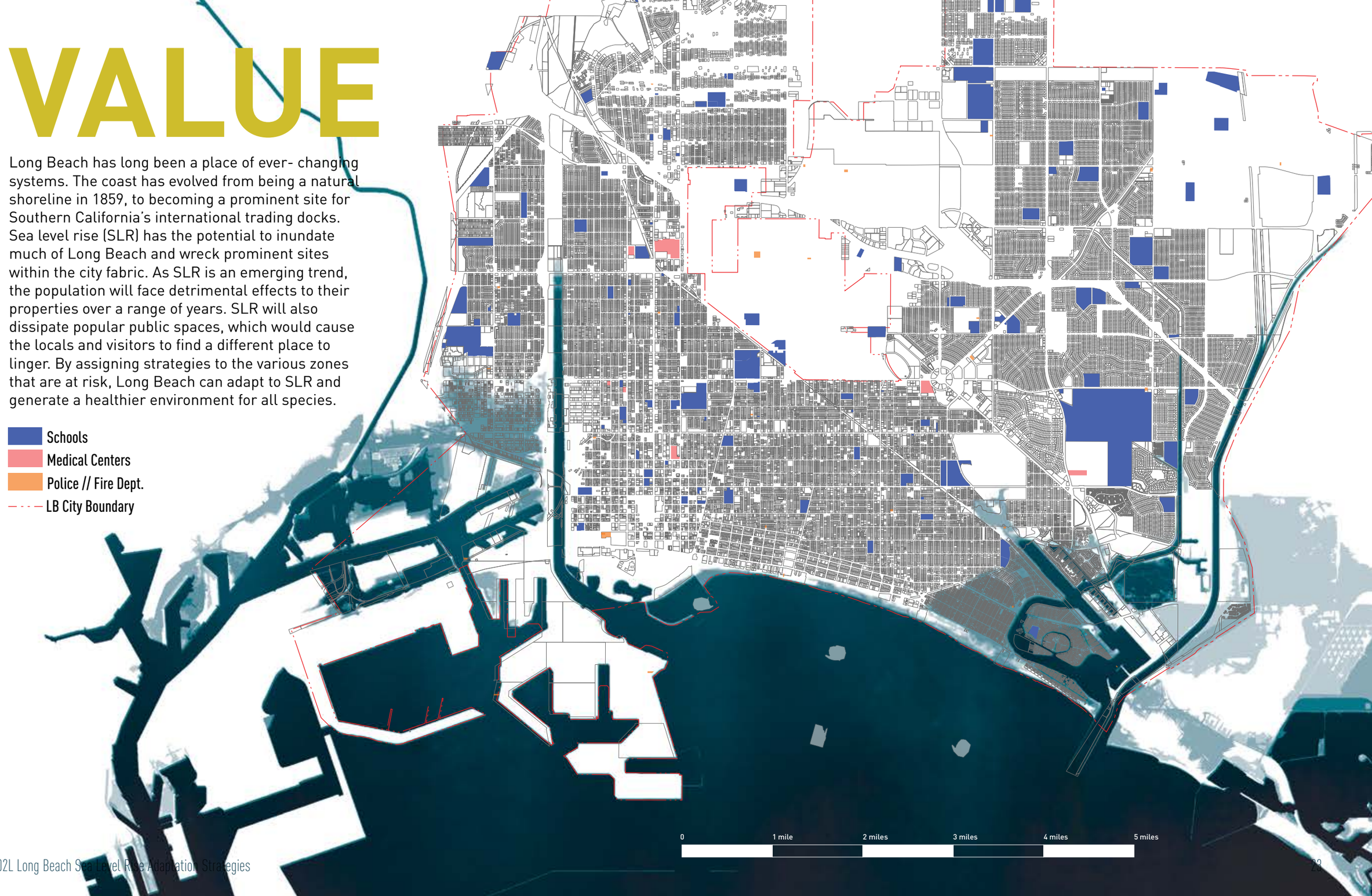
1990
Maersk Line opens a 107-acre container terminal on the pier J expansion.
The new terminal features a wharf with a flexible, multiple direction piling concept that disperses stress and reduces damage in the event of an earthquake.

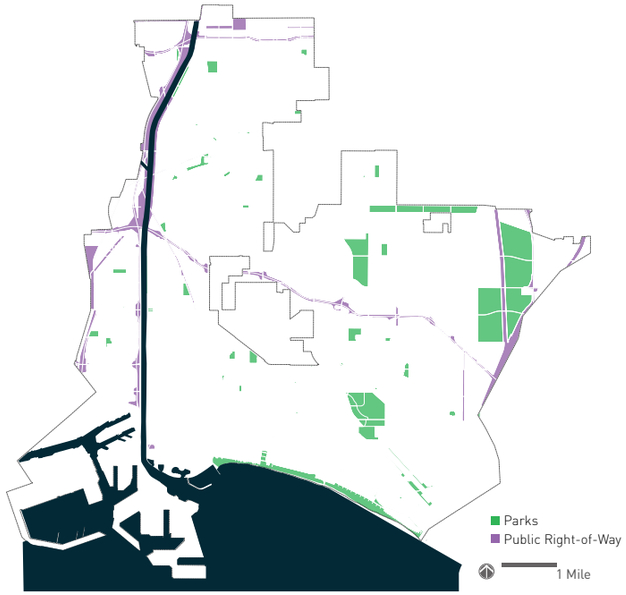
2000
Green Port Policy San Pedro Clean Air Action Plan Clean Trucks Program

2010
According to an annual air quality analysis released in August, the Port has cut diesel particulates 81% from 2005 to 2012.
Smog-forming nitrogen oxides and sulfur oxides are down 54% respectively.
Green-house gases have dropped by 24%

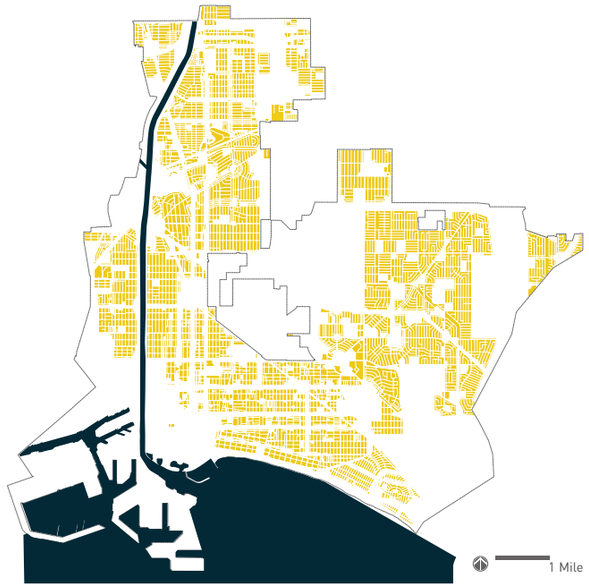
VALUE

Long Beach has long been a place of ever- changing systems. The coast has evolved from being a natural shoreline in 1859, to becoming a prominent site for Southern California's international trading docks. Sea level rise (SLR) has the potential to inundate much of Long Beach and wreck prominent sites within the city fabric. As SLR is an emerging trend, the population will face detrimental effects to their properties over a range of years. SLR will also dissipate popular public spaces, which would cause the locals and visitors to find a different place to linger. By assigning strategies to the various zones that are at risk, Long Beach can adapt to SLR and generate a healthier environment for all species.

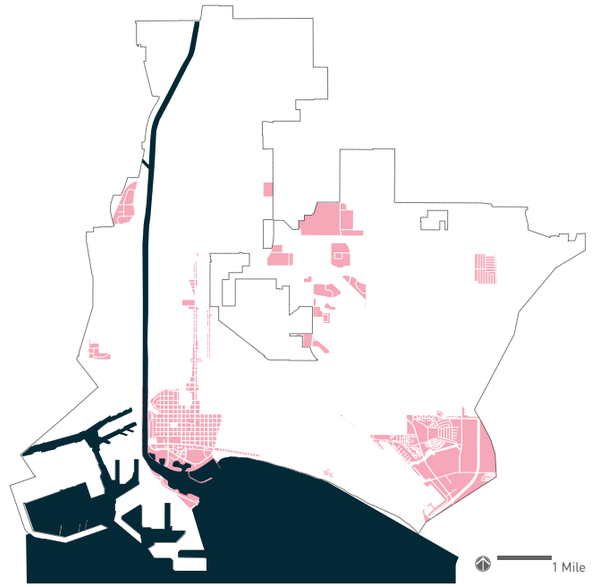




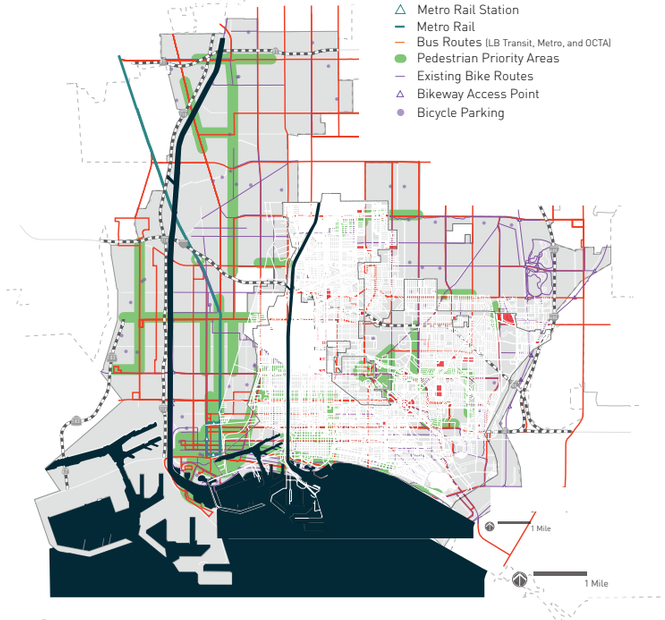
Public Use



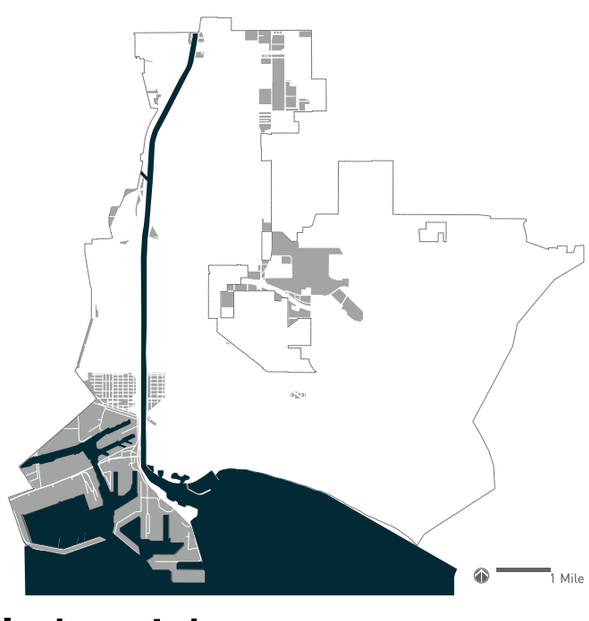
Residential



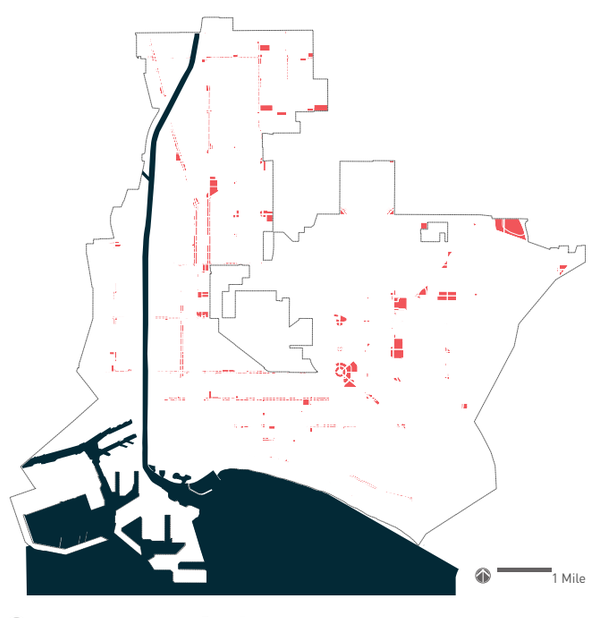
Planned Development



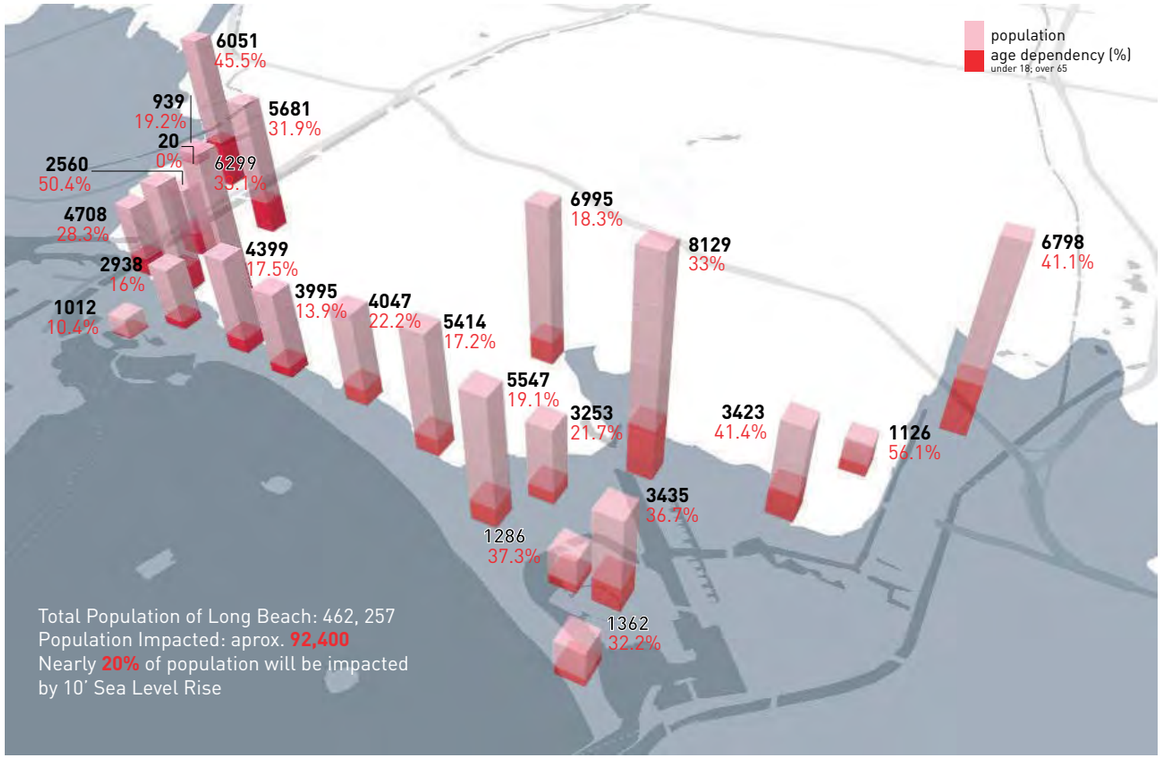
Circulation



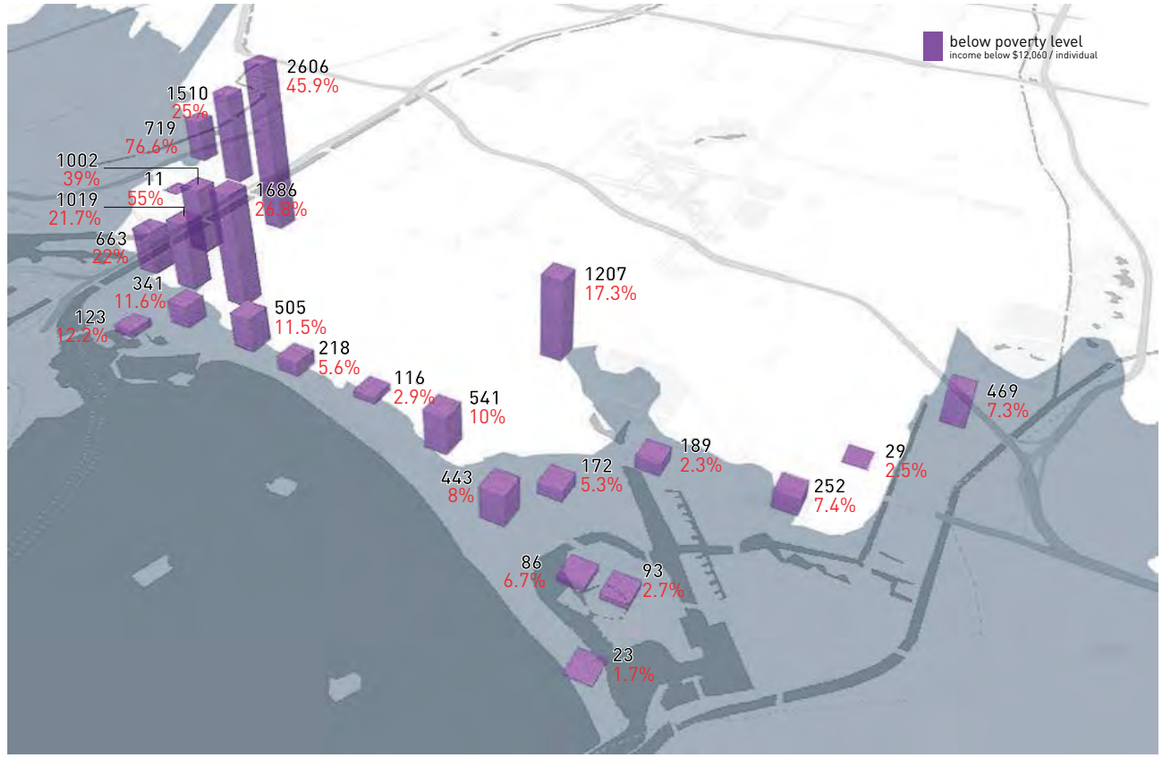
Industrial



Commercial



Impacted Population



Social Vulnerability

- Hairy Woodpecker // Picoides villosus
- Yellow-Chevroned Parakeet // Brotogeris chiriri
- Mitred Parakeet // Psittacara mitratus
- Great Horned Owl // Bubo virginianus
- Belted Kingfisher // Megaceryle alcyon
- Eurasian Collared-Dove // Streptopelia decaocto
- Rock Pigeon // Columba livia
- Mourning Dove // Zenaida macroura
- Common Gallinule // Gallinula galeata
- American Coot // Fulica americana
- Indian Peafowl // Pavo cristatus
- Golden Pheasant // Chrysolophus pictus
- Calidrids // Genus Calidris
- Sharp-Tailed Sandpiper // Calidris acuminata
- Western Sandpiper // Calidris mauri
- Least Sandpiper // Calidris minutilla
- Pectoral Sandpiper // Calidris melanotos
- Long-billed Dowitcher // Limnodromus scolopaceus
- Willet // Tringa semipalmata
- Western Willet // Tringa semipalmata inornata
- Solitary Sandpiper // Tringa solitaria
- Lesser Yellowlegs // Tringa flavipes
- Whimbrel // Numenius phaeopus
- Long-billed Curlew // Newmenius americanus
- Marbled Godwit // Limosa fedoa
- Wilson's Phalarope // Phalaropus tricolor
- Spotted Sandpiper // Actitis macularius
- Gulls, Terns, and Skimmers // Family Laridae
- Caspian Tern // Hydroprogne caspia
- Royal Tern // Thalasseus maximus
- Forster's Tern // Sterna forsteri
- Herring Gull // Larus argentatus
- Western Gull // Larus occidentalis
- Thayer's Gull // Larus thayeri
- Heermann's Gull // Larus heermanni
- Ring-billed Gull // Larus delawarensis
- California Gull // Larus californicus
- Laughing Gull // Leucophaeus atricilla
- Typical Plovers // Genus Charadrius
- Killdeer // Charadrius vociferus
- Black Oystercatcher // Haematopus bachmani
- Black-Necked Stilt // Himantopus mexicanus
- Black-headed Grosbeak // Pheuticus melanocephalus
- American Pipit // Anthus rubescens
- Blackpoll Warbler // Setophaga striata
- Yellow-rumped Warbler // Setophaga coronata
- Audubon's Warbler // Setophaga coronata ssp. Auduboni
- Townsends Warbler // Setophaga townsendi
- American Avocet // Recurvirostra americana
- Red-Throated Loon // Gavia stellata
- Western Grebe // Aechmophorus occidentalis
- Pied-billed Grebe // Podilymbus podiceps
- White-faced Ibis // Plegadis chihi
- Brown Pelican // Pelecanus occidentalis
- American White Pelican // Pelecanus erythrorhynchos
- Snowy Egret // Egretta thula
- Great Egret // Ardea alba
- Black-Crowned Night-Heron // Nycticorax nycticorax
- Least Bittern // Ixobrychus exilis
- Green Heron // Butorides virescens
- Peregrine Falcon // Falco peregrinus
- American Kestrel // Falco sparverius
- Anna 's Hummingbird // Calypte anna
- Allen 's Hummingbird // Selasphorus sasin
- Rufous Hummingbird // Selasphorous rufus
- Black-Chinned Hummingbird // Archilochus alexandri
- Vaux 's Swift // Chaetura vauxi
- Mute Swan // Cygnus olor
- Mallard // Anas platyrhynchos
- Domestic Duck // Anas platyrhynchos ssp. Domesticus
- Northern Pintail // Anas acuta
- Green-winged Teal // Anas crecca
- CinnamonTeal // Anas cyanoptera
- Blue-winged Teal // Anas discors
- Gadwall // Anas strepera
- Northern Shoveler // Anas clypeata
- American Wigeon // Anas americana
- Bufflehead // Bucephala albeola
- Surf Scoter // Melanitta perspicillata
- Ring-necked duck // Aythya collaris
- Lesser Scaup // Aythya affinis
- Ruddy Duck // Oxyura jamaicensis
- Cackling Goose // Branta hutchinsii
- Black-and-white Warbler // Mniotilta varia
- Orange-Crowned Warbler // Oreothlypis celata
- Nashville Warbler // Oreothlypis rificapilla
- Common Yellowthroat // Geothlypis trichas
- Northern Red Bishop // Euplectes franciscanus
- Bushtit // Psaltriparus minimus
- Cedar Waxwing // Bombycilla cedrorum
- Common Raven // Corvus corax
- House Finch // Haemorphous mexicanus
- Canada Goose // Branta canadensis
- Wood Duck // Aix sponsa
- Muscovy Duck // Cairina moschata
- Domestic Muscovy Duck // Carina moschata ssp. Domestica
- Egyptian Goose // Alopochen aegytiaca
- Cooper's Hawk // Accipiter cooperii
- Red-tailed Hawk // Buteo jamaicensis
- Turkey Vulture // Cathartes aura
- Double-crested Cormorant // Phalacrocorax auritus
- Pelagic Cormorant // Phalacrocorax pelagicus
- Barn Swallow // Hirundo rustica
- Northern Rough-winged Swallow // Stelgidoptryx serripennis
- Brown-headed Cowbird // Molothrus ater
- Yellow-headed Blackbird // Xanthocephalus xanthocephalus
- Western Meadowlark // Sturnella neglecta
- Great-tailed Grackle // Quiscalus mexicanus
- Red-wingled Blackbird // Agelainus phoeniceus
- European Starling // Sturnus vulgaris
- House Wren // Troglodytes aedon
- American Robin // Turdus migratorius
- Hermit Thrush // Catharus guttatus
- Western Bluebird // Sialia mexicana
- Willow Flycatcher // Empidonax traillii
- Black Phoebe // Sayornis nigricans
- Warbling Vireo // Vireo gilvus
- Song Sparrow // Melospiza melodia

118 Bird Species in Long Beach

17 **Threatened Species**

POTENTIAL

ECOLOGY

The potential in designing for Long Beach's ecology lies in the 'edge conditions' of the city, demonstrated by the abundance of avian presence in these conditions. Equally presented by this mapping is the opportunity to design outside of the edges; the reason that birds have been pushed to the edges are due to medium and high density development that has ravaged their native habitats. What was once covered in coastal sage scrub and various types of wetland habitat is now proliferated with buildings and concrete surfaces that force avian species to move to the edges in order to have access to their food sources.

In relation to sea level rise, these edge condition areas become more valuable because of the potential that exists to choreograph wetland habitat for avian species as water begins to encroach upon these spaces. The creation of wetland habitats not only aids avian species; there's also potential to increase Long Beach's biodiversity, clean the polluted water, and enrich the social experience of the city. The potential becomes exponential if applied on a variety of scales in the city.

(Wilmington) 6.

S P

B M 9

PINE AVENUE PIER

LONG BEACH

49

BIXBY PARK

4TH ST.

65

OCEAN

50 AVE

BELMONT PIER

S A N P E D R O

1185 000 YARDS

1925 Long Beach, Calif, US Geological Survey

Strategies

Mitigation

LEGEND

FLOODING FROM SLR
- +6'-0"
- +5'-0"
- +4'-0"
- +3'-0"
- +2'-0"
- +1'-0"

EDGES

SOFT
- MARSH
- SANDY SHORE

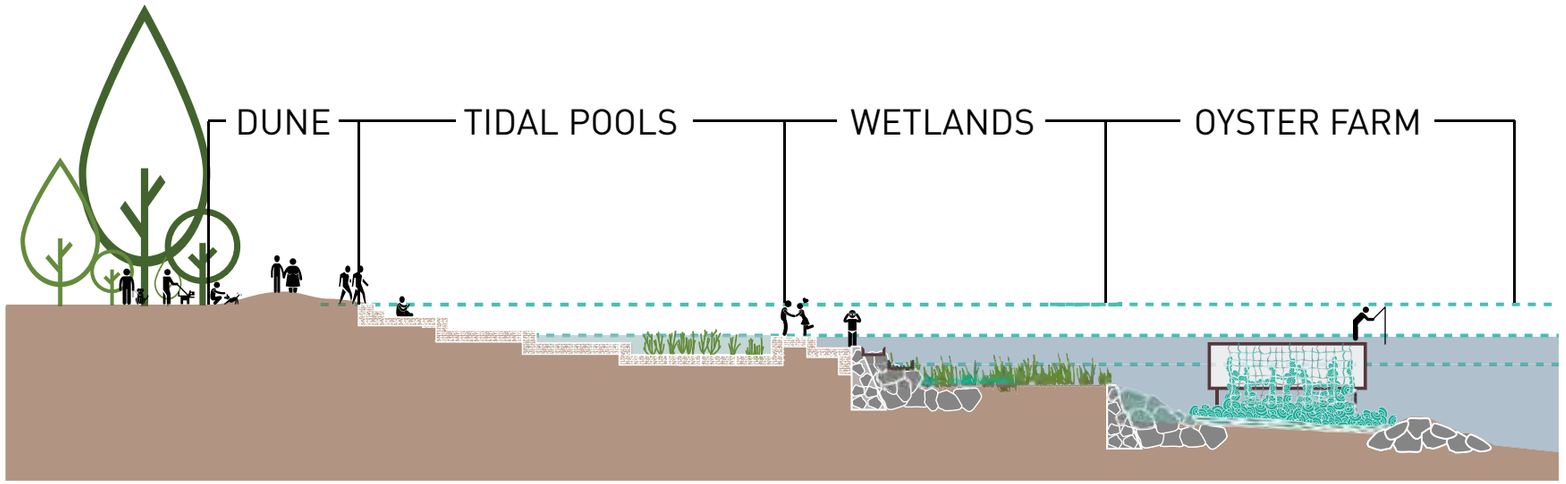
MEDIUM
- RIPRAP

HARD
- SEA WALL

0 1 mile 2 miles 3 miles 4 miles 5 miles

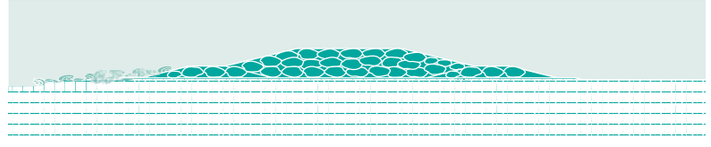
LIVING BREAKWATER

Section of a living shoreline that involves multiple stages to form a protected coastline that is capable of serving multiple functions such as productive oyster farming, life supporting tide pools, and water filtering plantings. Various typologies associated with living breakwaters display the wide variety of scenarios that mitigation strategies can account for. Dunes and berms negate high waves, absorbing edges can take on tidal surges, constructed reefs are an ecological attempt to mitigate wave action, and tidal flats maintain low lying sand flats along the shore.



Dunes / Berms

Absorptive Edges



Constructed Reefs

Tidal Flats

ABOVE HIGH TIDE

EASTERN RED CEDAR

RED OAK

BAYBERRY

WAX MTRTLE

TIDAL WETLANDS AT HIGH TIDE

GROUNDSEL TREE

MARCH HIBISCUS

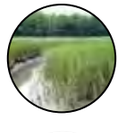
SWITCH GRASS

TIDAL WETLANDS AT MID TIDE

SALTMARSH BULRUSH

SALT MEADOW HAY

TIDAL WETLANDS AT LOW TIDE



MARSH GRASS

COMMON THREESQUARE

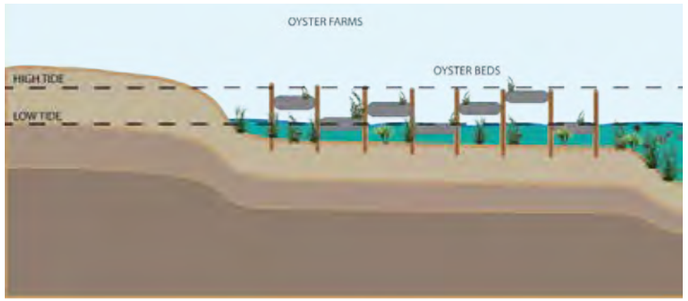
OCHRE SEA STAR

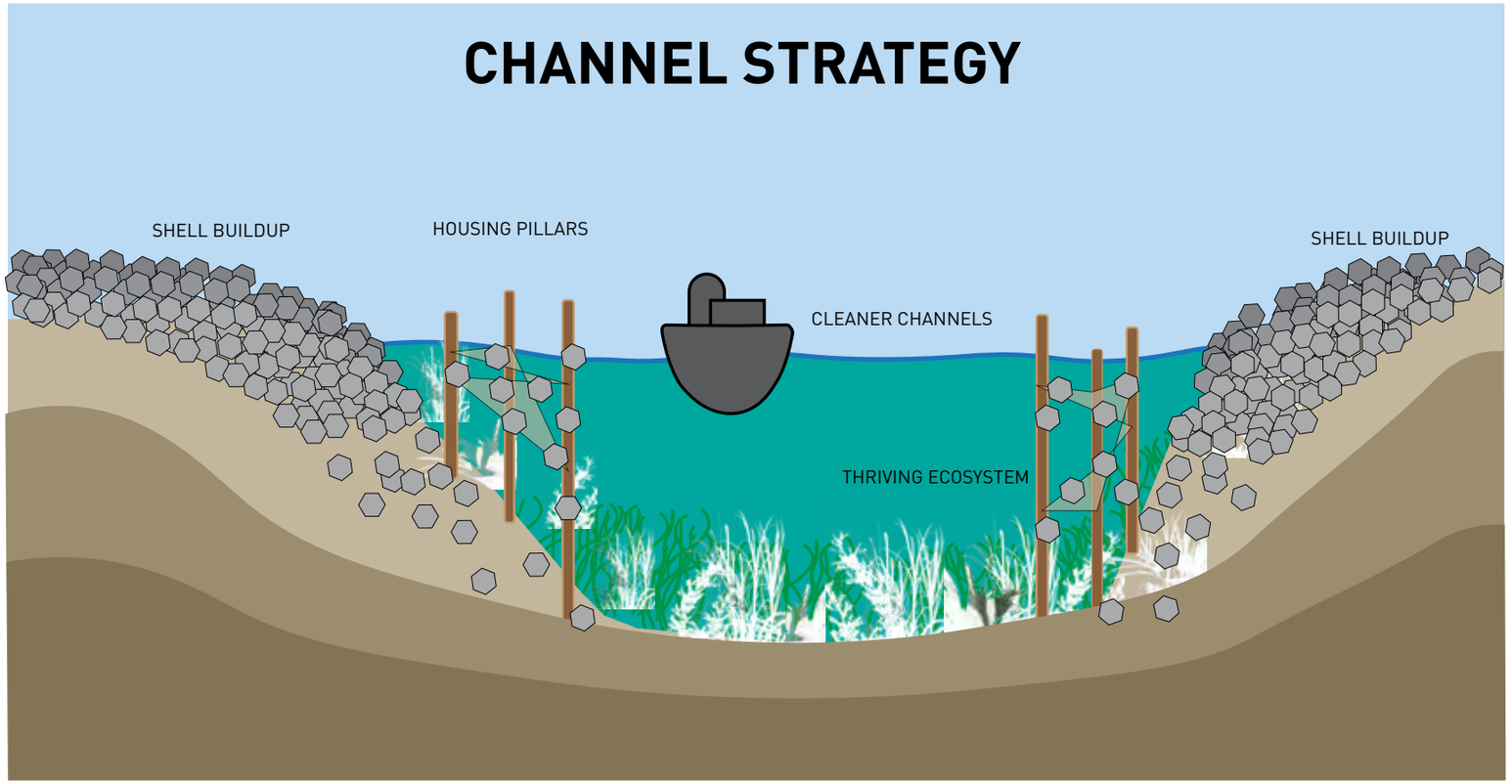
CALIFORNIA MUSSELS

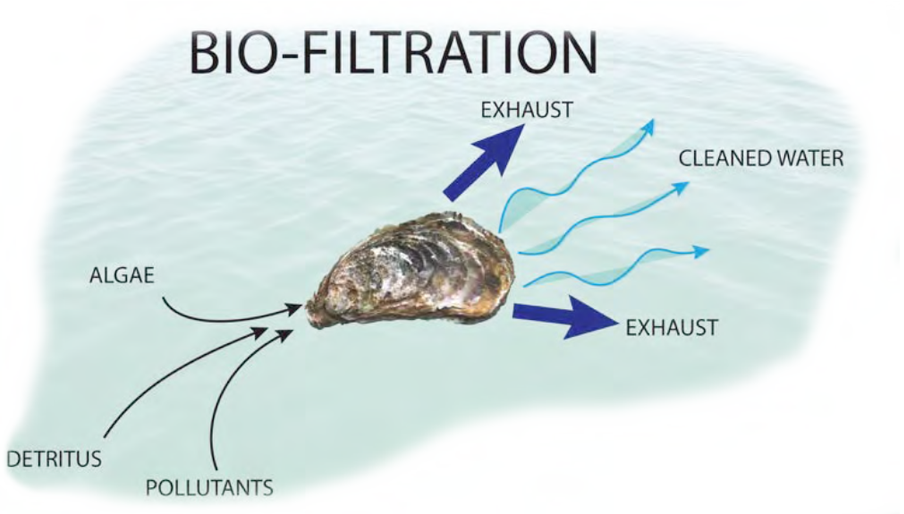
OYSTERS

OYSTER-TECTURE

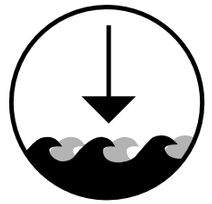
With the cleansing and clearing of water columns, submerged aquatic vegetation thrives in the higher sunlight levels. The sea grass then acts as a layer of reinforcement for the shifting sands that oysters reefs are built upon and, when storms occur, holds the coastline together. The varying pros included with oyster-tecture is that it not only helps protect shores, oysters filter water by means of bio-filtration. In cleaner areas, the oysters can be farmed and eaten. Oysters can create an ecosystem if given space to thrive in shallow areas.







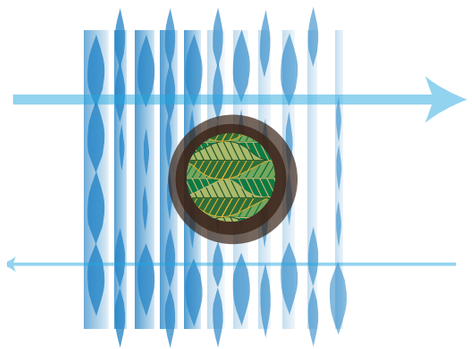
Hazardous/ not walkable



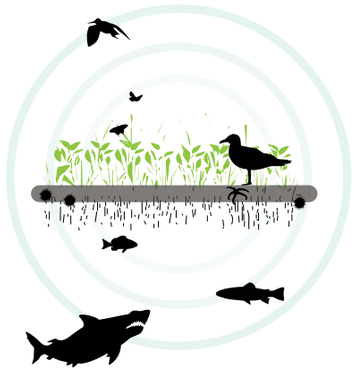
Low tides

FLOATING WETLAND

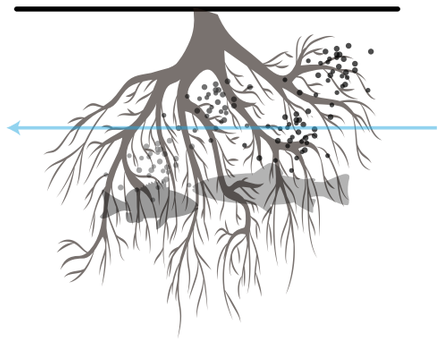
Floating Wetland has the potential to provide a habitat for marine creatures as well as plants. It can become a resting place for the birds, food for the bugs, and a home to the fishes. As for the people it is visually pleasing and may mitigate waves that are heading towards the shore. The most significant quality of a floating wetland is the its function as a water filtration system, reducing nutrient concentration in the water.



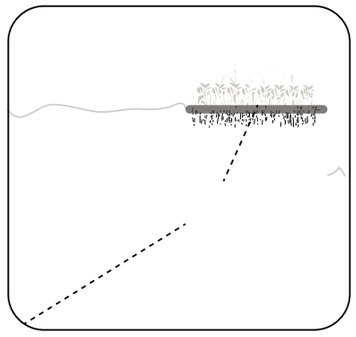
WAVE BUFFER



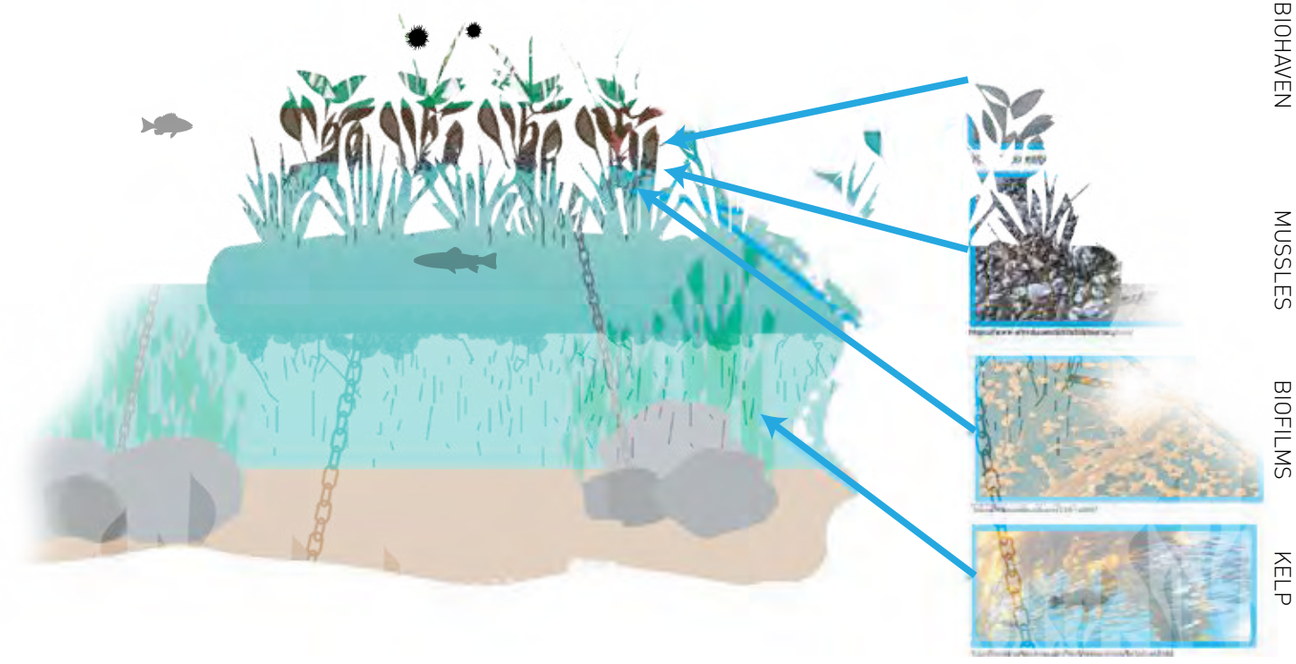
HABITAT



FILTER PARTICULATES



ANCHOR BREAKAGE



BIOHAVEN

MUSSLES

BIOFILMS

KELP

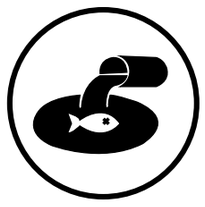
MARSHES, KELP, & FILTER FEEDERS

Ecological processes that purify water includes wetlands, aquatic plants (such as kelp), and filter feeders (oysters, clams, mussels, and sponges).

Oysters and Mussels remove particles that are laden with pollutants such as herbicides, heavy metal, and oil.

Kelps oxygenates the water and create a natural environment in which marine animals can live in while also protecting them from harmful predators.

Kelp and marsh plants support biofilms of microorganisms that trap and metabolize pollutants.



Pollution and Animal Intervention

No Surfing

Habitat Intervention

Hazardous/not walkable

LA402L visiting Golden Shore Wetland Reserve with Dr. Christine Whitcraft & Jenni Zell..

Adaptation

LEGEND

FLOODING FROM SLR
- +6'-0"
- +5'-0"
- +4'-0"
- +3'-0"
- +2'-0"
- +1'-0"

EDGES

SOFT
- MARSH
- SANDY SHORE

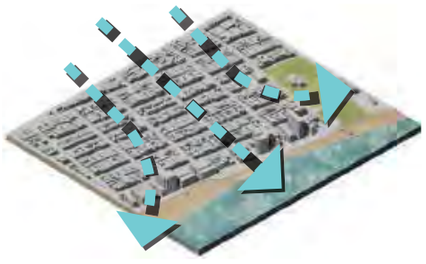
MEDIUM
- RIPRAP

HARD
- SEA WALL

0 1 mile 2 miles 3 miles 4 miles 5 miles

AMPHIBIOUS NEIGHBORHOODS

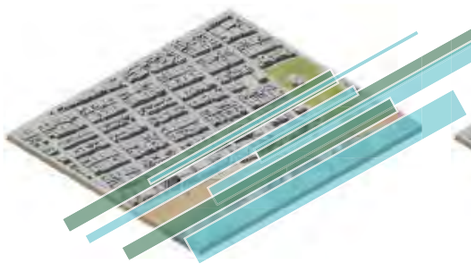
CURRENT CONDITION



WATER CONVEYANCE

SOFTSCAPE HARDSCAPE

FOCUS



SALTWATER BUFFERS

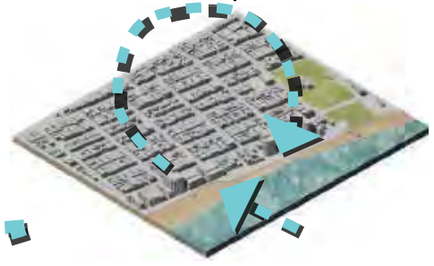
SOFTSCAPE HARDSCAPE

FOCUS

AQUATECTURE

SOFTSCAPE HARDSCAPE

FOCUS



CHANNELING ECOLOGICAL // SOCIAL ACCESS

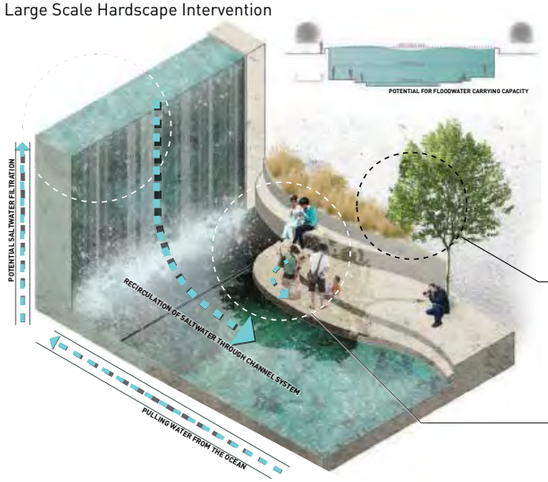
SOFTSCAPE HARDSCAPE

FOCUS

FOCUSED ON WATER CONTENT

SCOPE
Downtown Long Beach // Shoreline

CHANNELING ECOLOGICAL AND SOCIAL ACCESS
Large Scale Hardscape Intervention



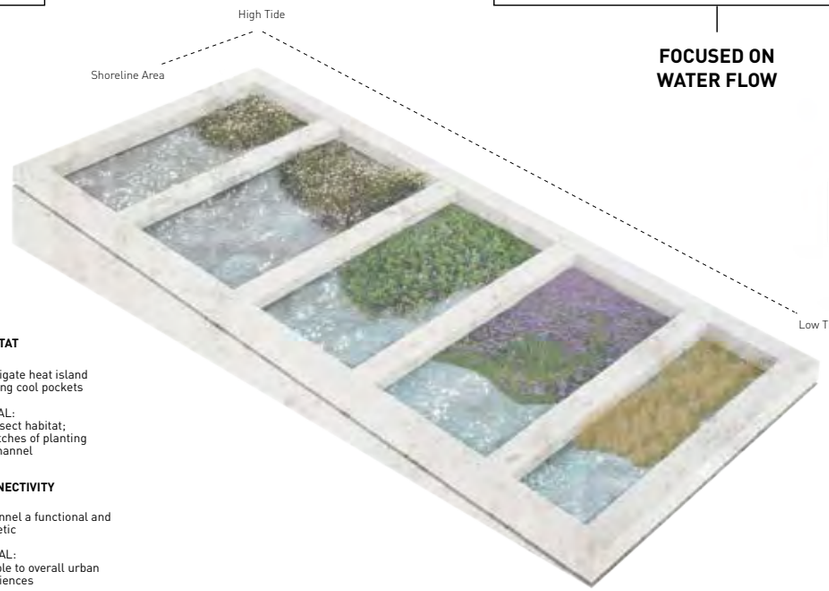
URBAN HABITAT
BENEFITS:
Plantings mitigate heat island effect, providing cool pockets

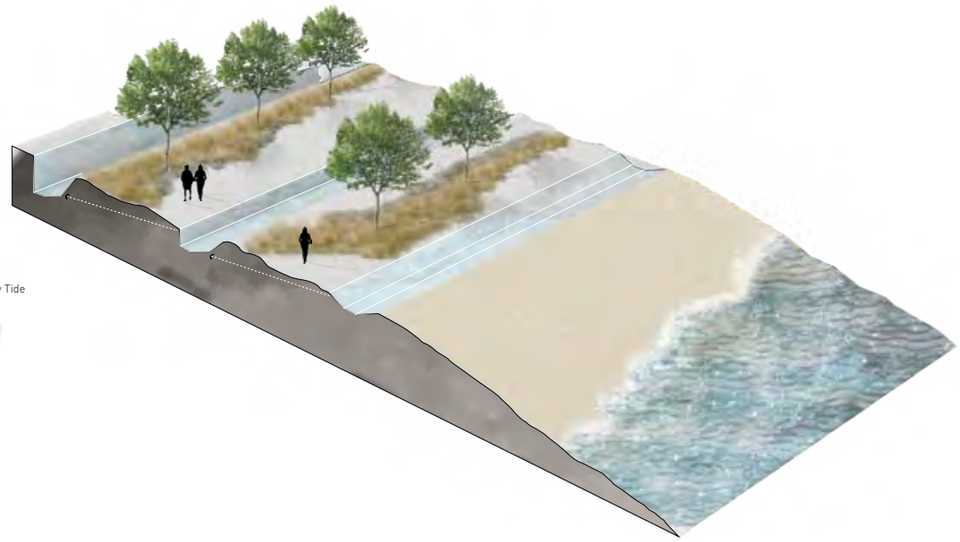
OVERALL GOAL:
Plant, bird, insect habitat; ecological patches of planting throughout channel

SOCIAL CONNECTIVITY
BENEFITS:
Terraced channel a functional and design aesthetic

OVERALL GOAL:
Connect people to overall urban habitat experiences

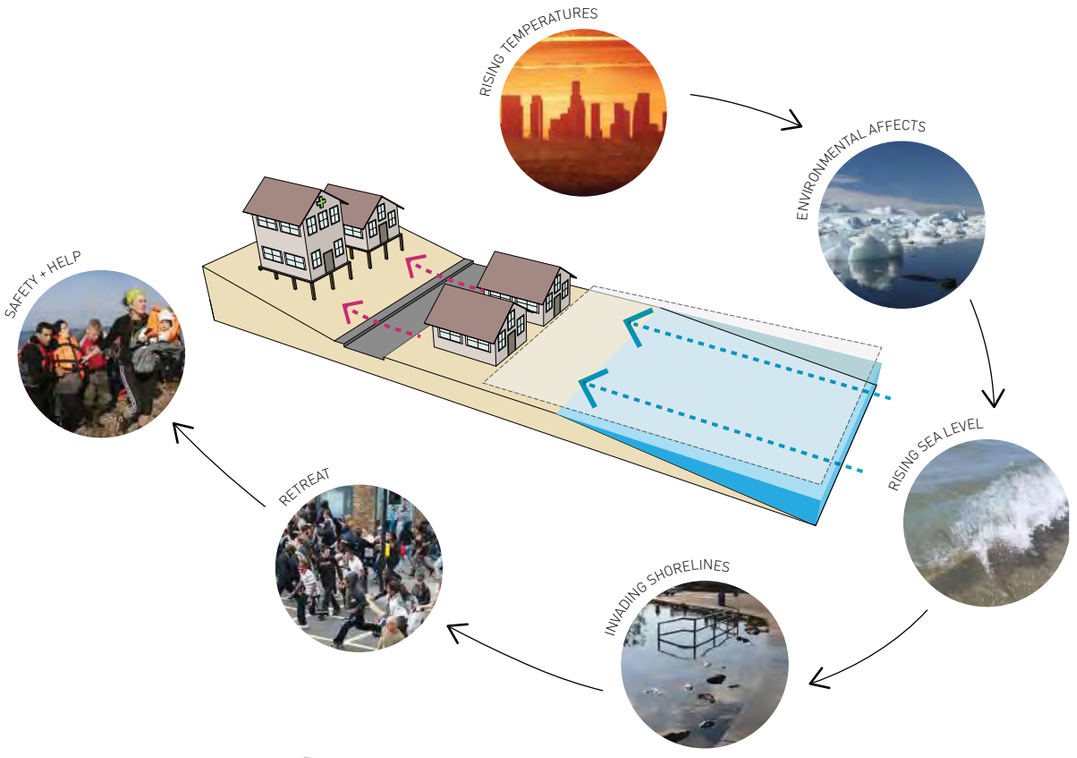
FOCUSED ON WATER FLOW

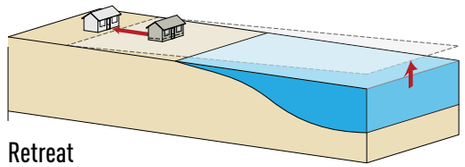




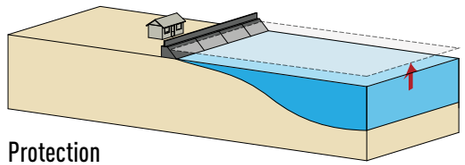
An amorphous merging of hardscape and softscape strategies characterize the typologies for adapting to sea level rise, ameliorating the heat island effect, immersing people into theurban habitat experience, and enhancing the biodiversity of Long Beach.

MANAGED RETREAT

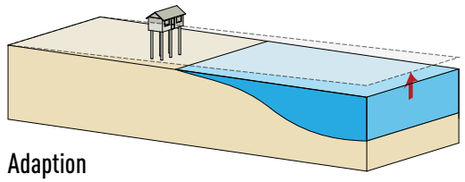




Retreat

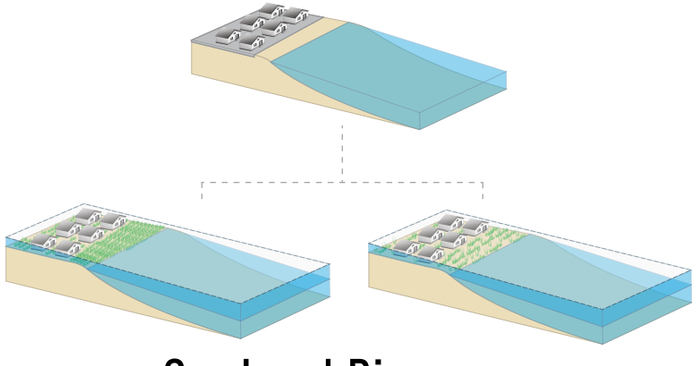


Protection

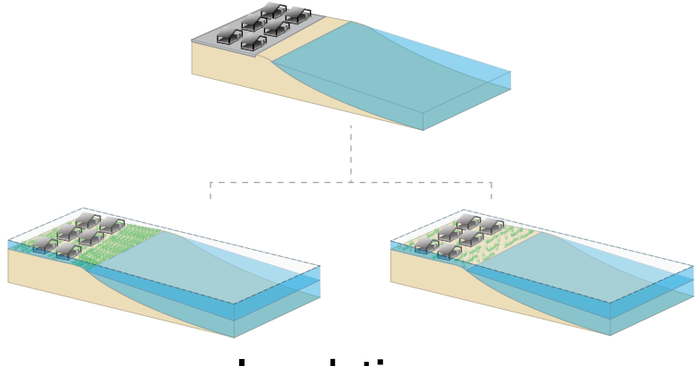


Adaption

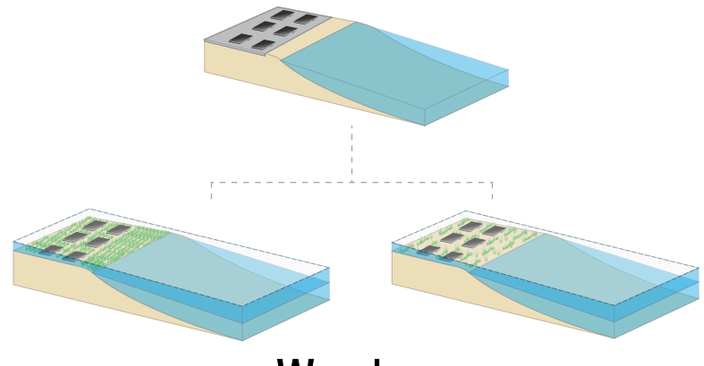
Retreating is a last resort measure saved for the places that may have no other solution but to let the ocean claim their homes. People may have to leave, but it opens the door to new wildlife opportunity that we can help influence and form for a new environment that maintains some of the history.



Sea Level Rise



Inundation



Wreckage

NOTE D

Traffic lanes and Pilot Areas established or approaches to Los Angeles and Long Beach Harbors are shown on Charts 18748, 18749, and 18720.

The normal Pilot Operating Areas are outlined by impassable magenta bands. Mariners are advised to exercise extreme care in navigating within these areas. No vessel may enter this area unless it is entering or departing the Los Angeles or Long Beach main channels. Vessels shall pass directly through without stopping or lowering anchor except for taking on a pilot.

To receive information regarding the movement of vessels in the traffic separation schemes and the precautionary area contact the Vessel Traffic Service. This working frequency for the VTS is channel 14 VHF/FM (156.7 MHz) (ch 313-832-6111) and the call sign is "San Pedro Traffic."

CAUTION

Limitations on the use of radio signals as aids to marine navigation can be found in the U.S. Coast Guard Light Lists and National Geospatial-Intelligence Agency Publication 117.

Radio direction-finder bearings to commercial broadcasting stations are subject to error and should be used with caution.

Station positions are shown thus:

⊙(Accurate location) ○(Approximate location)

TIDAL INFORMATION

PLACE		Height referred to datum of soundings (MLLW)		
NAME	(LAT/LONG)	Mean Higher High Water	Mean High Water	Mean Low Water
		feet	feet	feet
Los Angeles, Outer Harbor	(33°43'N/118°16'W)	5.5	4.8	0.9
Los Angeles Harbor, Mormon Island	(33°45'N/118°16'W)	5.4	4.7	1.0

Dashes (- - -) located in datum columns indicate unavailable datum values for a tide station. Real-time water levels, tide predictions, and tide current predictions are available on the Internet from http://tidesandcurrents.noaa.gov.

(Mar 2012)

AUTHORITIES

Hydrography and topography by the National Ocean Service, Coast Survey with additional data from the Corps of Engineers, Department of the Navy, City of Los Angeles, City of Long Beach, and U.S. Coast Guard.

NOTE C

CAUTION

The Los Angeles and Long Beach Main Channels are considered narrow channels. Vessels less than 20 meters in length, sailing vessels, vessels engaged in fishing, or any vessel attempting to cross these channels shall not impede a vessel that can only safely navigate within a narrow channel as per Inland Navigation Rules, Rule 9. To obtain information on the movement of deep draft vessels under the Federal Breakwater, contact the Los Angeles Pilot Station on channel 73 (156.675 MHz) / ph 562-732-3600, or Long Beach Pilot Station on channel 74 (156.8 MHz) / ph 562-432-2854.

NOTE E

The Restricted Harbor Area Entrance Regulations are contained in the City of Long Beach Tariff No. 4 (February 2, 1994) Board of Harbor Commissioners (Port of Long Beach).

NOTE F

NO DISCHARGE ZONE, 40 CFR 140

Under the Clean Water Act, Section 312, all vessels operating within a No-Discharge Zone (NDZ) are completely prohibited from discharging any sewage, treated or untreated, into the waters. All vessels with an installed marine sanitation device (MSD) that are navigating, moored, anchored, or docked within a NDZ must have the MSD sealed to prevent the overboard discharge of sewage (treated or untreated) or install a holding tank. Regulations for the NDZ are contained in the U.S. Coast Pilot. Additional information concerning the regulations and requirements may be obtained from the Environmental Protection Agency (EPA) web site: http://www.epa.gov/owm/mtb/vessel_sewage.

NOTE H

Vessels with 20 foot draft or less will be Seaward south of PACON Buoy 3. Vessels with a draft greater than 50 feet will be Seaward south of Buoy 1.

MINERAL DEVELOPMENT STRUCTURES

Obstruction lights and sound (fog) signals are required for fixed mineral development structures shown on this chart, subject to approval by the District Commander, U.S. Coast Guard (33 CFR 67).

NOTE K

MARINER ACTIVATED SOUND SIGNAL (MIRASS)

Horn is activated by keying the mic 5 times on VHF-FM Ch 81A - Horn will operate for thirty minutes.

CAUTION

Mariners are cautioned that exploratory surveys

HORIZONTAL DATUM

The horizontal reference datum of this chart is North American Datum of 1983 (NAD 83), which for charting purposes is considered equivalent to the World Geodetic System 1984 (WGS 84). Geographic positions referred to the North American Datum of 1927 must be corrected an average of 0.067" northward and 3.249" westward to agree with this chart.

For Symbols and Abbreviations see Chart No. 1

COLREGS: International Regulations for Preventing Collisions at Sea, 1972. Demarcation lines are shown thus: — — — —

ANCHORAGE BERTHS

The anchorage berths shown in green are for the convenience of the Captain of the Port and/or pilot. Anchorages outside the federal breakwaters are assigned by the Captain of the Port through VTMS. Anchorages inside the breakwater are assigned by the applicable pilot group. The three anchorages are for the use of the U.S. Navy and U.S. Coast Guard for explosive carriage.

NOAA WEATHER RADIO BROADCASTS

The NOAA Weather Radio stations listed below provide continuous weather broadcasts. The reception range is typically 20 to 40 nautical miles from the antenna site, but can be as much as 100 nautical miles for stations at high elevations.

Los Angeles , CA	KWO-37	162.550 MHz
Santa Ana , CA	WWG-21	162.450 MHz

RADAR REFLECTORS

Radar reflectors have been placed on many floating aids to navigation. Individual radar reflector identification on these aids has been omitted from this chart.

WARNING

The position-keeping aids are not relied upon as any single aid to navigation, particularly on floating aids. See U.S. Coast Guard Light List and U.S. Coast Pilot for details.

SCALE 1:20,000

Nautical Miles

Yards

NOTE A

Navigation regulations are published in Chapter 2, U.S. Coast Pilot 7. Additional revisions in Chapter 2 are published in the Notice to Mariners. Information concerning the regulations may be obtained at the Office of the Commander, 11th Coast Guard District in Alameda, California as well as the Office of the District Engineer, Corps of Engineers in Los Angeles, California.

Refer to charted regulation section numbers.

CAUTION

Improved channels shown by broken lines are subject to shoaling, particularly at the edges.

NOTE F

A precautionary area has been established in the Los Angeles - Long Beach area. Large vessels are recommended to establish an operational procedure with the traffic separation systems. It is recommended vessels proceed with extreme caution in this area.

Vessels are prohibited from anchoring in the precautionary area except in designated anchorages (110.214).

POLLUTION REPORTS

Report all spills of oil and hazardous substances to the National Response Center via 1-800-424-8802 (toll free), or to the nearest U.S. Coast Guard facility if telephone communication is impossible (33 CFR 153).

AIDS TO NAVIGATION

Consult U.S. Coast Guard Light List for supplemental information concerning aids to navigation.

RADIO TOWER ⊙

NOTE G

VESSEL TRAFFIC MANAGEMENT SYSTEM

The Vessel Traffic Service of Los Angeles-Long Beach, jointly operated by the U.S. Coast Guard and Marine Exchange, has been established within the approaches to San Pedro Bay. The working frequency for the VTS is channel 14 VHF/FM (156.7 MHz) and the call sign is "San Pedro Traffic." Upon entering the VTS area, which is 25 nautical miles radius of the Pioneer (LAT 33°42.3'N, LONG 118°17.6'W), all inbound vessels shall report or channel 14 their vessel name, call sign, position, course and speed, destination, estimated time of arrival to their destination, and whether or not their vessel will be taking on a pilot. Outbound vessels shall report 15 minutes prior to reaching the breakwater. To obtain information on the movement of deep draft vessels inside the Federal Breakwater, contact the Los Angeles Pilot Station on channel 73 (156.675 MHz) / ph 562-732-3600, or Long Beach Pilot Station on channel 74 (156.8 MHz) / ph 562-432-2854.

LOS ANGELES

WILMINGTON

LONG BEACH

SAN PEDRO

SAN PEDRO BAY

TERMINAL ISLAND

MIDDLE HARBOR

INNER HARBOR

Channel

Flood Control Channel

Consolidated Slip

Northwest Slip

West Basin

East Basin (Turning Basin)

Cerritos Channel

MAIN CHANNEL

EAST BASIN CHANNEL

Southwest Slip

Basin Six

Southeast Basin

Back Channel

Queensway Bay

Channel Two

Channel Three

PIER A

PIER B

PIER C

PIER D

PIER E

PIER F

PIER G

PIER H

PIER J

PIER S

PIER T

PIER 300

TURNING BASIN

TEMPORARY SHALLOW WATER HABITAT

NAVAL BASE MOLE

BERTH NUMBERS

The numbers on the land along the waterfront are the berth numbers.

2015, Chart 18479 San Pedro Bay, National Oceanic and Atmospheric Administration

THE NATION'S CHARTMAKER SINCE 1807

UNITED STATES - WEST COAST

CALIFORNIA

SAN PEDRO BAY

Mercator Projection
Scale 1:20,000 at Lat 33° 43'
North American Datum of 1983
(World Geodetic System 1984)
SOUNDINGS IN FEET
AT MEAN LOWER LOW WATER

Additional information can be obtained at nauticalcharts.noaa.gov.

HEIGHTS
Heights in feet above Mean High Water.

CAUTION
Temporary changes or defects in aids to navigation are not indicated on this chart. See Local Notice to Mariners.

SUPPLEMENTAL INFORMATION
Consult U.S. Coast Pilot 7 for important supplemental information.

NOTE X
Within the 12-nautical mile Territorial Sea, established by Presidential Proclamation, some Federal laws apply. The Three Nautical Mile Line, previously identified as the outer limit of the territorial sea, is retained as it continues to depict the jurisdictional limit of the other laws. The 9-nautical mile Natural Resource Boundary off the Gulf coast of Florida, Texas, and Puerto Rico, and the Three Nautical Mile Line elsewhere remain in most cases the inner limit of Federal fisheries jurisdiction and the outer limit of the jurisdiction of the states. The 24-nautical mile Contiguous Zone and the 200-nautical mile Exclusive Economic Zone were established by Presidential Proclamation. Unless fixed by treaty or the U.S. Supreme Court, these maritime limits are subject to modification.

NOTE J
Floating security barriers have been installed at U.S. Naval Weapons Station Seal Beach in Anaheim Bay. The barriers are marked by alternating orange and white spherical buoys and approximately mark the restricted water space surrounding the facility.

U.S. NAVAL WEAPONS STATION

NO-DISCHARGE ZONE (see note Z)

ANAHEIM BAY
HUNTINGTON HARBOUR
Scale 1:15,000
SOUNDINGS IN FEET
AT MEAN LOWER LOW WATER

Nautical Miles
Yards

SEAL BEACH
ANAHEIM BAY
Hog Island
Sunset Beach
BOLSA CHICA CHANNEL
HUNTINGTON HARBOUR
Long Beach Marina
Alamitos Bay
SAN GABRIEL RIVER
Anaheim Bay
LONG BEACH OUTER HARBOR
Island White
Island Freeman
Island Chaffee
Marsh
Pier
Wharf
Ramp
Log boom
Spoil
Numerous Piers
Fixed Bridge
Tank
Sunset

33° 44'
118° 06'
118° 05'
43'
04'

N

Projects

BLUE YONDER

STRATEGIC INTERVENTIONS // WEST LONG BEACH

AMANDA FLORES // ELISE AHN // ILIANA VALENZUELA

NARRATIVE

KEY MAP

OBJECTIVES

DIAGRAMS

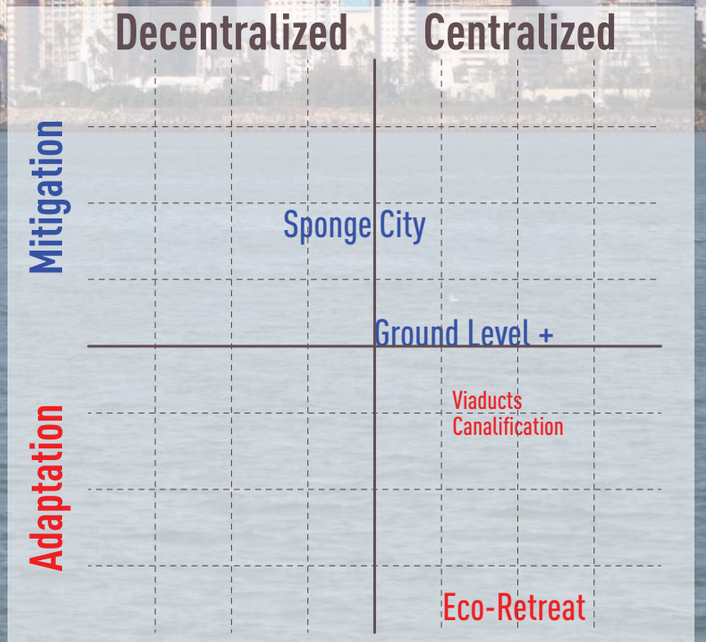
SCHEMATIC MASTER SITE PLAN

TYPOLOGIES

Blue Yonder

Amanda Flores, Elise Ahn, Iliana Valenzuela

Key Map



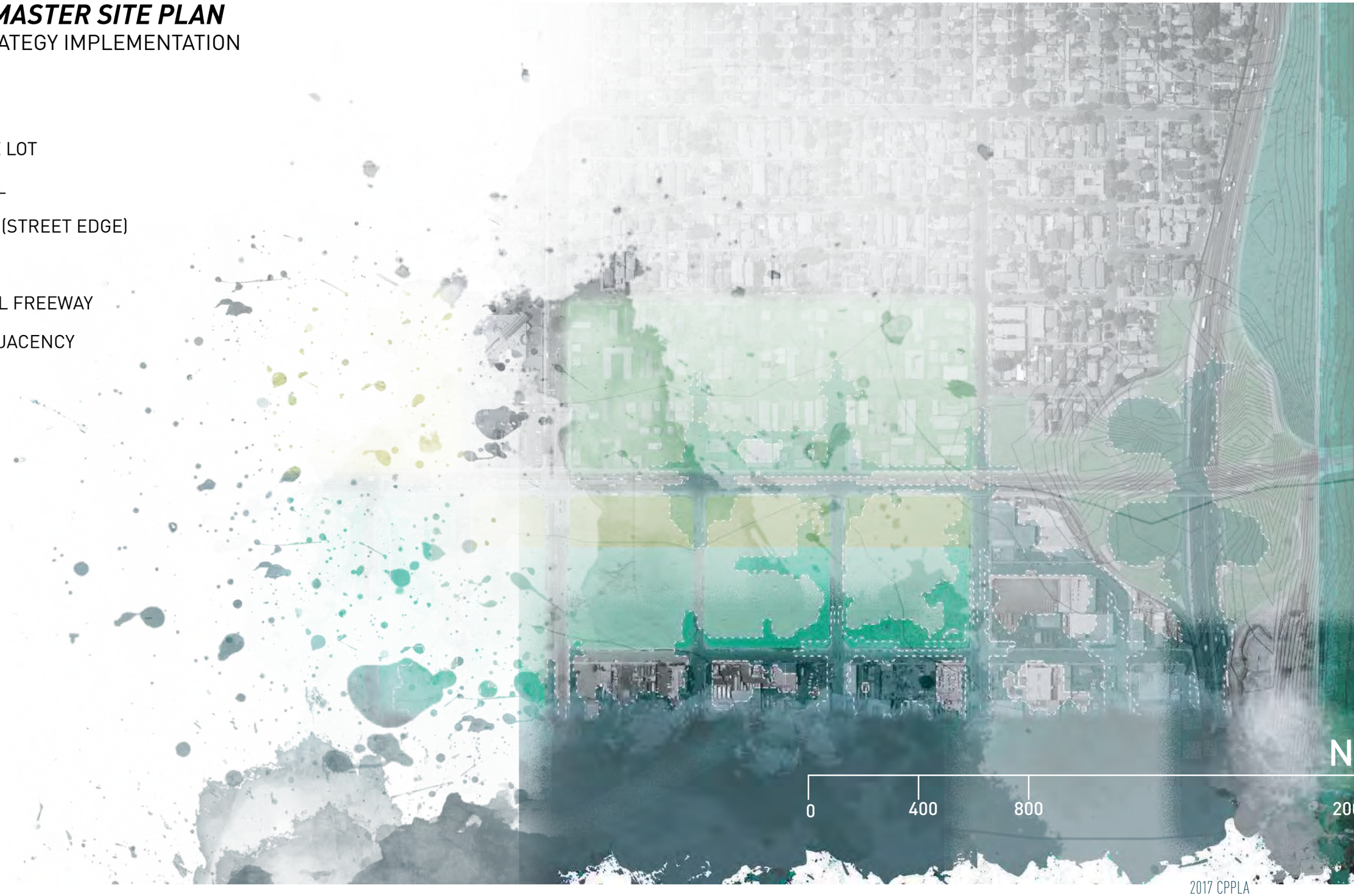
Strategy Matrix

SCHEMATIC MASTER SITE PLAN

AREAS FOR STRATEGY IMPLEMENTATION

LEGEND

- OPEN SPACE LOT
- RESIDENTIAL
- INDUSTRIAL (STREET EDGE)
- INDUSTRIAL
- INTERSTITIAL FREEWAY
- LA RIVER ADJACENCY



Blue Yonder Strategic Interventions // West Long Beach

Narrative

Our team's focused on the west side of Long Beach, with a dense low-income population adjacent to the industrial Port of Long Beach and the Los Angeles River. This area will be highly impacted by the sea level rise and other water-related catastrophes.

Mitigation strategies such as multi-purpose levees and terraces actively block ocean water from entering residential areas, while enabling commercial and public development behind them . Right by the LA River, strategies that divert, cleanse, store, and reroute river water prevent inundation, encourage public engagement, and provide habitats for species.

These adaptations poise the site for ecological/social interactions that increase the quality of life for the people and local ecology that would benefit from these interventions, and enliven this community as a whole.

Objectives

- Deflect pollutants from the port/industrial area and the freeway.
- Accommodate for the rising water levels from sea level rise and stormwater flood events using various strategies
- Restore some of the native wetland habitats that once proliferated the city
- Incorporate habitat and plantings that correspond well with the native avian ecologies
- Ameliorate the fragmentation of the city by connecting the city hydraulically and ecologically

KEY MAP

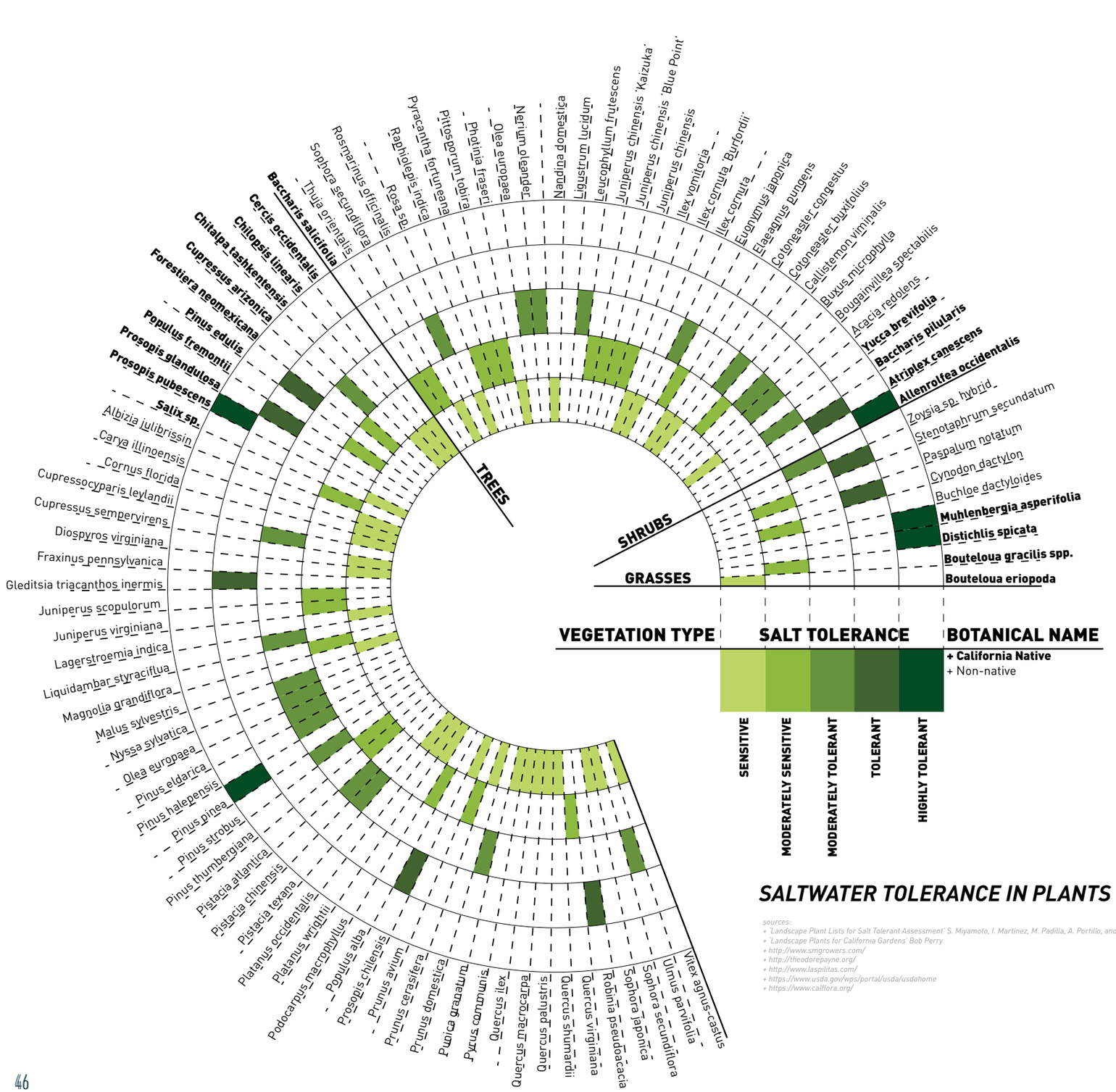
SITE

WEST LONG BEACH
APPROX. 215 ACRES
ADJACENCY TO
LA RIVER,
710, AND PCH

FUTURE WATER INUNDATION DIAGRAM

PLANT MATERIAL ADAPTATION

Sea level rise will inevitably cause drastic changes within the urban ecosystem. As the ocean rises, the shoreline is brought in closer to the city, shifting the margins in which plants are able to thrive in various salt inundated microclimates. Large, open areas would be ideal for marine terracing strategies to create socially and ecologically adaptable wetlands as the water level continues to rise. Color is used in the plant diagram to highlight the variety of potential plant growth that can be installed to adapt to these new conditions, and across various scales, including the marine terracing scenario.

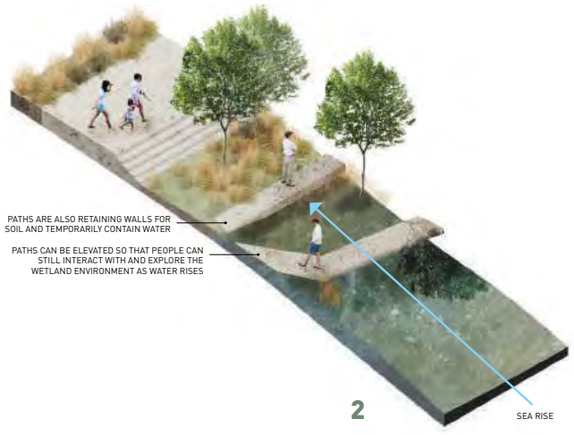


SALTWATER TOLERANCE IN PLANTS

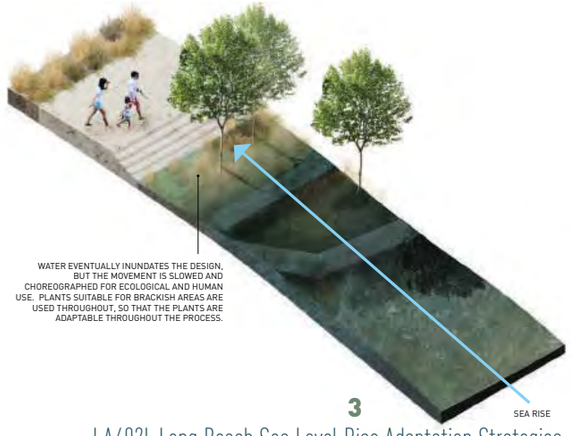
sources:
+ 'Landscape Plant Lists for Salt Tolerant Assessment' S. Miyamoto, I. Martinez, M. Padilla, A. Portillo, and D. Ornelas
+ 'Landscape Plants for California Gardens' Bob Perry
+ http://www.smgrowers.com/
+ http://theodorepayne.org/
+ http://www.laspilitas.com/
+ https://www.usda.gov/wps/portal/usda/usdahome
+ https://www.calflora.org/

AMELIORATING THE SHIFTING SHORE

MARINE TERRACING 1
SOCIALLY // ECOLOGICALLY ADAPTABLE WETLANDS



2



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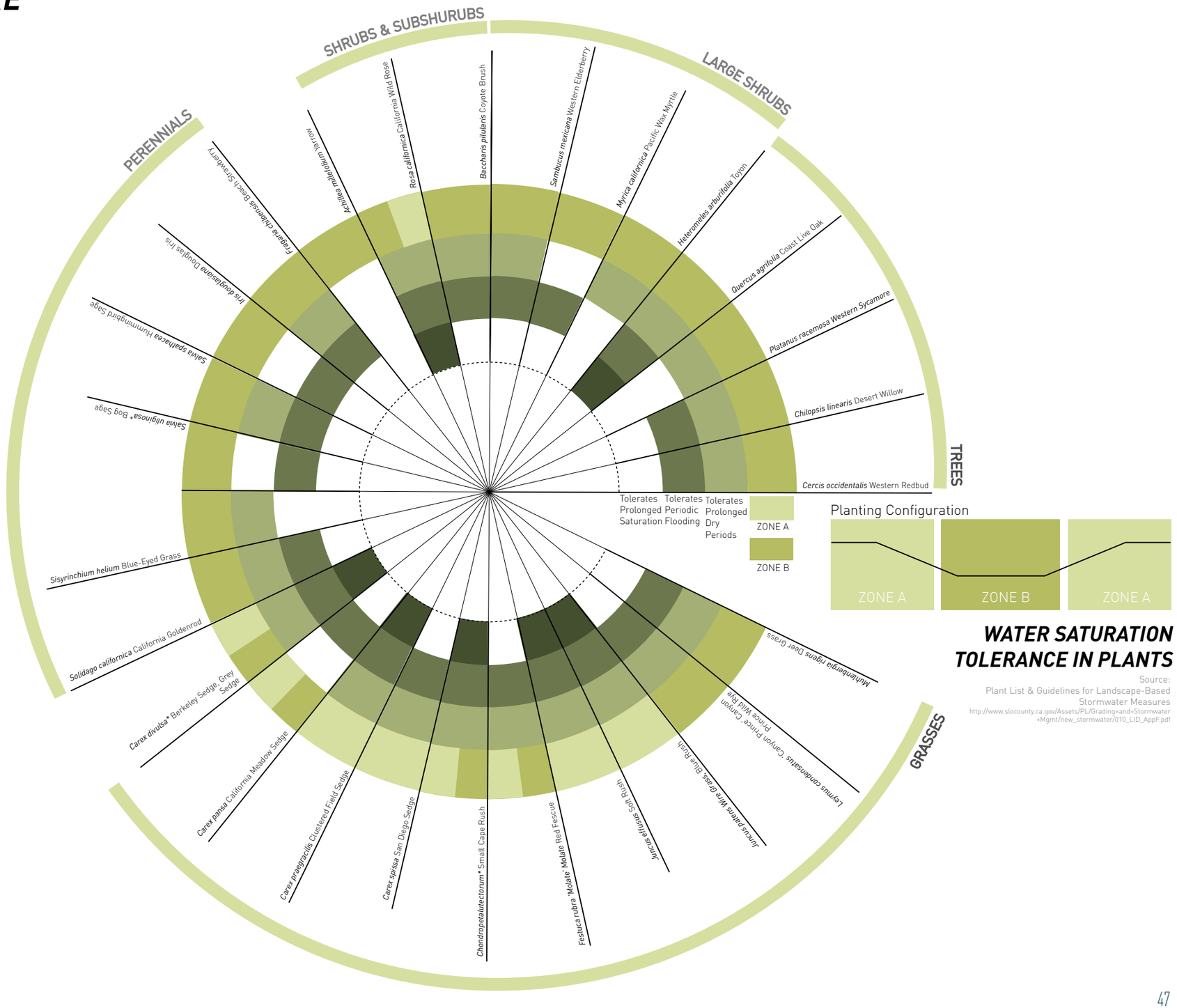
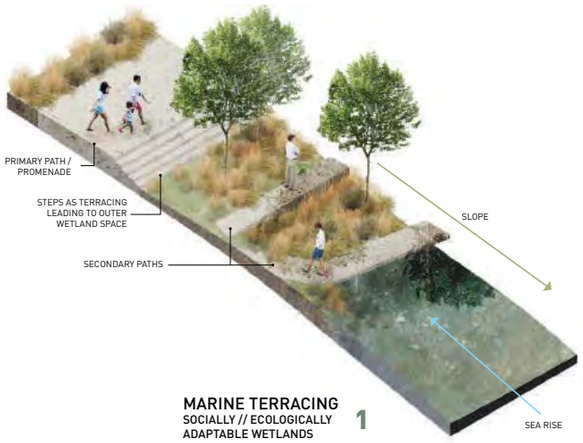


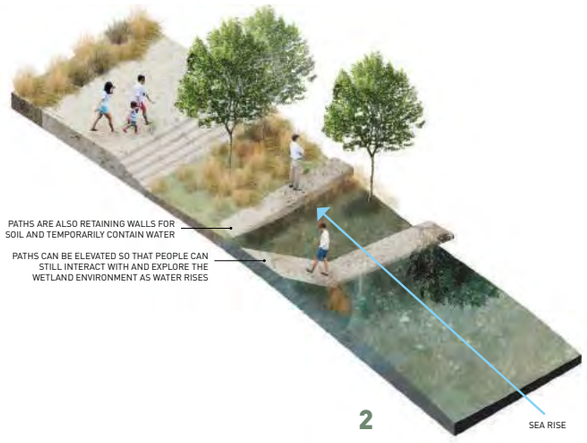
WATER SATURATION TOLERANCE IN PLANTS

Source:
Plant List & Guidelines for Landscape-Based Stormwater Measures
http://www.slocounty.ca.gov/Assets/PL/Grading+and+Stormwater+Mgmt/new_stormwater/010_LID_AppF.pdf



MARINE TERRACING
SOCIALLY // ECOLOGICALLY ADAPTABLE WETLANDS

1



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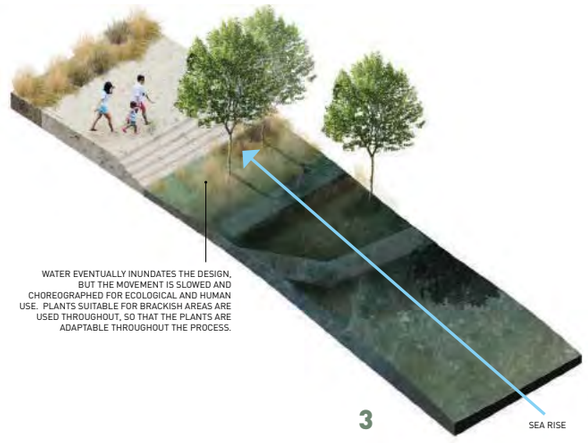
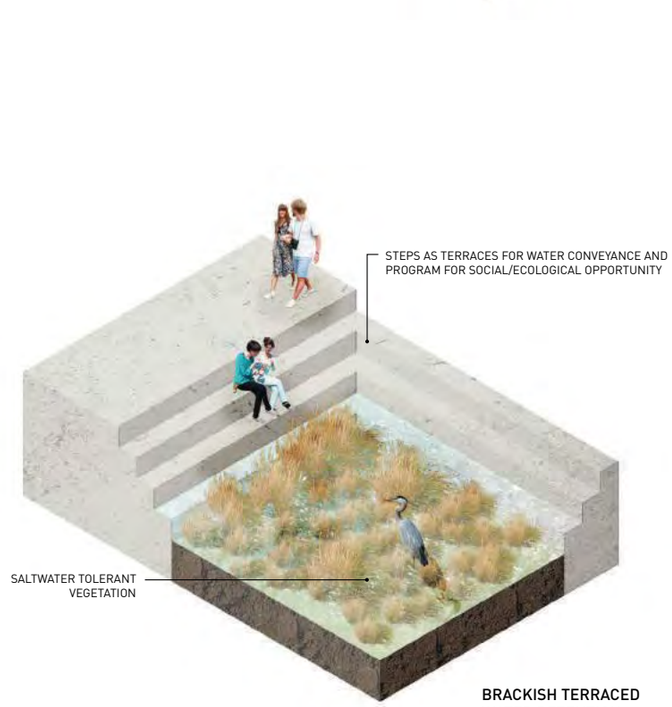


3

HARDSCAPE/SOFTSCAPE CHANNEL HYBRID

BRACKISH TERRACED WATER RETENTION:
SOFTSCAPE



BRACKISH TERRACED WATER RETENTION:
HARDSCAPE/SOFTSCAPE HYBRID

Open Space Lot // Industrial

BRACKISH WETLANDS

In relation to sea level rise, both open lots and existing industrial spaces are prime conditions that have great value because of the potential that exists to choreograph wetland habitat for avian species as the water begins to proliferate these areas. The creation of wetland habitats not only aids avian species; there's also potential to increase Long Beach's biodiversity, clean the polluted water, and enrich the social experience of the city. The potential becomes exponential if applied on a variety of scales in the city.

KEY MAP + APPLICATION

OPEN SPACE LOT

INDUSTRIAL

RESIDENTIAL INTERVENTIONS

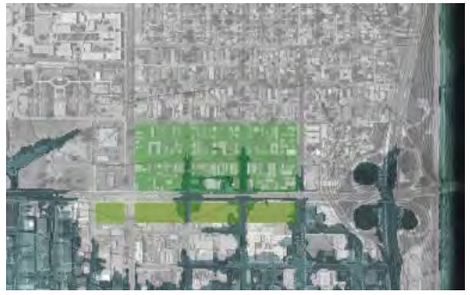
The hardscape and softscape channel hybrid strategy is applied on the residential areas that is exposed to 6 feet sea level rise. Because it's channelized, the residential areas are no longer under water. In case of extreme flood events and high tides, the water will naturally flow into the channel, hiding and revealing different aspects of the design.

With lower water level, only the channel is occupied by water, providing open public space right nearby houses. The neighborhood is still equipped for extreme water-related events such as the 100 year flood, as the floatable residences float when floods occur. With different water levels and events, the residences are able to observe and learn how the rising sea level can affect the environment and their everyday lives.

KEY MAP + APPLICATION

RESIDENTIAL

INDUSTRIAL STREET EDGES



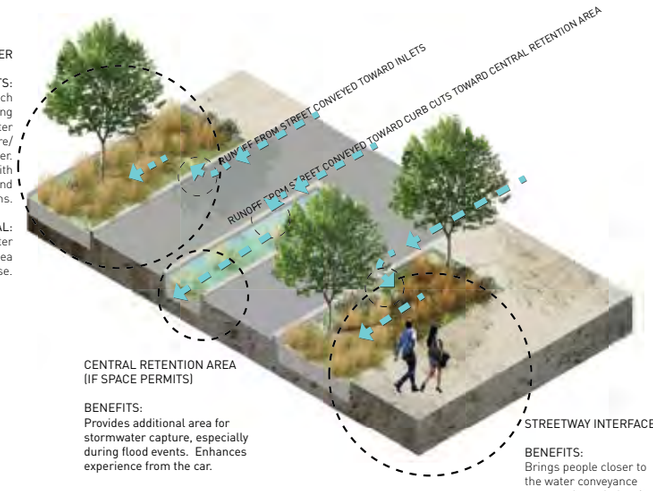
HARDSCAPE/SOFTSCAPE CHANNEL HYBRID

ECOLOGICAL BREAKWATER TERRACES

STORMWATER PLANTER

BENEFITS:
Connects Long Beach hydraulically using stormwater planter connections to capture/ convey freshwater. Potential use with current catch basins and along with gravity mains.

OVERALL GOAL:
Ameliorate saltwater inundation from sea level rise.

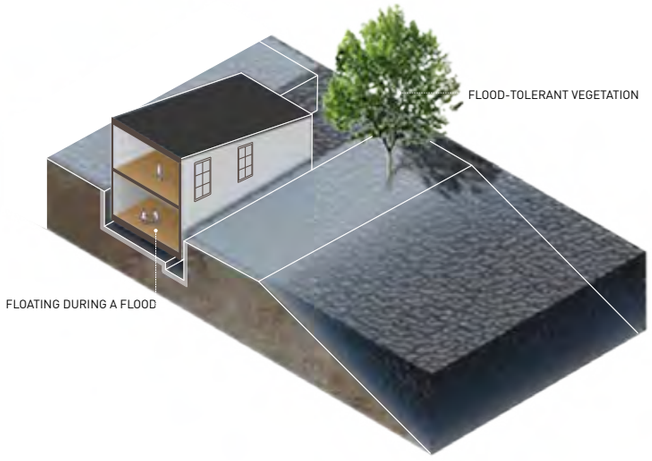


CENTRAL RETENTION AREA (IF SPACE PERMITS)

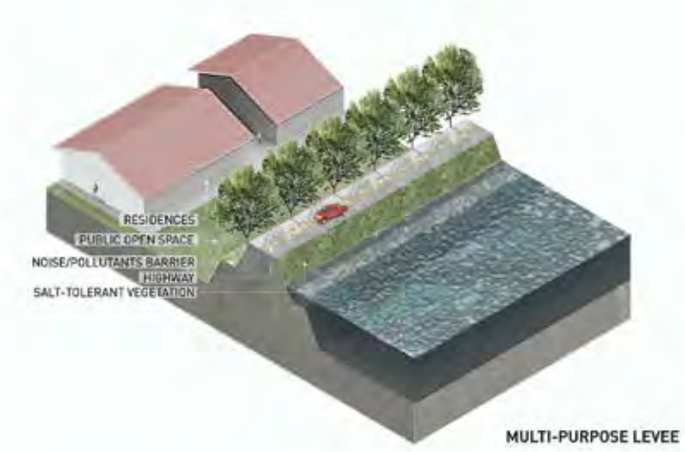
BENEFITS:
Provides additional area for stormwater capture, especially during flood events. Enhances experience from the car.

STREETWAY INTERFACE

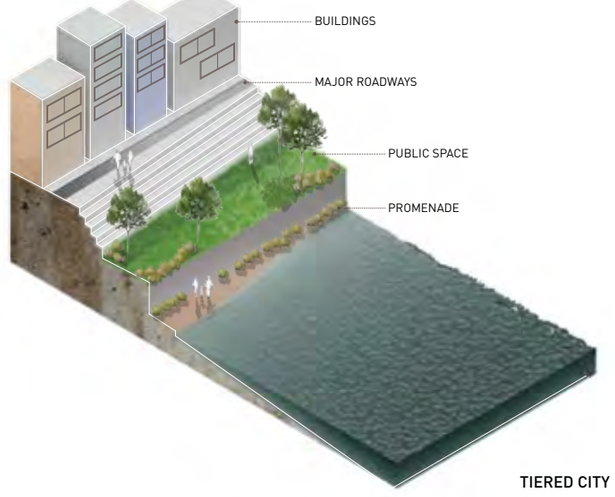
BENEFITS:
Brings people closer to the water conveyance process through the city. Cools down the temperature of the sidewalk area and enhances the pedestrian experience.



FLOATING BUILDING

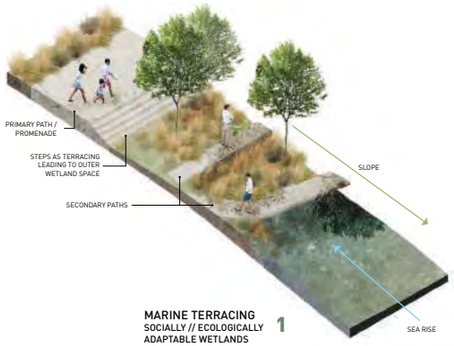


MULTI-PURPOSE LEVEE



TIERED CITY

Residential // Street Edges

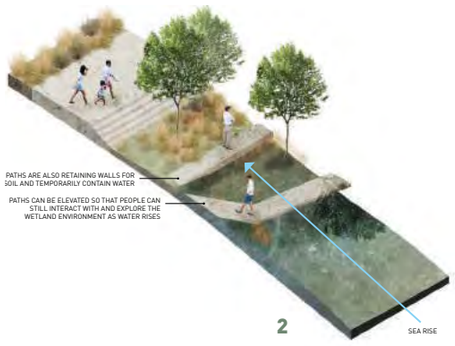


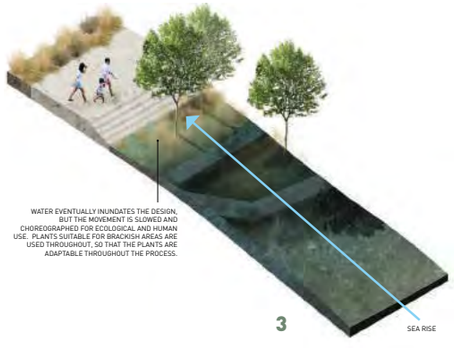
MARINE TERRACING
SOCIALLY // ECOLOGICALLY ADAPTABLE WETLANDS **1**

ECOLOGICAL BREAKWATER TERRACES

TIERED CITY
PROTECTION WITH TERRACING

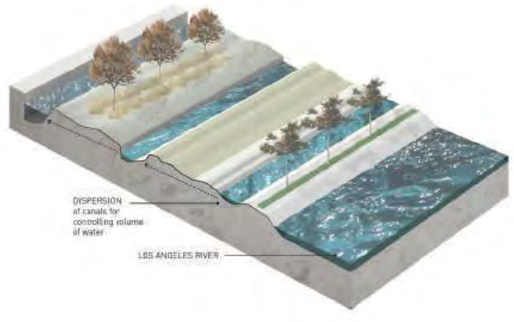
REROUTING WATER
BIOSWALE // FILTRATION





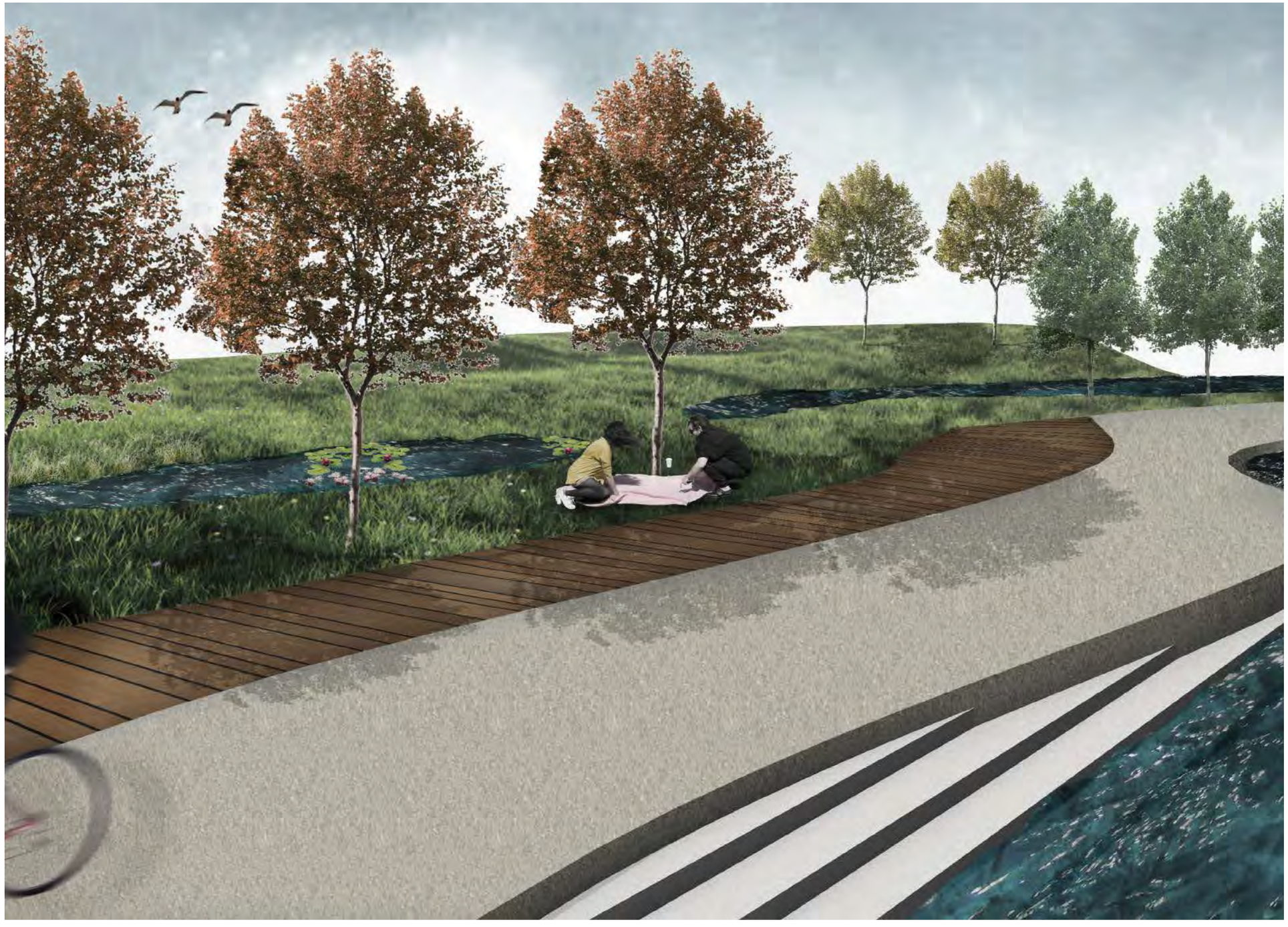
RECONFIGURING RIVER'S EDGE

DIVERSION OF WATER TO SUBVEGETATED ZONES



DISPERSION CANAL BUFFERS

LA River Adjacency // Interstitial Freeway



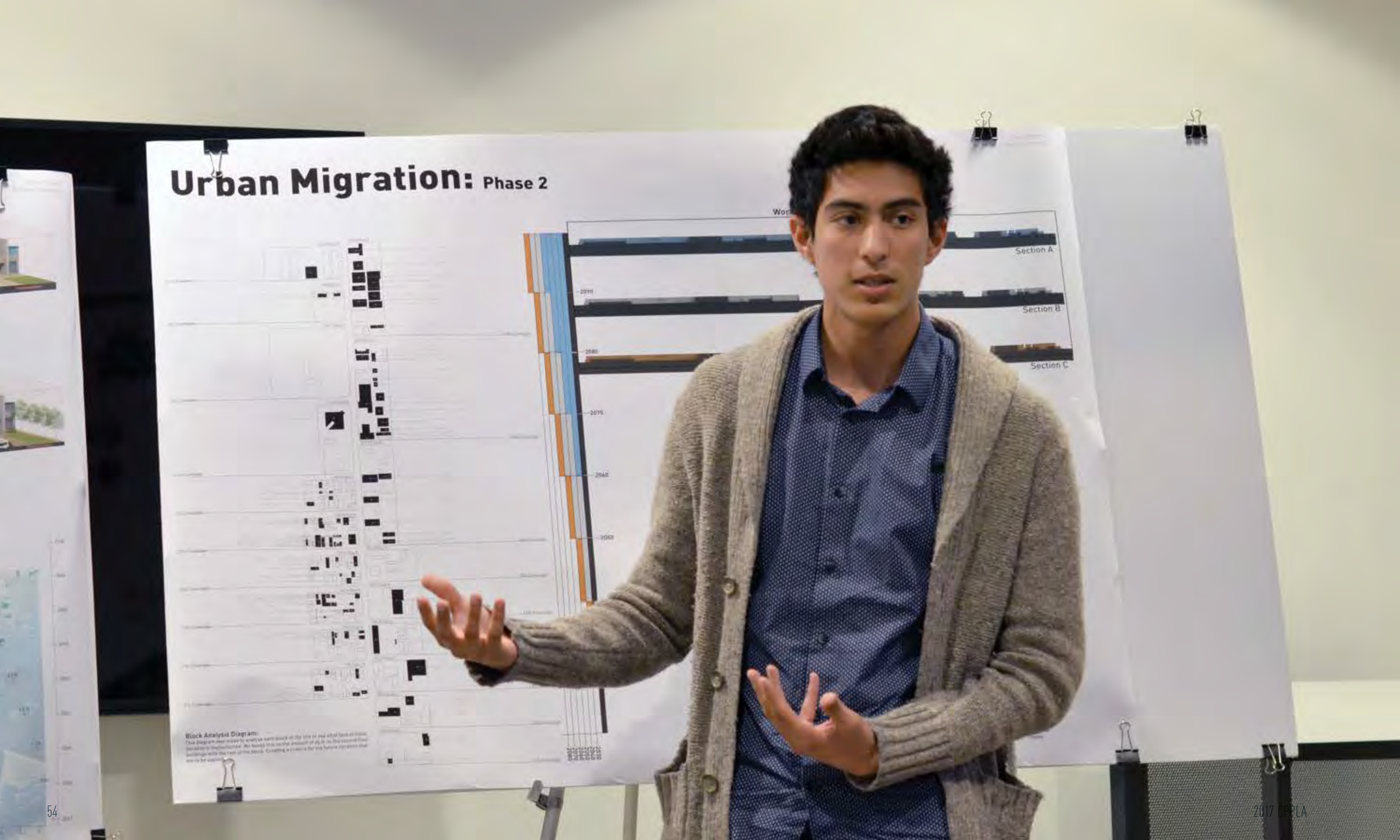
LA RIVER ADJACENCY

The interstitial spaces between the residential and commercial zones and the adjacency of the Los Angeles River contributed to the integration of strategies. These strategies include diversion, rerouting, reconfiguring, and dispersion. These strategies inform edge conditions, providing more space for utilizing the water and slowing it down, rather than the water traveling at a higher pace. These strategies develop new ways of thinking and can be applied to many other sites adjacent to the Los Angeles River. The spaces would be suitable to apply saturation tolerant and salt tolerant vegetation, which will improve the overall performance of water throughout the space. This interstitial green space will provide much more than a functional value to the site, but will provide a recreational space for humans to occupy and to experience.

KEY MAP + APPLICATION

LA RIVER ADJACENCY

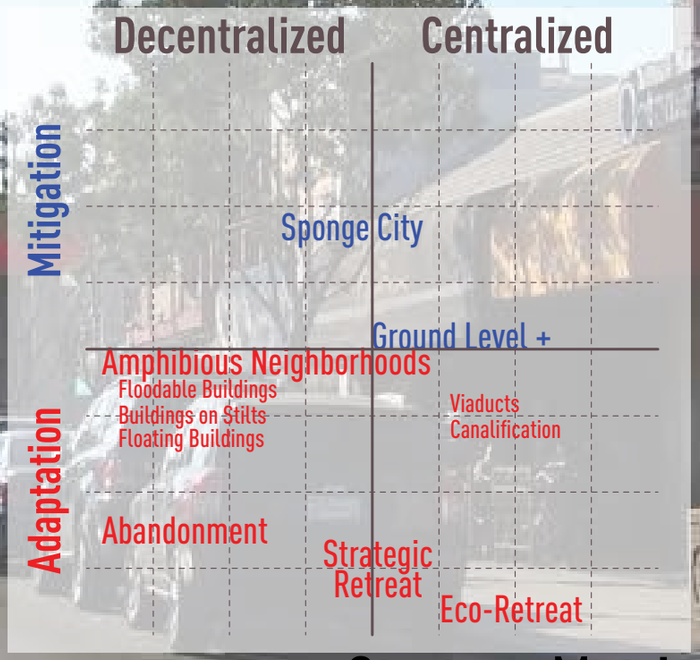
INTERSTITIAL FREEWAY


Urban Migration: Phase 2
Section A
Section B
Section C
Block Analysis Diagram:

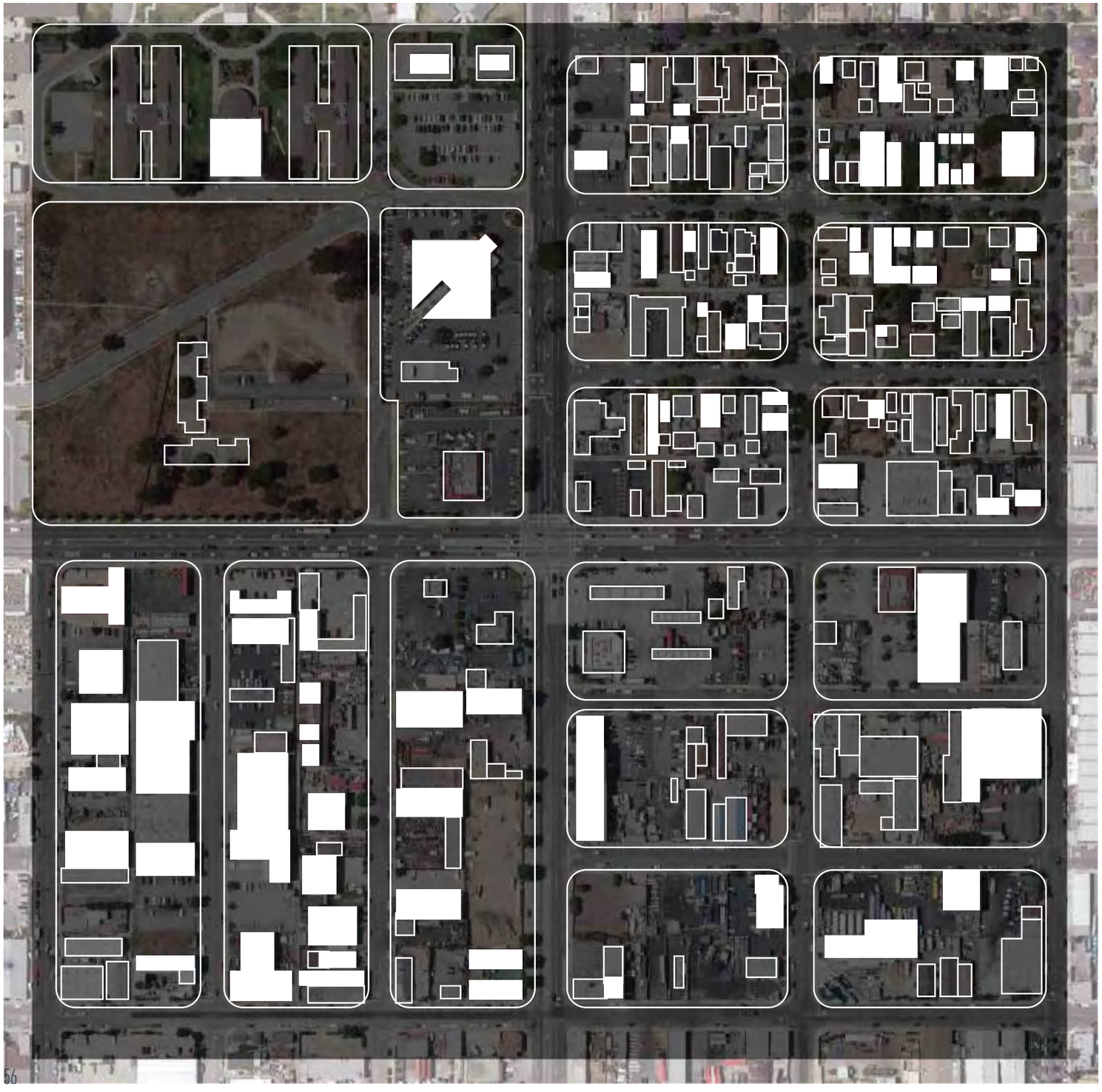
Coastal Migration

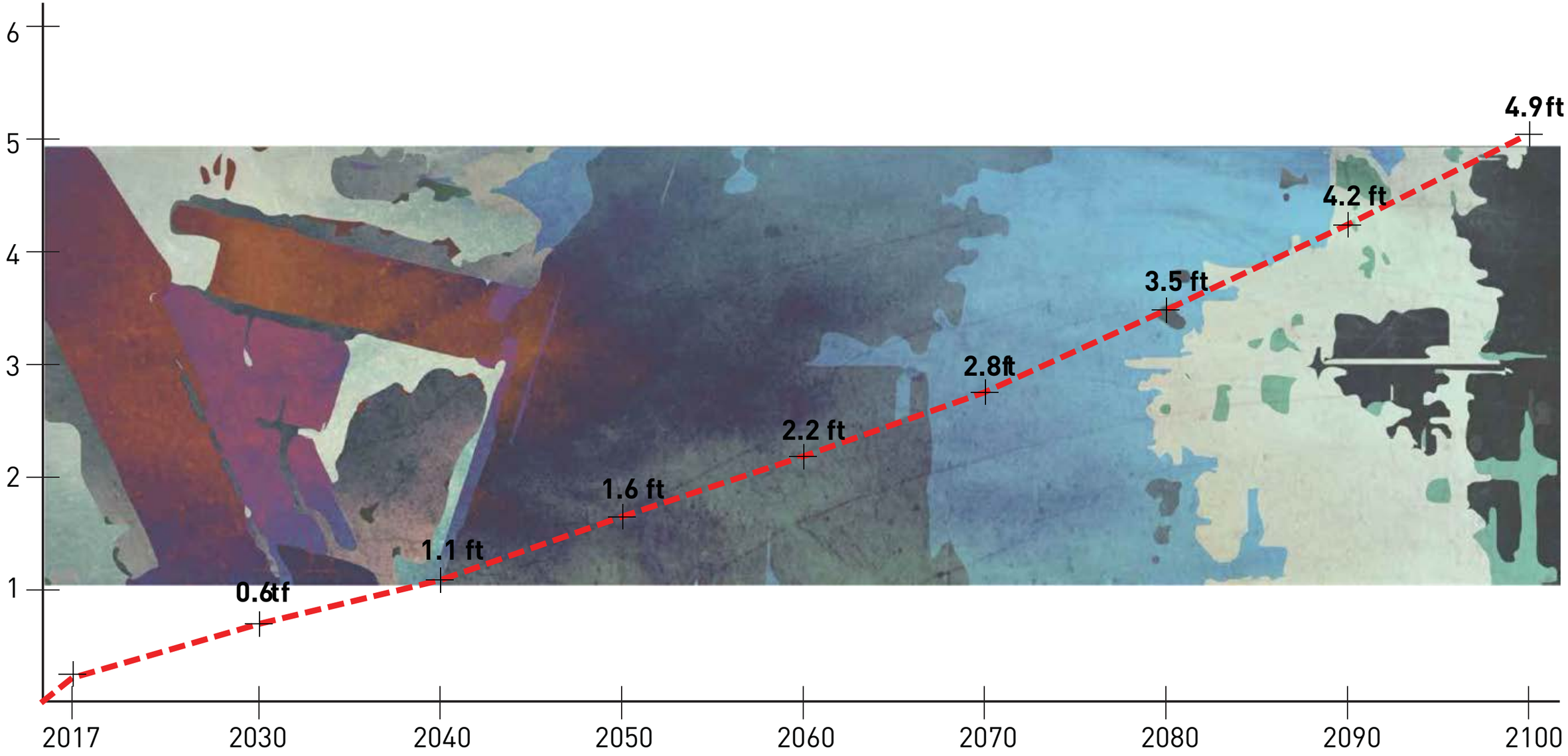
Adrian Arevalo, Estevan Castañeda

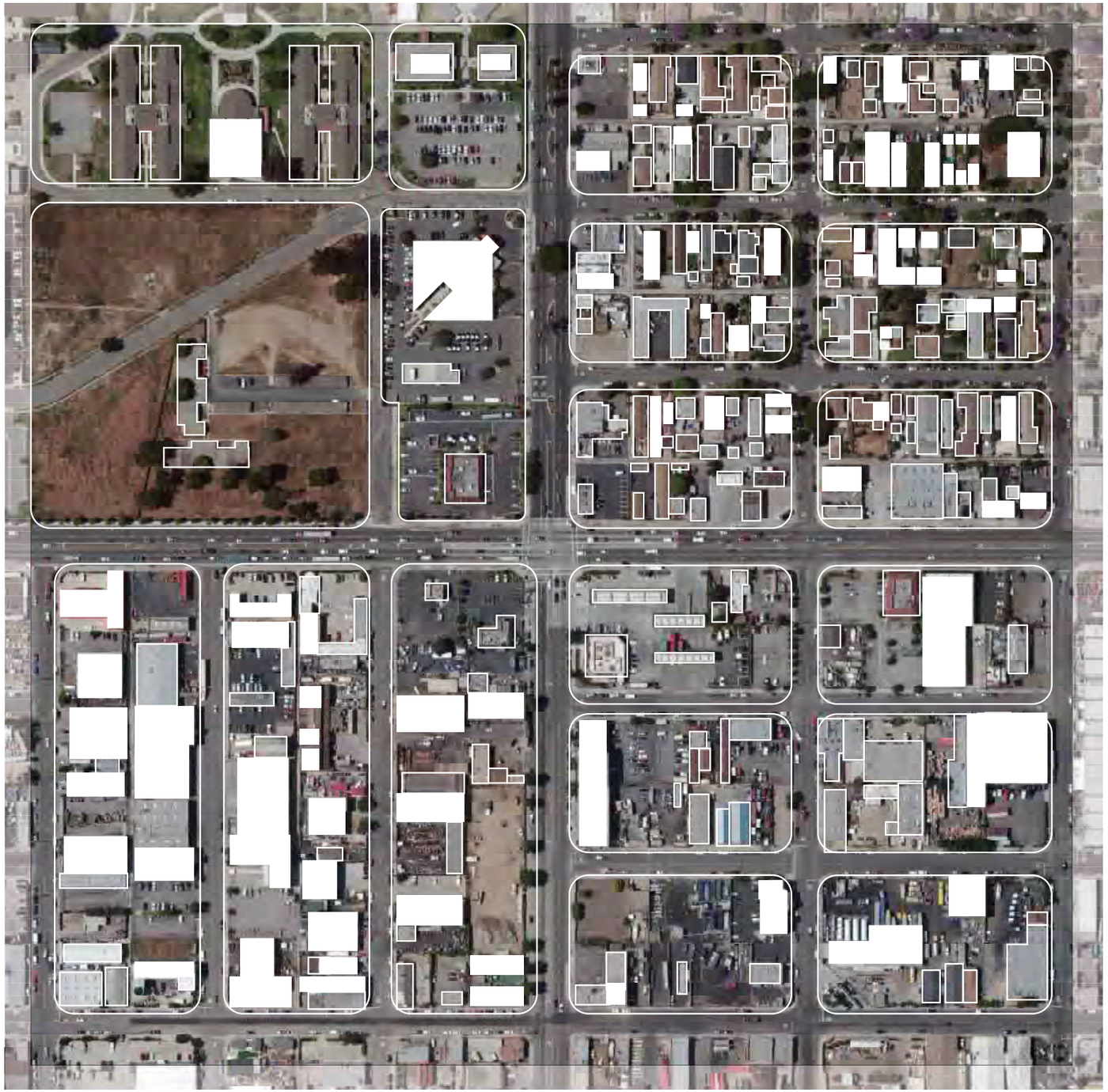
Key Map

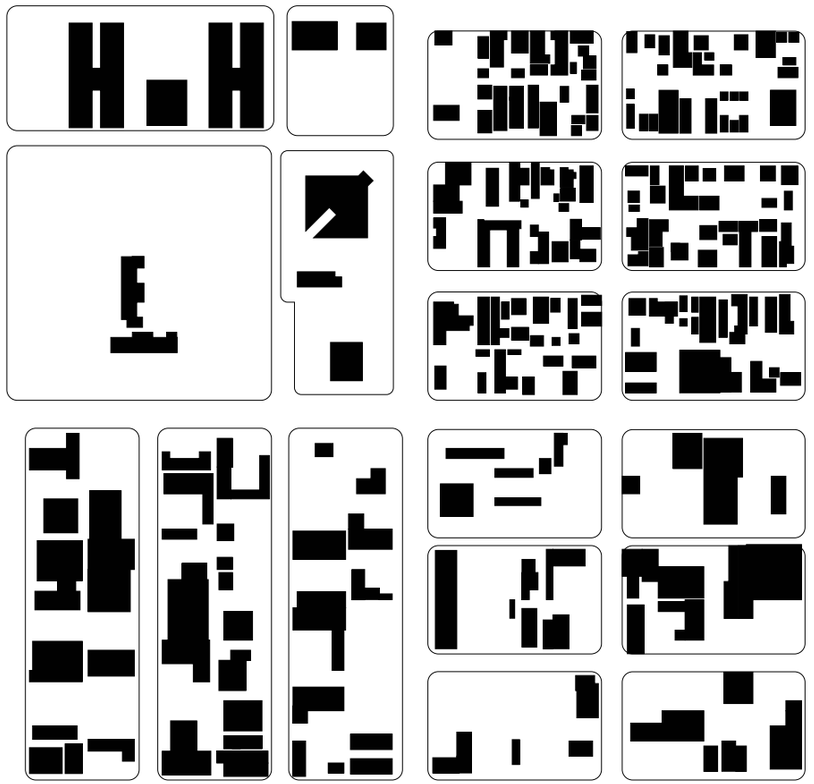


Strategy Matrix




6
5
4
3
2
1
4.9ft
4.2 ft
3.5 ft
2.8ft
2.2 ft
1.6 ft
1.1 ft
0.6tf
2017
2030
2040
2050
2060
2070
2080
2090
2100





The Urban Migration plan is a strategy to slowly move the population away from the incoming sea level rise. The purpose of this strategy is to create plans and iterations for areas that are not near a body of water. Through the next century, a large portion of Long Beach will be submerged in water but a common misconception is these areas are not seen as being threatened simply because of their distance to water.

Legend:

Two Story Buildings

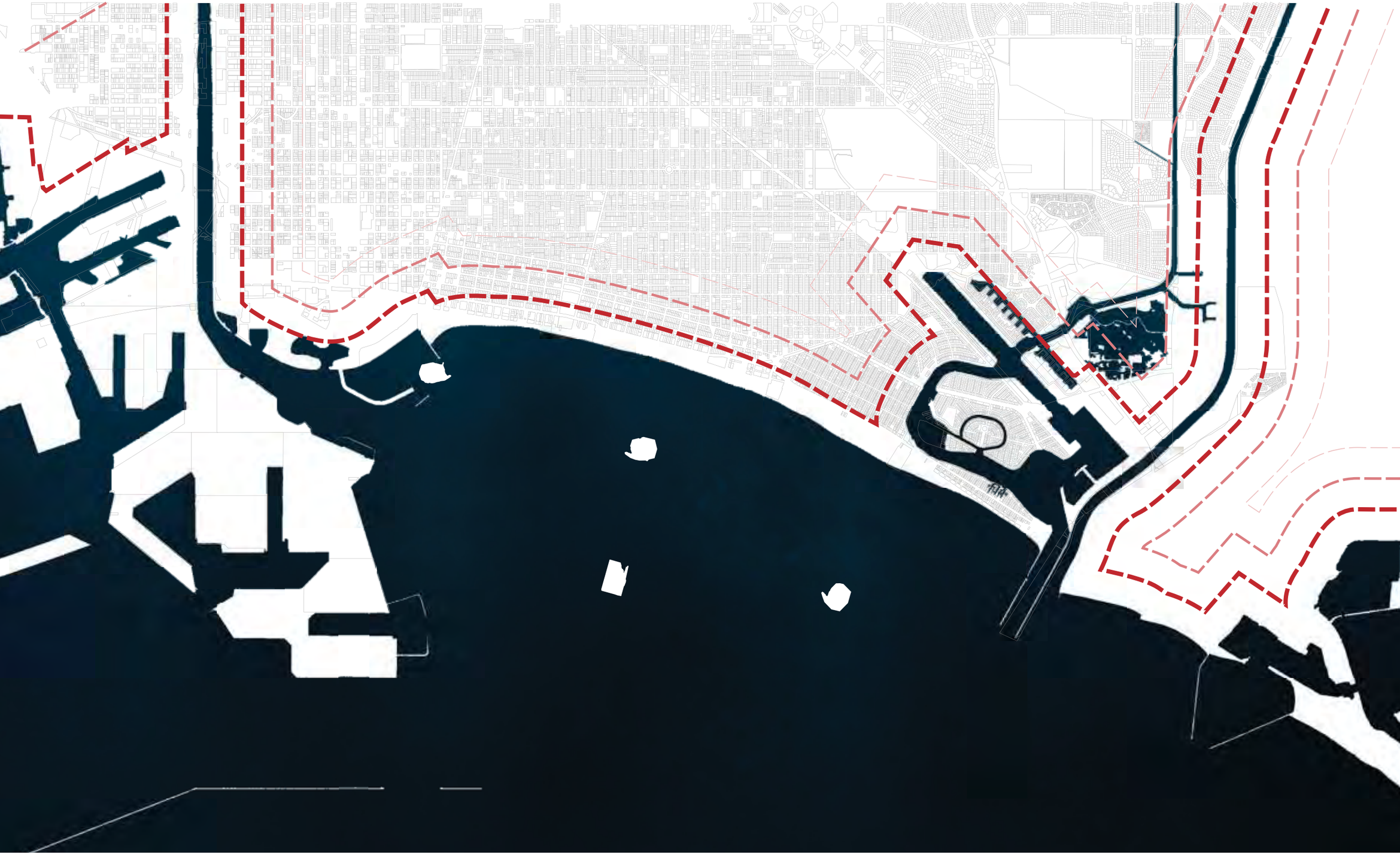
One Story Buildings

Aerial photograph of Long Beach- WPPilot

The Shoreline Tax:

This tax would be the first stage of the Managed Retreat section of our plan. This is a method that slowly pushes communities out of an area in a safe and moral way without a defined edge. The tax can range from a ridiculously high tax to a lower tax, depending on the distance of the property to the shoreline. The reason for this tax is to slowly show residents that they are in danger or at least make them uncomfortable enough that the residents choose when they leave instead of the government kicking them out. This is only a concept of a policy, the technical aspect of this project is more of the issues that come from it. This project is supposed to start a discussion on the issue and problems because the issues are all simple problems that can be solved.

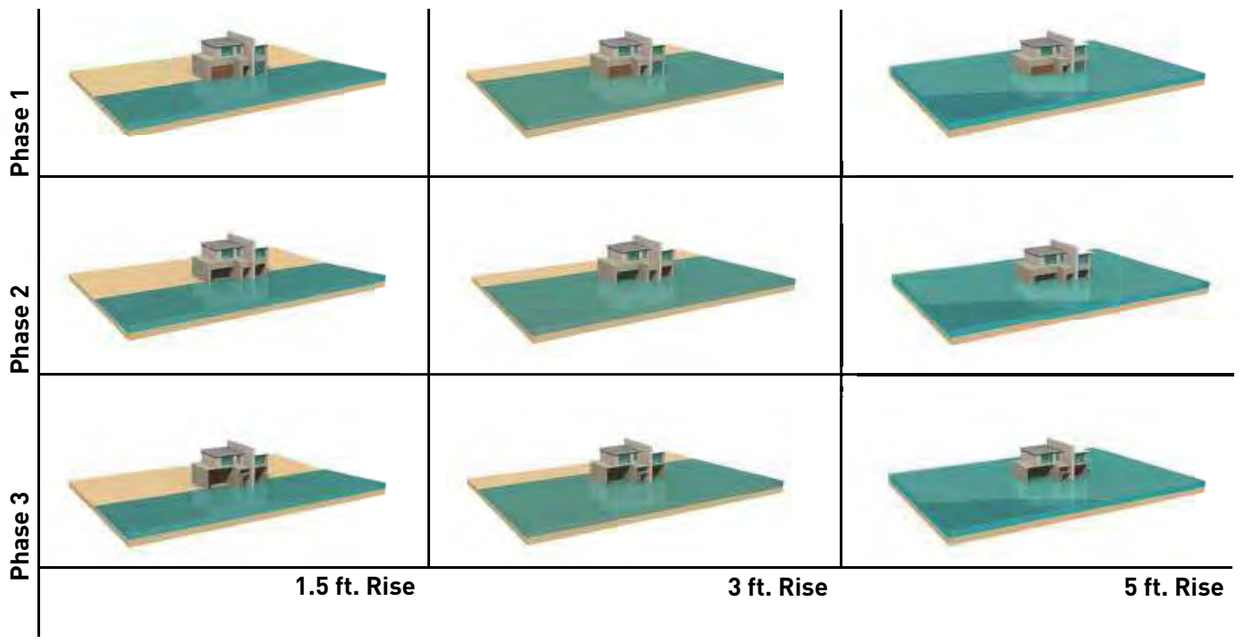
This project is meant to start a discussion on the issues derived from the problematic implementation of the Shoreline Tax.

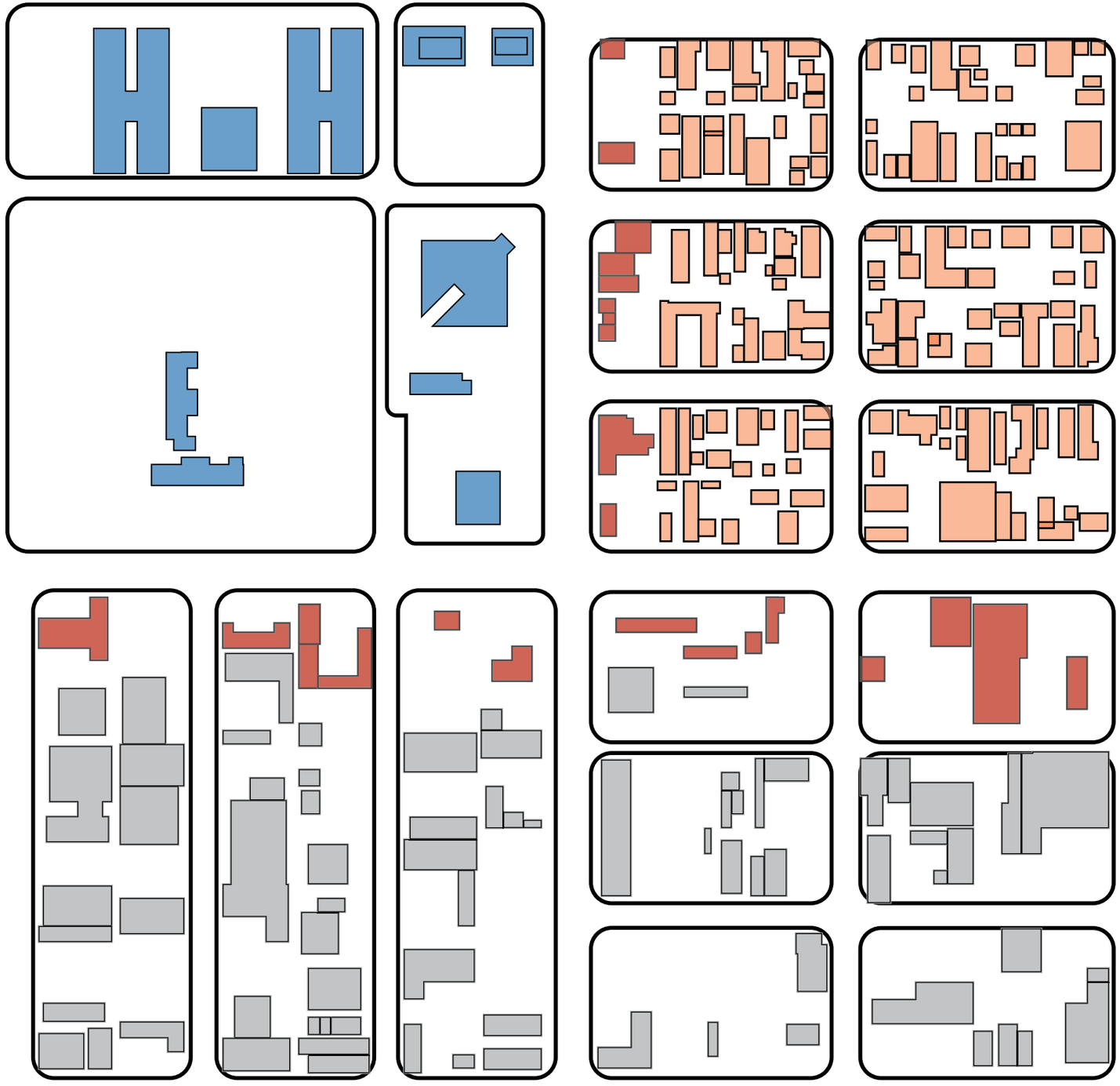


Commercial
Residential
Industrial
Institutional
Streets

Two-Story

One-Story





Zoning Plan:

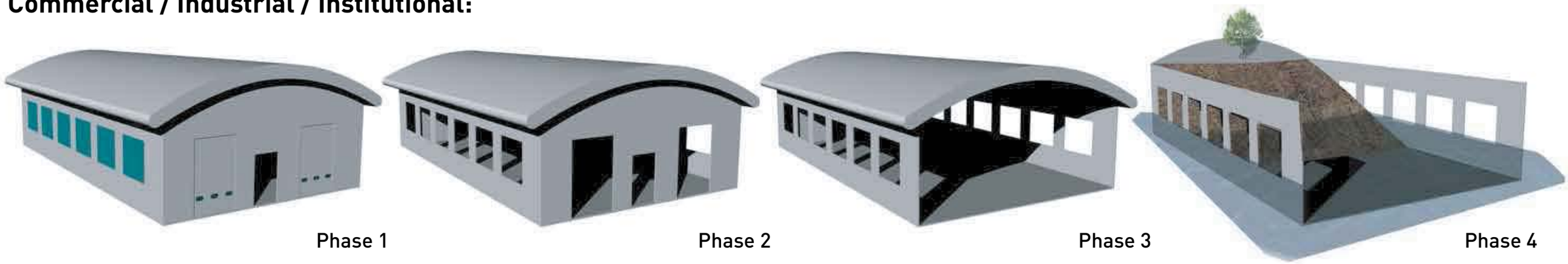
Our first state of analysis was the breakdown of the types of buildings within the site. Since the site is an intersection of different types of buildings, it offers more opportunities. The four categories we found were commercial, residential, industrial, institutional. We then found that within this area, all structures were either one or two story buildings, which was another key directive for our process.

Legend:

- Commercial
- Residential
- Industrial
- Institutional

Building Typologies:

Commercial / Industrial / Institutional:



Phase 1 Phase 2 Phase 3 Phase 4

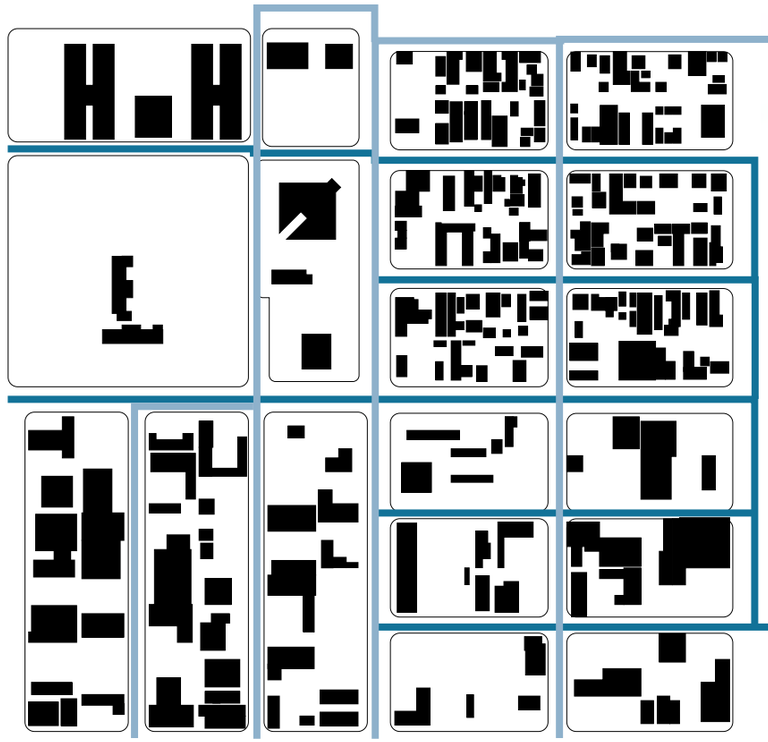
Residential:

Phase 1 Phase 2 Phase 3 Phase 4

Industrial Typologies

These typologies work for one story commercial/residential/ institutional structures. Our process involves removing all ocean facing walls to diminishing the impact on surrounding structure. These new structures not only act as a physical barriers but now act as containment areas for thriving ecosystems to inhabit.

Street Typologies:

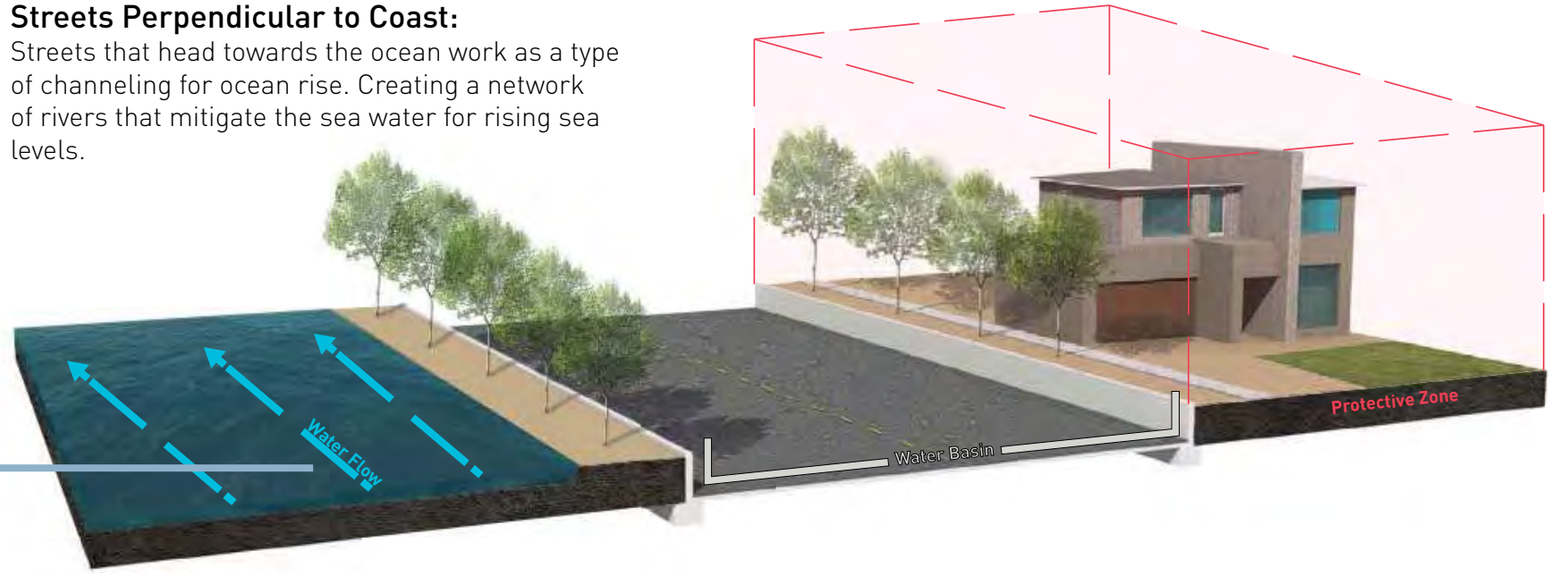


Street Iteration Plan:

These streets iterations are fit to any street based on their orientation to the ocean. Working with every type of street, this iteration not only works as a method to mitigate and redirect ocean rise; but bring awareness to people around Long Beach of the effects of ocean rise.

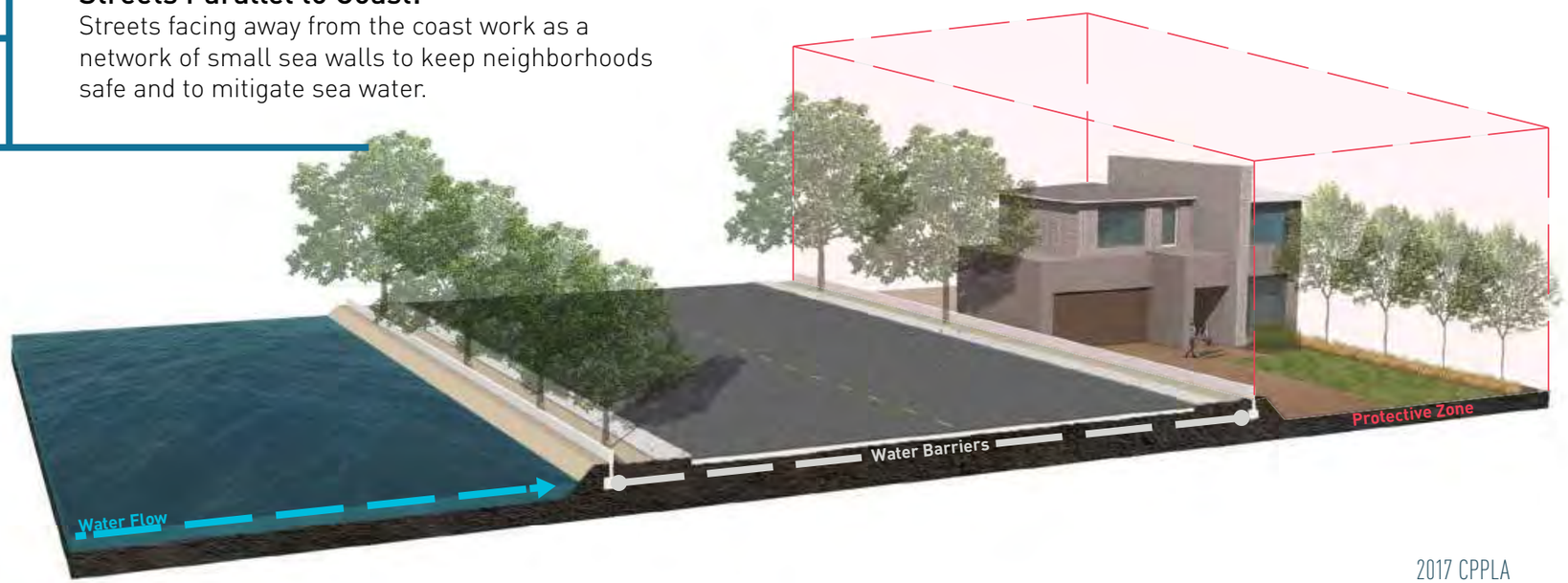
Streets Perpendicular to Coast:

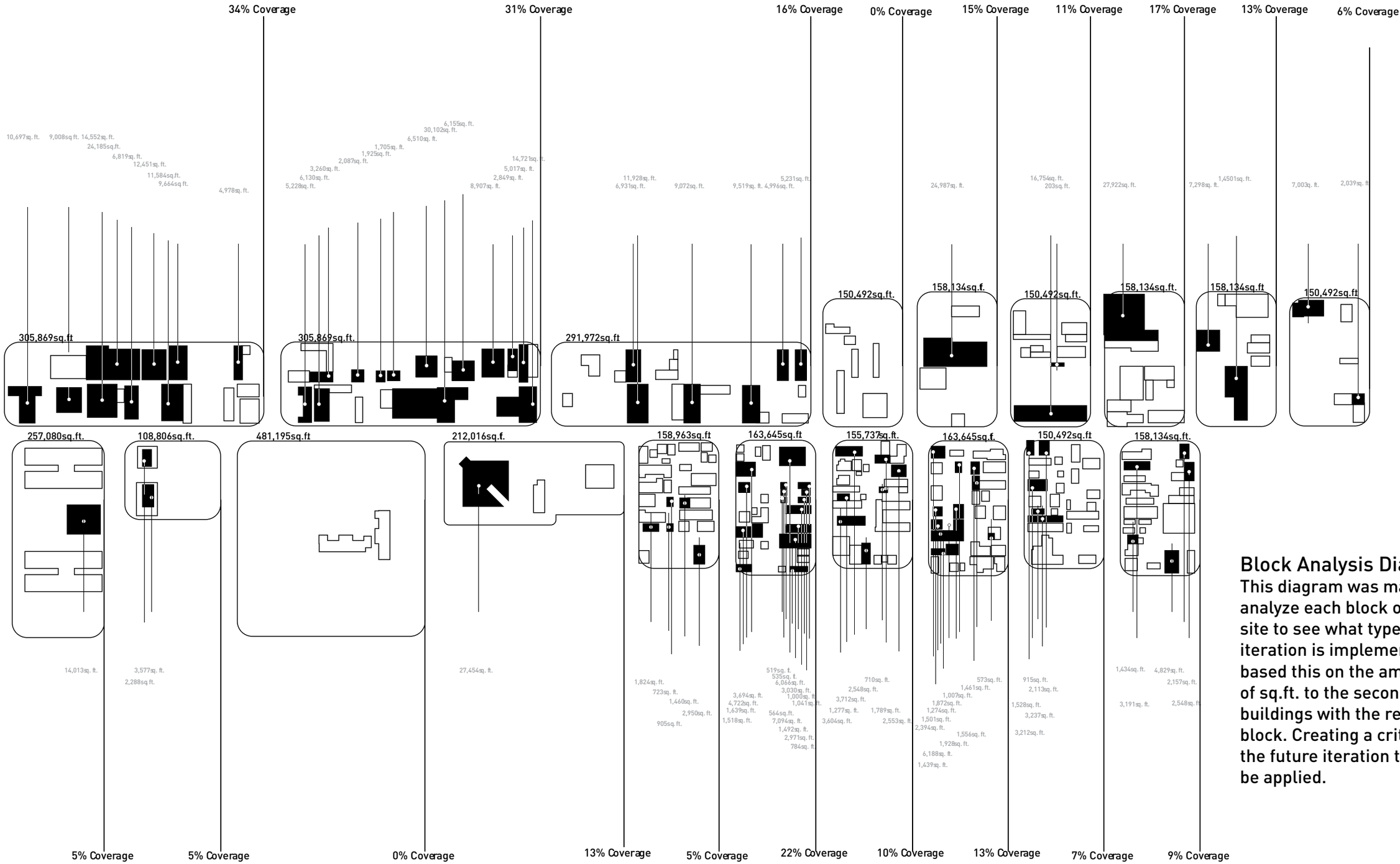
Streets that head towards the ocean work as a type of channeling for ocean rise. Creating a network of rivers that mitigate the sea water for rising sea levels.



Streets Parallel to Coast:

Streets facing away from the coast work as a network of small sea walls to keep neighborhoods safe and to mitigate sea water.

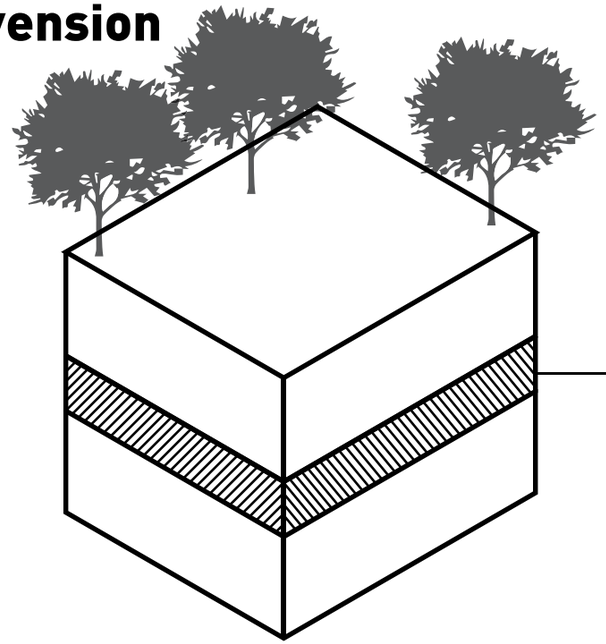


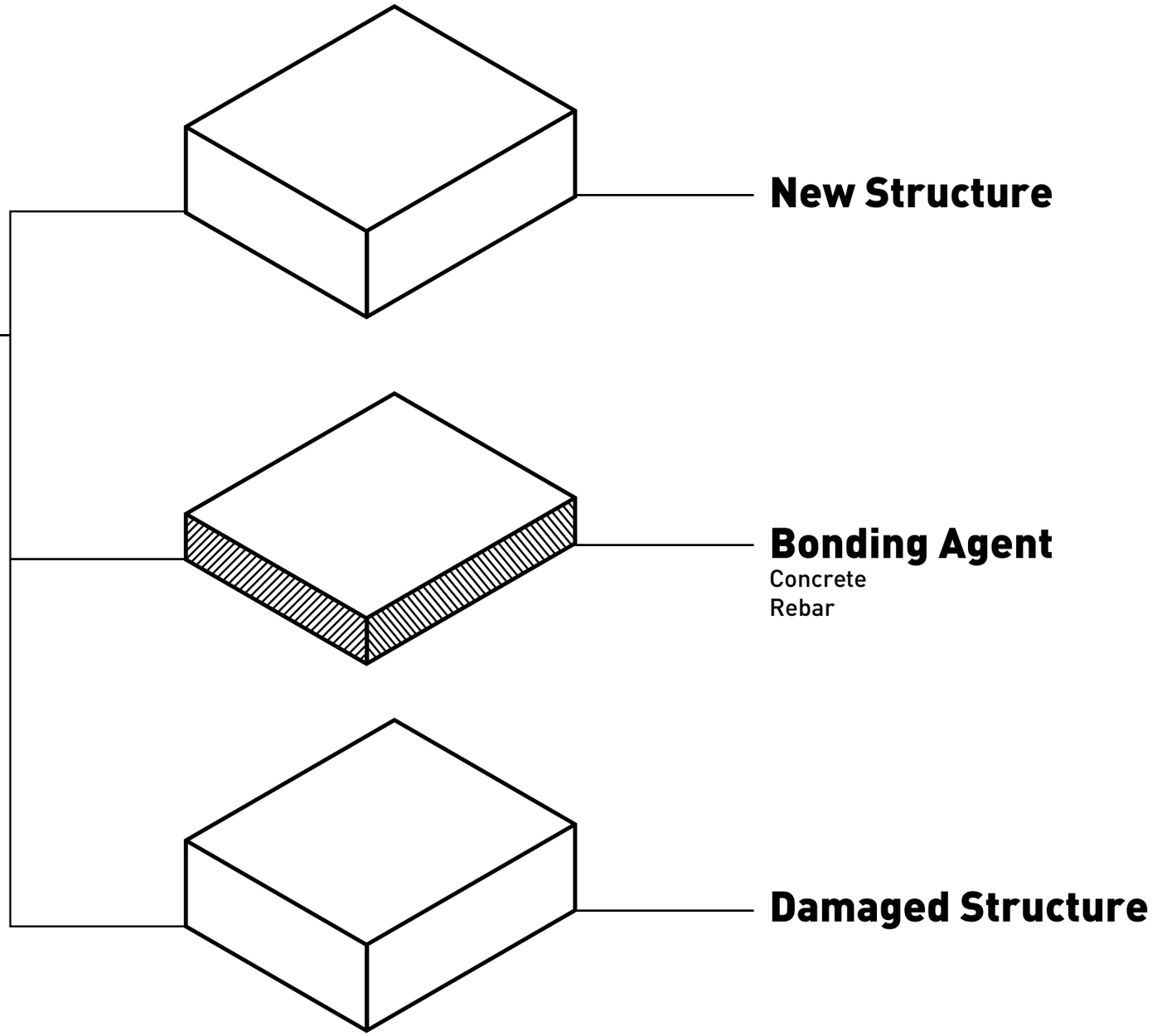


Block Analysis Diagram:

This diagram was made to analyze each block of the site to see what type of block iteration is implemented. We based this on the amount of sq.ft. to the second floor buildings with the rest of the block. Creating a criteria for the future iteration that are to be applied.

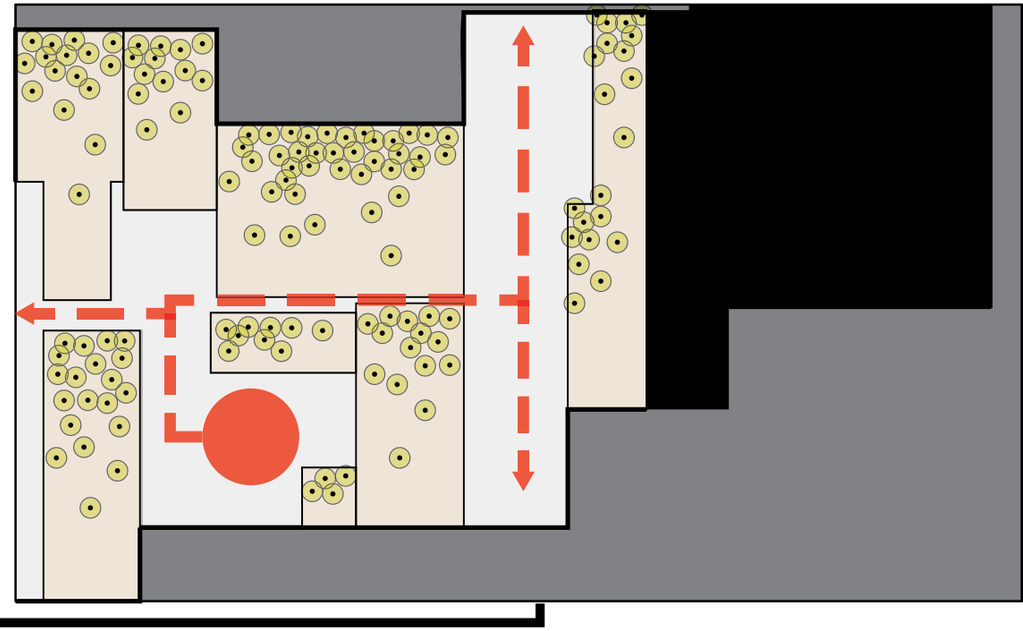
Design Intervension





Typology Diagram:

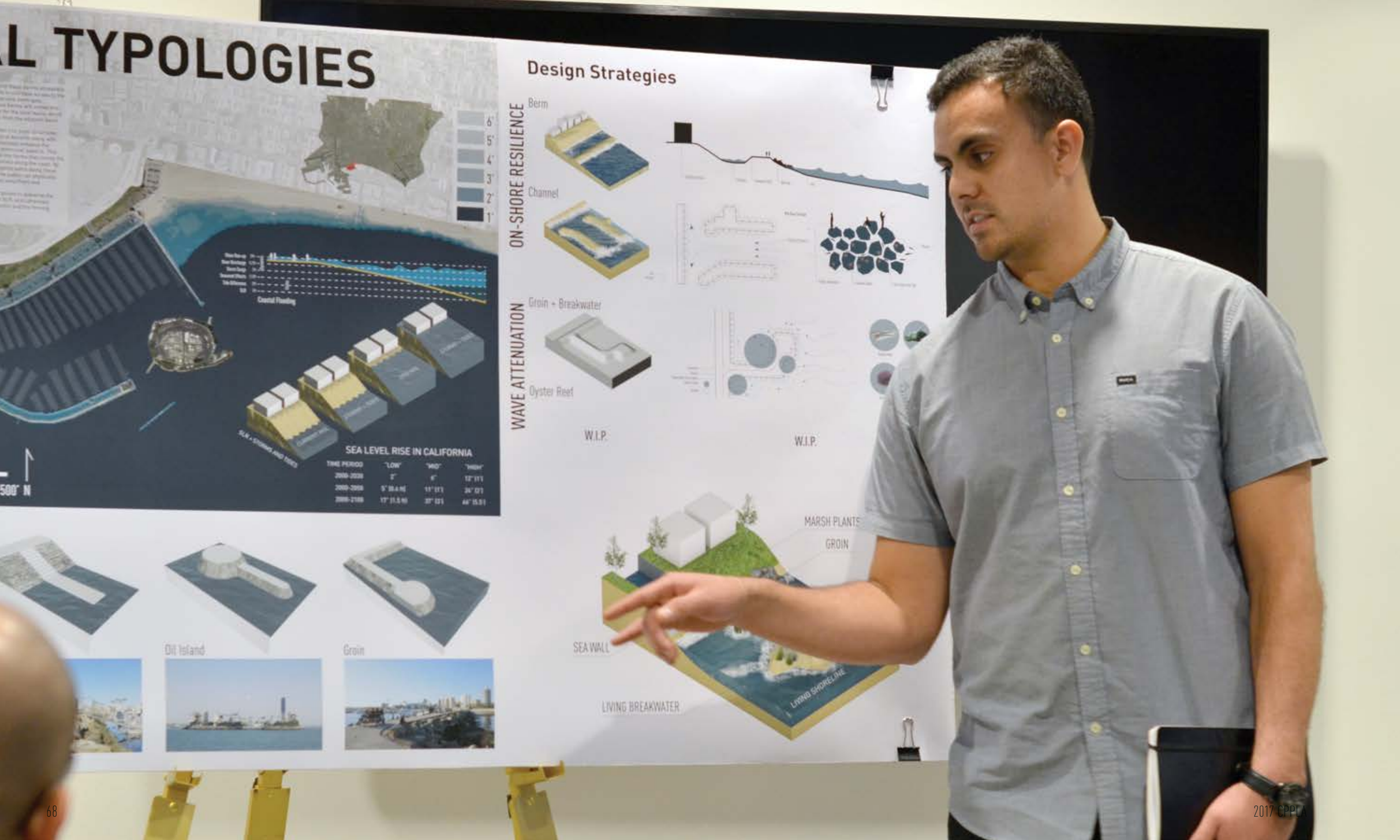
Each piece of infrastructure becomes an opportunity for the future. The idea is to simply take off the ocean facing walls from the structure but if the structure is made with materials that are not as durable, the structure is filled with a bonding agent and re-bar to become pillars for the final stage.



Final Design Strategy

The iterations in the previous pages shape a different type of environment, creating a place where some people would think is useless or dirty. Out goal is not to create profit, but for the protection of cities and the people within them. In the first stages, the site would seem abandoned, but the things that are critical to see are the invisible ecosystems that surround them. The buildings that would be altered in the way where the infrastructure was somewhat compromised so a bonding agent was applied, would eventually become the hubs for new growth vertically and horizontally, creating a new ground level.

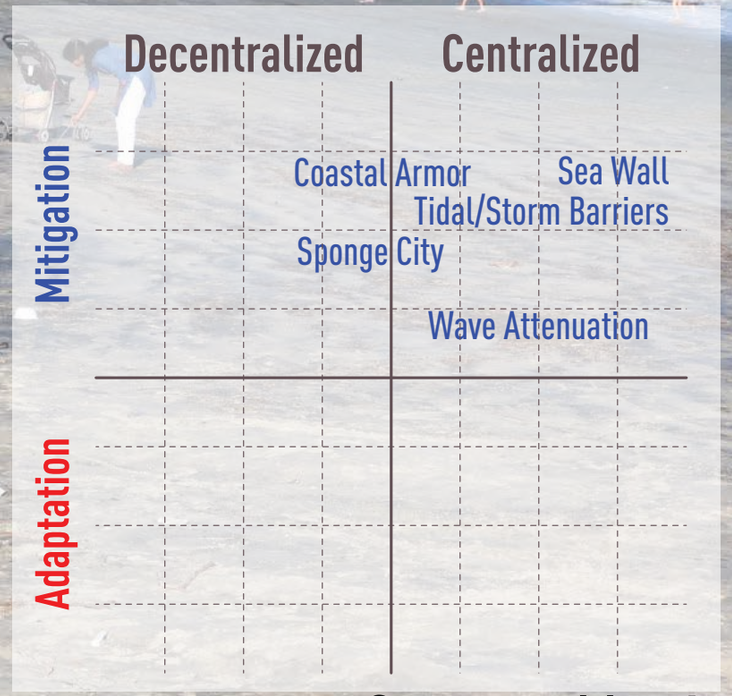
The iteration with the subtraction of the ocean facing wall would become these collection basins of sand and sediment. These pieces, when the second floor becomes the new ground floor, become not only detention basins to take the water out of the area, but can be planted with a particular planting palette that can grow in those extreme situations.


L TYPOLOGIES
6'
5'
4'
3'
2'
1'
Coastal Flooding
SEA LEVEL RISE IN CALIFORNIA
TIME PERIOD
"LOW"
"MID"
"HIGH"
500' N
Design Strategies
ON-SHORE RESILIENCE
Berm
Channel
WAVE ATTENUATION
Groin + Breakwater
Oyster Reef
W.I.P.
W.I.P.
MARSH PLANTS
GROIN
SEA WALL
LIVING SHORELINE
LIVING BREAKWATER
Oil Island
Groin

Coastal Typologies

Antonio De Jesus, Andres Raygada

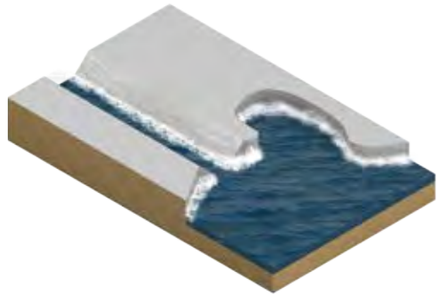
Key Map

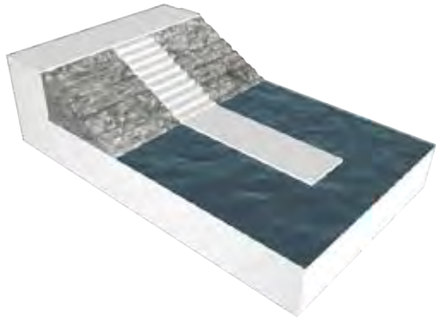


Strategy Matrix

Sea level rise (SLR) will cause many zones of Long Beach to be inundated and demolished. The west coast of Long Beach, a prominent locale for the locals and visitors, is unfortunately vulnerable to SLR. Inundation to this site will decimate public access and cause coastal erosion.

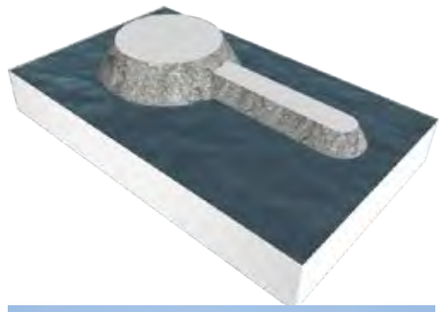
Existing Typologies

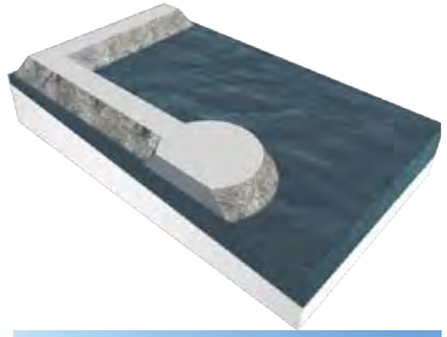




LA River

Rip Rap Seawall





Oil Island

Groin

Design Approach

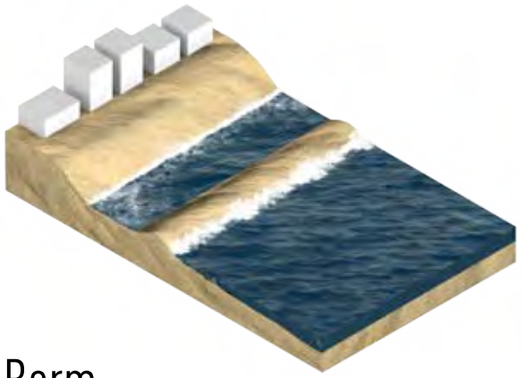
There are various strategies that can be applied to this site in ways that can cohesively enhance ecosystems, and the health of the community. Proposed typologies can be applied on-shore for resilience and adaptation, and offshore for wave attenuation. Many of these strategies acquire riprap material, which has the tendency to dissipate wave energy, filter effluent, and generate habitat for fauna. It also serves as a playful platform for people to utilize for fishing, and simply perching to view the panorama of the oceanic horizon.

The berm concept is defined by a raised platform used to shield the coast from erosion. Over time, SLR along with other wave energies will brim over the structure to fill the opposite side. These can be constructed in layers; one berm constructed behind the other. By making these berms accessible, they will allow pedestrians to still have access to the space once the most vulnerable berm gets inundated. Over time, these berms will evolve into predominant habitat sites for the local fauna, which the public can experience from the adjacent berm structure.

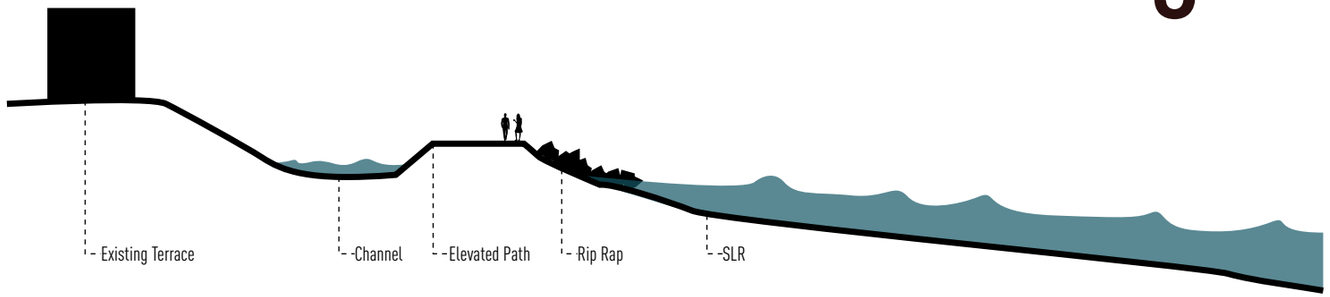
Riprap can be morphed into groin structures that provide all the ecological benefits along with public engagement, to cohesively enhance the thriving ecosystems and communal aspects. This material may be morphed into forms that convey the water into a series of channels along the coast. By providing a series of elongated paths along these curated bodies of water, the public can physically engage with the generated waterfront and ecosystems.

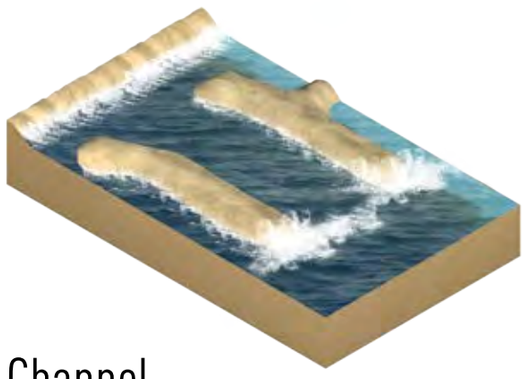
These strategies are poised to preserve the coast of Long Beach from SLR, and cohesively improve the lives of the public and the thriving ecology.

Design Strategies

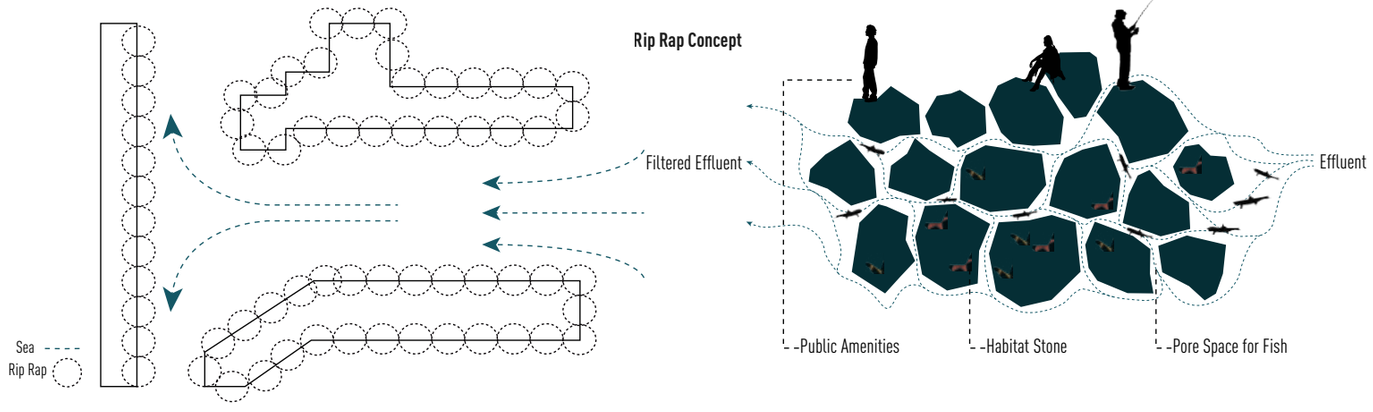


Berm

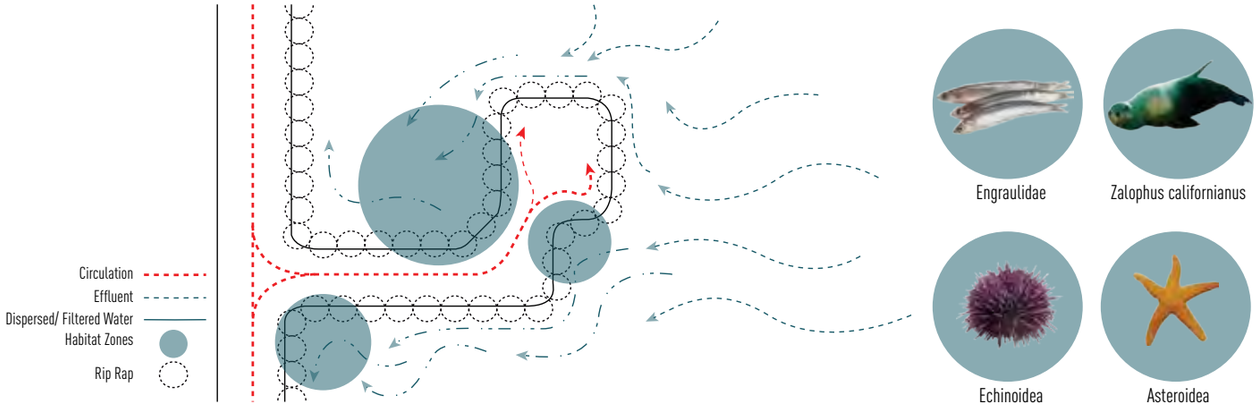


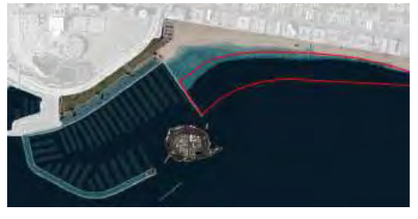


Channel

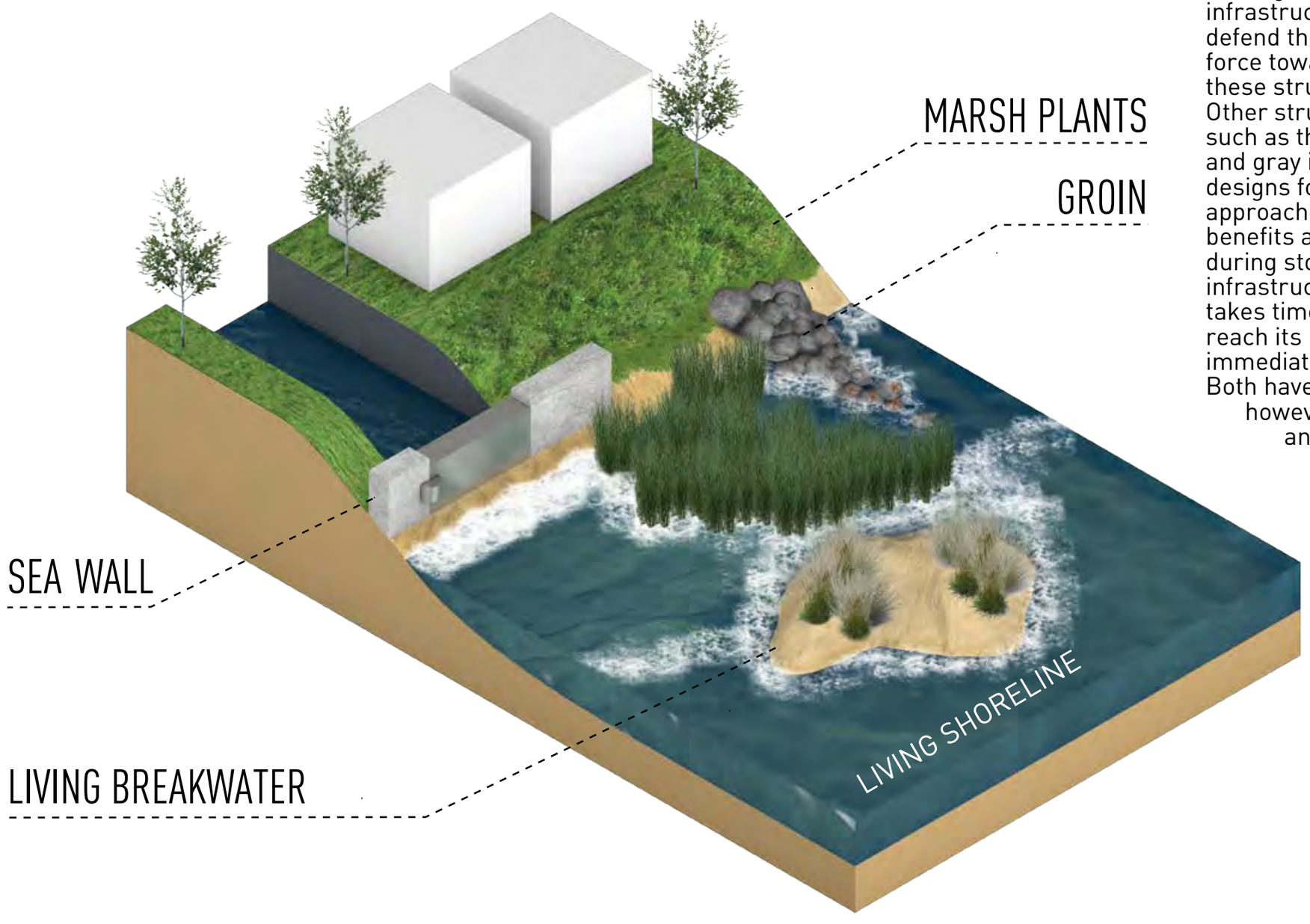


Groin + Breakwater





Green + Gray Infrastructure



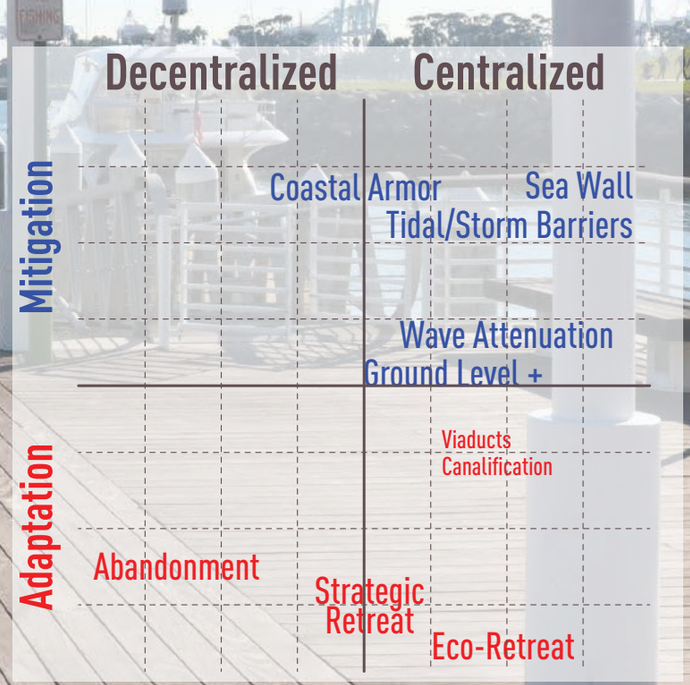
A living shoreline consists of green and gray infrastructure. It consists of structures that defend the coast from the ocean's destructive force towards coastal communities. Some of these structures are static such as sea walls. Other structures serve a more dynamic system, such as the living breakwater. Combined green and gray infrastructure, dynamic and static designs form a living shoreline. Together, these approaches promise for the most ecological benefits and multiple layers of wave protection during storm and high tide events. Green infrastructure is dynamic and adaptable, but takes time to become fully established or reach its mature state. Gray infrastructure is immediately put to effect once its established. Both have their strengths and weaknesses, however hybrid defenses will complement and balance each other out.


TACTICS // DESIGN
Floating House Foundation
Floating House Flooded
Tidal Pool
starfish genus
anemone
hermit crab
crab
oyster
mussel genus
sea urchin
Enhanced Seawall
Above High Tide
bayberry
wax myrtle
grapevine tree
switch grass
Tidal Wetlands
saltmarsh bulrush
salt meadow hay
Intertidal Zone
marsh grass
threesquare
mussel genus
Enhanced Seawall
20
8.5
5
=
OR

Conditional Adaptation

Ernesto Esquer, Tong Xue

Key Map



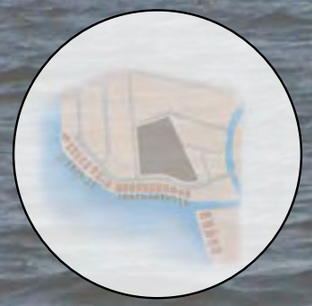
Strategy Matrix

Narrative

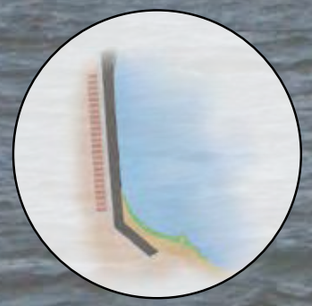
Climate change continues to affect sea level rise as a increasing threat to coastal cities such as Long Beach. With an estimated increase of six feet over the next 100 years, many areas within the city are under threat of inundation. One of the areas that is in immediate threat within Long Beach is the west shore, Los Alamitos area including Naples Island.

Our project seeks to identify the conditions that present themselves at this site and how they impact future interventions. These conditions vary with the physical topography, the socio-political situation of a very affluent area, and the influences and opportunities they present. With these conditions in mind, we discover there is no single strategy that accounts for the many present conditions. As such our, design seeks to implement an array of strategies accordingly, to adapt to the existing conditions while relying on what is available to influence our design interventions. Our end goal is to project against the impact of sea level rise while adjusting to the specific needs of the existing conditions, to drive a multifunctional approach to sea level adaptation.

Project Zones



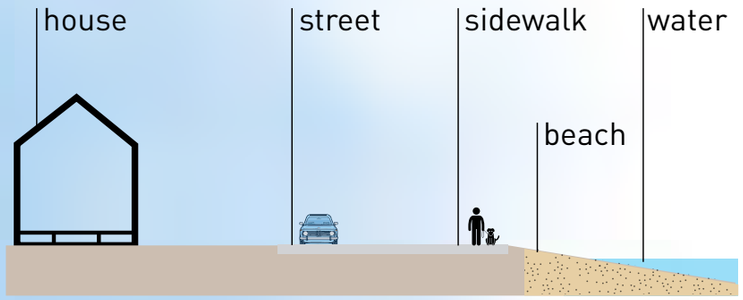
Floating Neighborhood

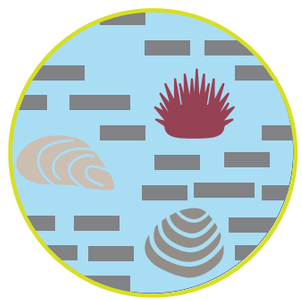


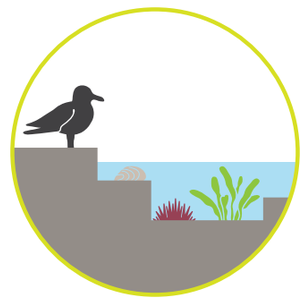
Bayfront

Dunes

Public Bayfront
Armored Terrace // Restored Wetland







Acting as soft barriers, living shorelines mitigate wave action with reefs, beaches, and marshlands, all of which can reduce coastal erosion, while providing ecosystem services such as water filtration and habitat.

The restoration of historical wetlands of the area promotes and broadens the local ecology and creates an area that can be used to educate the community of historical wetlands conditions of Long Beach along with the local marine life.

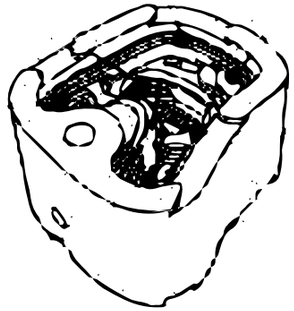
Wetlands offer a series of conditions that take into account low, medium, and high tides allowing for a diverse ecosystem where several types of flora and fauna can flourish depending on their needs.

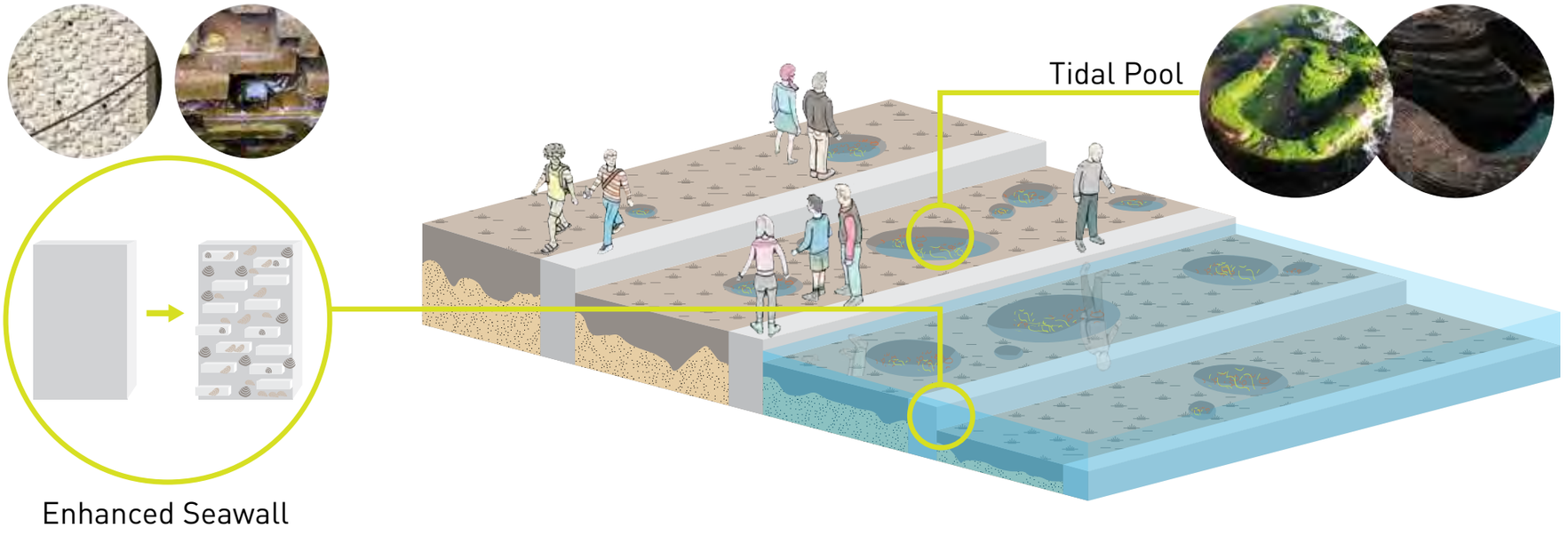
Our strategy also creates multi-functional seawalls using plentiful recycled concrete to encourage the growth of marine life and broadens the marine ecosystem. These surfaces provide shelves, notches, overhangs, and shade that replicates the natural formations seen along rocky coastlines.

Terracing walls that account for high and low tides allow for the creation of artificial tidal pools that creates an interactive zone between the community and marine life. This developing marine ecology provides an educational location for local school and facilities.

Terraced Tidal Pools

Designed to create ecosystems that simulate the natural water ponds typical in rocky coastlines, the tidal pools can compensate for the loss of natural habitats and can be integrated into any other man made structure such as rip rap





startfish genus

anemone

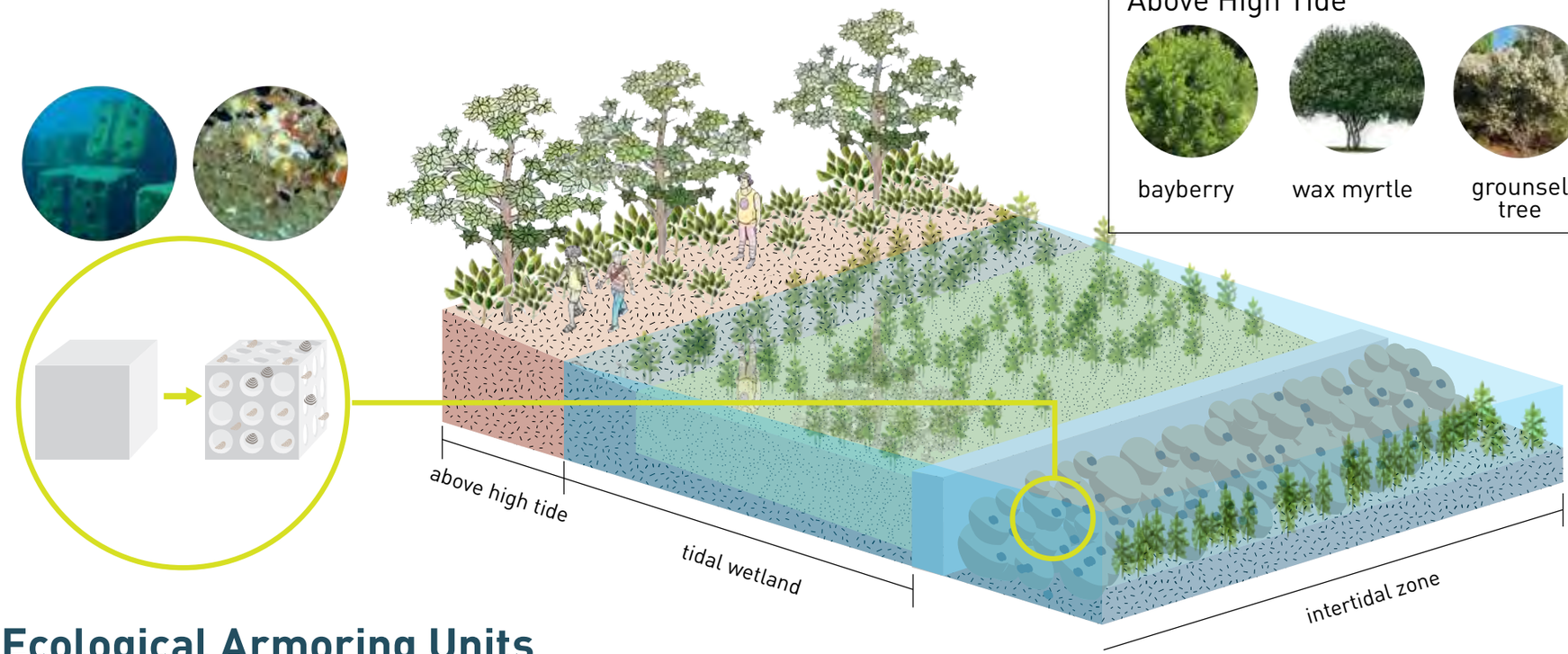
hermit crab

crab

oyster

mussel genus

sea urchin



Above High Tide

bayberry

wax myrtle

grounsel tree


switch grass

Tidal Wetlands


saltmarsh bulrush


salt meadow hay

Intertidal Zone


marsh grass


threesquare

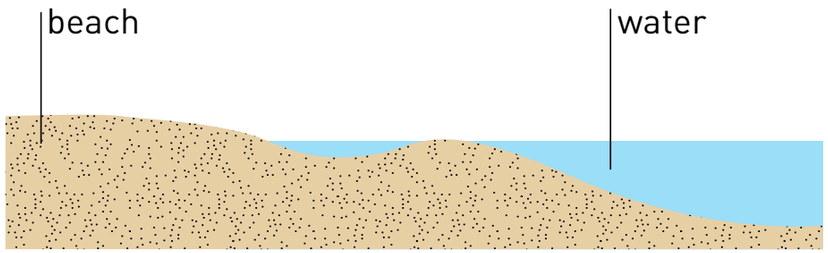

mussel genus

Ecological Armoring Units

With a textured surface and various protrusions, enhanced seawalls can support the growth of various marine plants and animals. Able to be designed for certain species or locations, these design options allow for varying degrees of complexity and flexibility allowing for different structural and functional properties.

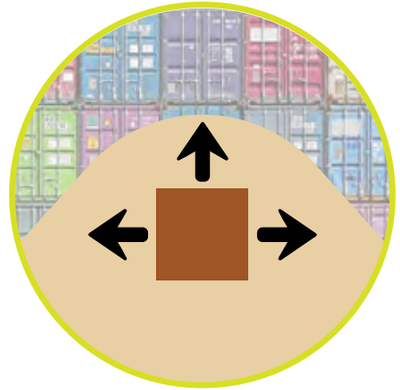
Sand Dune Beach // Adaptive Reuse

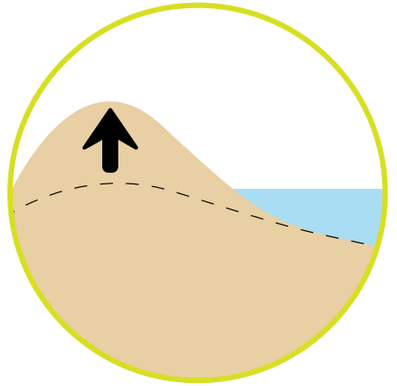
Public Beach

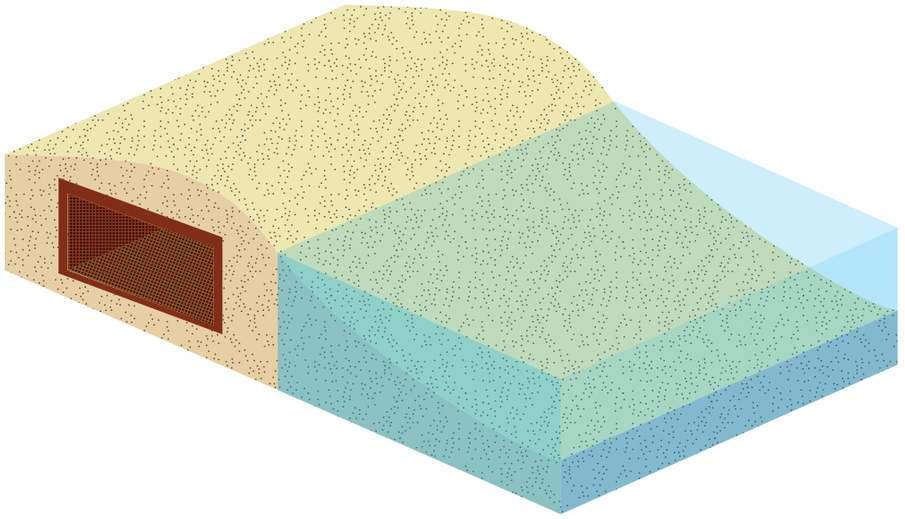


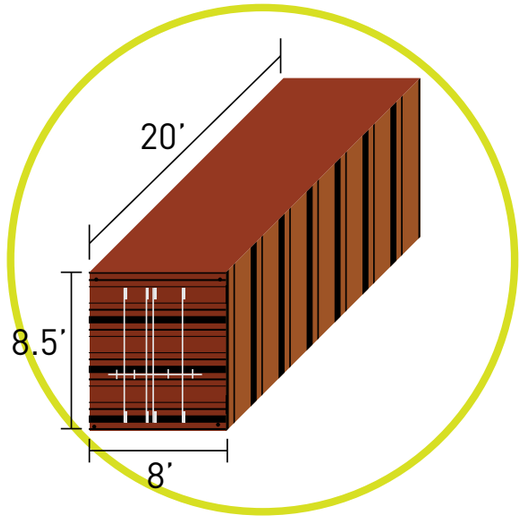
Dunes to act as barriers against sea level rise and minimizes coastal erosion. Our strategy is to bury shipping containers (reducing the need to import more sand) to create a series of dunes to protect against sea level rise while still functioning as a public beach.

Using plant material such as beach grasses to secure dunes can prevent the loss of material from water and wind. Plants also stabilize the dunes to prevent the resurfacing of buried material and provide habitat.









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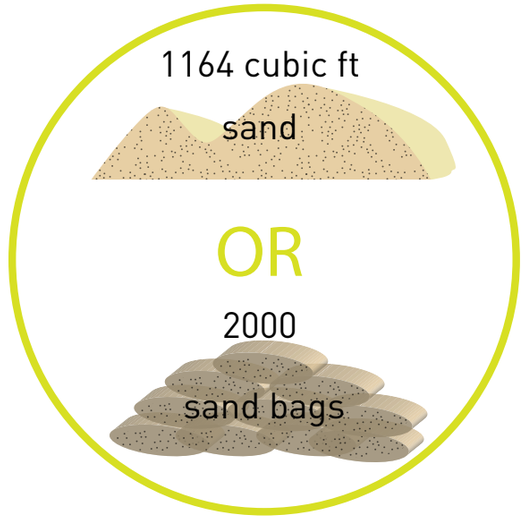
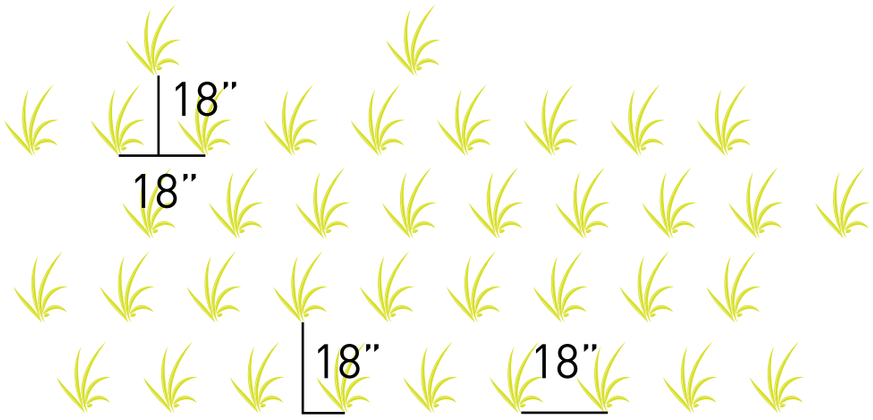
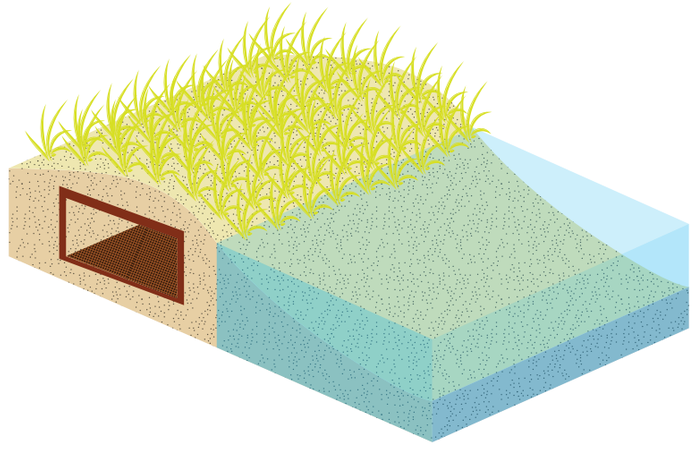




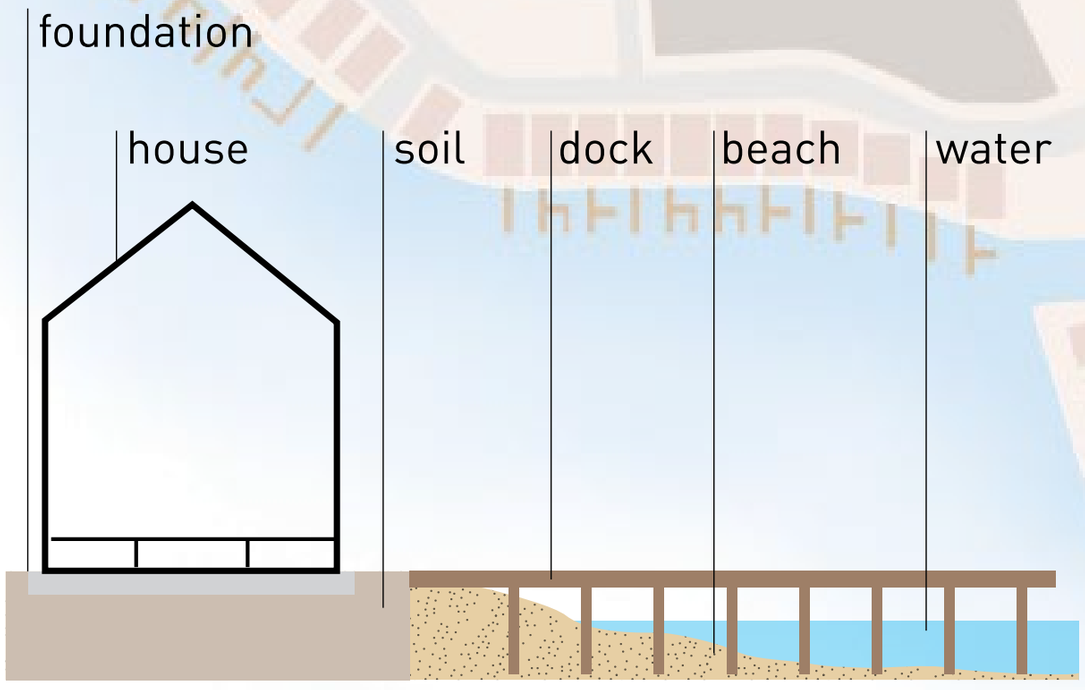
Using a sticks to punch 10” in holes placing two stems at minimum of 8” to prevent being dried out by the sun or blown away from wind.

Compressing the surrounding sand to remove air pockets allow material to settle and apply fertilizer 30 days after initial planting



Private Beachside Residence
Flooding Island // Floating Home

Raised Structures

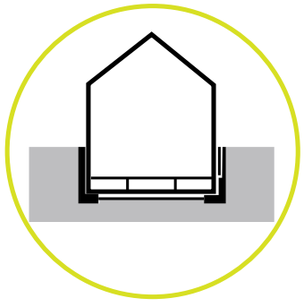


As an decentralized adaptation strategy, raised structures and floating homes enable flood water to flow below the occupied space, keeping the living areas high and dry.

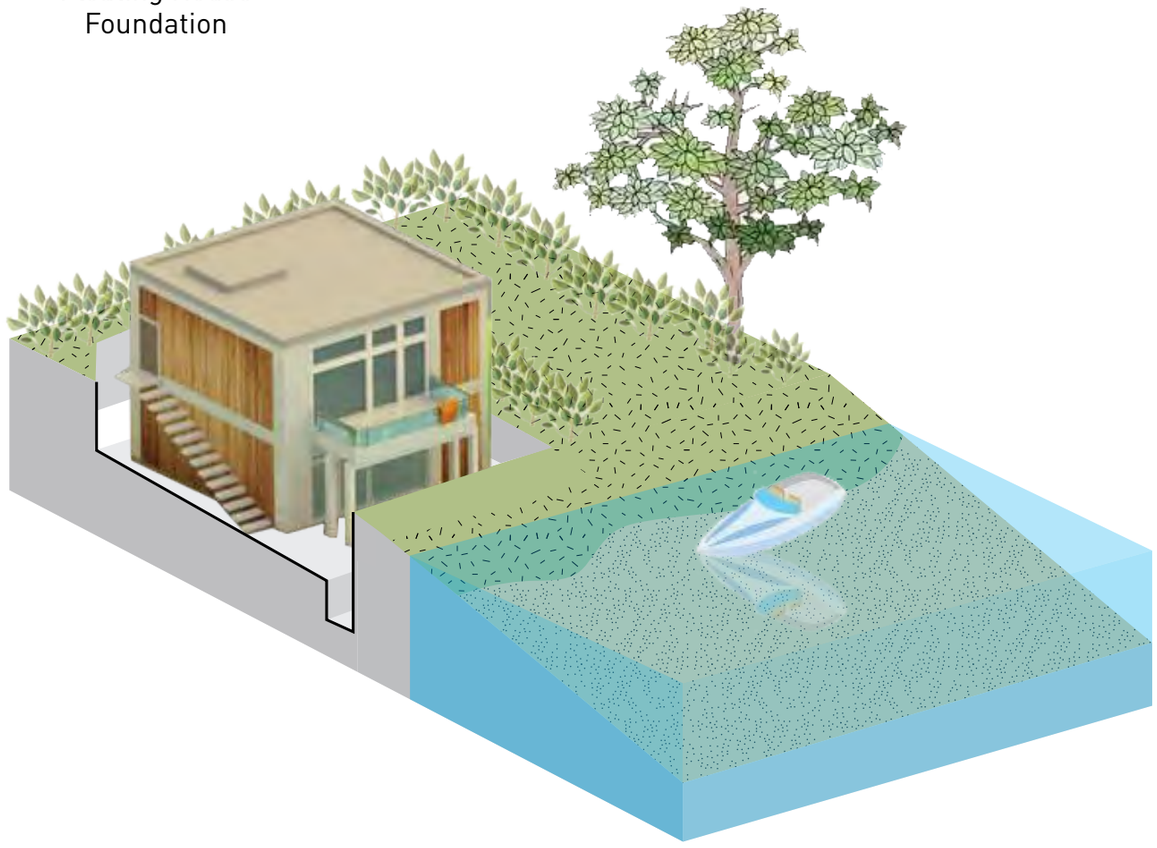
Existing structures can be raised as a means to adapt to changing risks without the need for retreat. Raised structures can be awkward and impact the quality of the urban fabric.

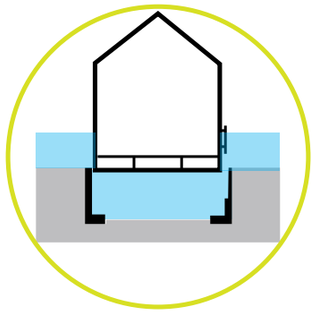
Floating structures are more expensive, but accomodate a wider range of flood conditions, and reduce the visual impact to the community.

To enable raised or floating structures, Long Beach would need to change the zoning and building codes.

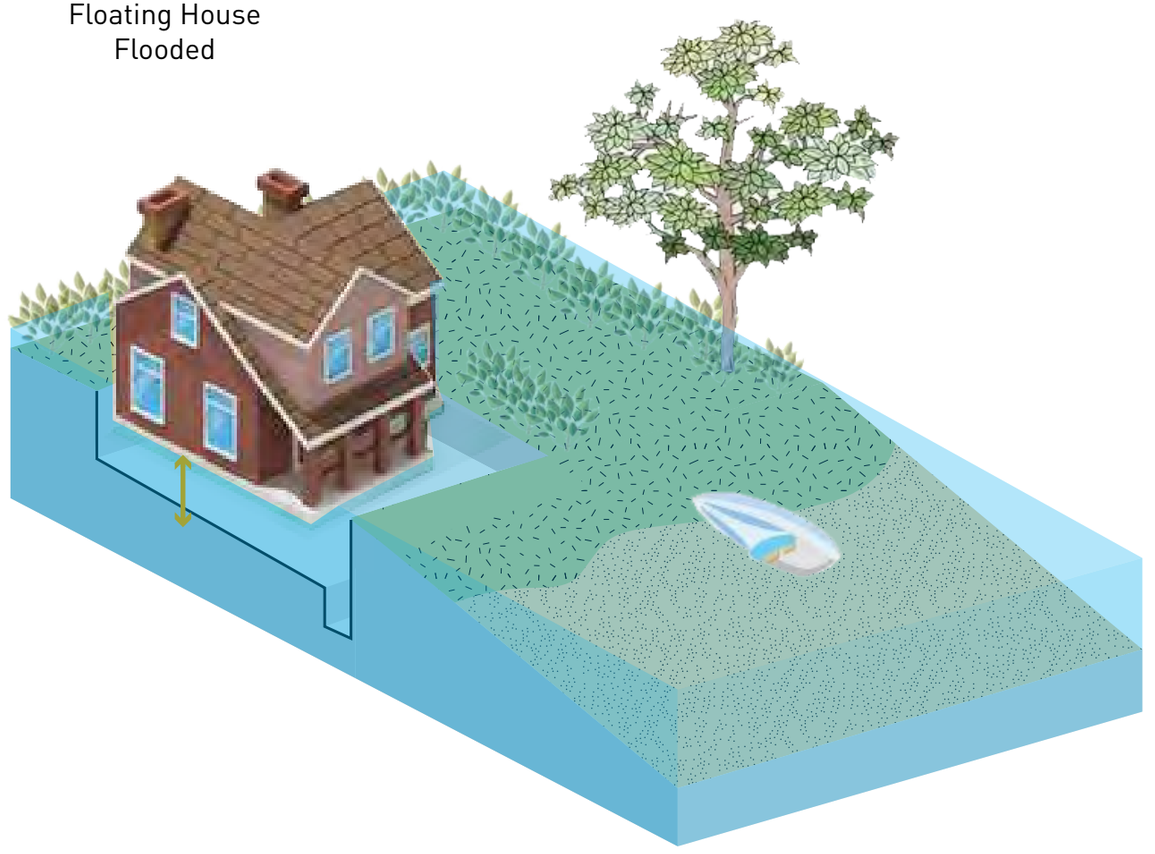


Floating House
Foundation





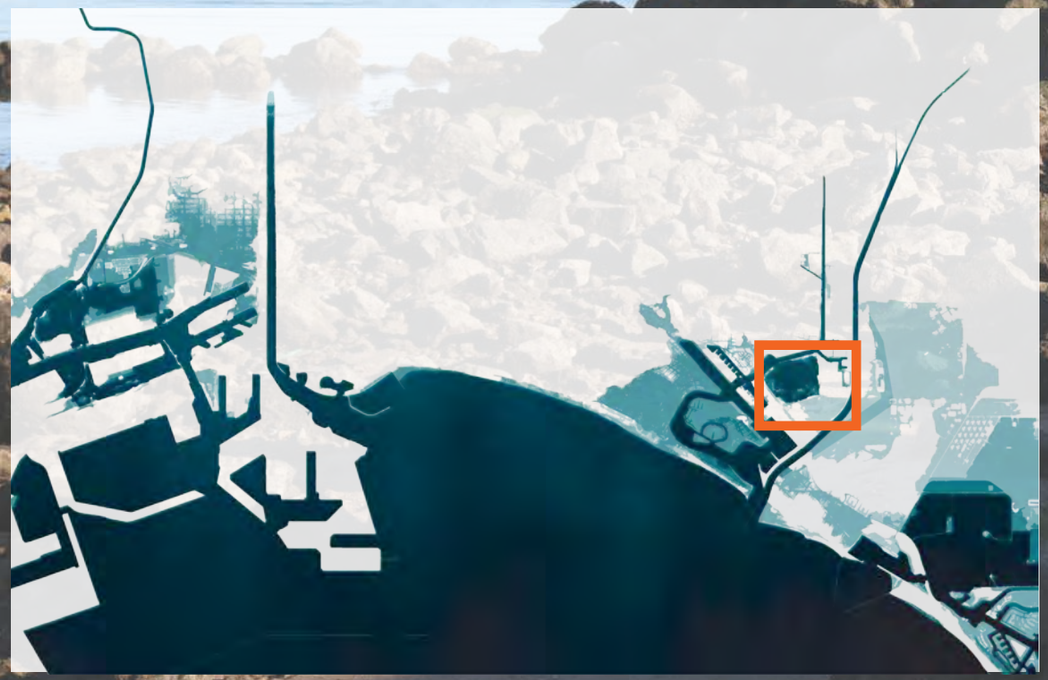
Floating House
Flooded



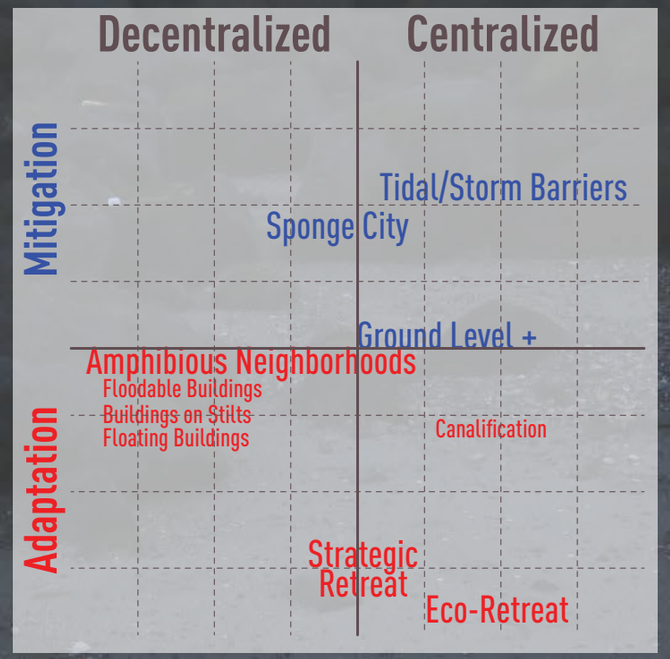

B
M
PRESERVED ESTUARY
PARKING LOT
B
PARKING LOT
WESTMINISTER BLVD
PCH
A
A
PRESERVED ESTUARY
6' BERM
SAN GABRIEL RIVER
STUDEBAKER RD
RAISED WOOD
DECK WALKWAY
15' HIGH SLOPE
DREDGED CHANNELS
MUD FLAT FLOOD ZONE
AND ESTUARY PRESERVE
TRASH COLLECTOR

Sea Coastuary

Julia Baek, Khael Castanedes, Jorge Colmenero, Ryan Lawson, Alex Wade



Key Map



Strategy Matrix

Potential habitats for animal species

Belding's Savannah Sparrow Habitat
Passerculus sandwichensis

California Least Tern Habitat
Sterna antillarum browni

Pacific Green Sea Turtle Habitat
Chelonia mydas

Wandering Skipper Habitat
Panoquina errans

Burrowing Owl Habitat
Athene cunicularia

Brown Pelican Habitat
Pelecanus occidentalis

Salt Marsh Tiger Beetle Habitat

California Sea Lion Habitat
Zalophus californianus

Light-Footed Clapper Rail Habitat
Rallus longirostris levipes

Potential habitats for plant species

Coulter's Gold Fields
Lasthenia glabrata

Estuary Sea-Blite
Suaeda esteroa

Southern Tarplant
Centromadia parryi ssp. *australis*

Southwestern Spiny Rush
Juncus acutus ssp. *leopoldii*

Lewis' Primrose
Camissoniella lewisii

Saltgrass
Distichlis spicata

Common Eelgrass
Zostera marina

Pacific Cordgrass
Spartina foliosa

Site Analysis

Our team was assigned the task of analyzing and evaluating important economical, ecological, and environmental aspects of various areas of Long Beach with the greatest risk for flooding. One such area is southeastern Long Beach, an area of roughly 1,500 acres that is largely under-developed and is now a focal point for environmentalist, businesses, and government officials. SEADIP (Southeast Area Development and Improvement Plan) offers a unique opportunity to create a series of flood mitigation typologies with the ability to not only alleviate coastal flooding, but also to further restore the Los Cerritos wetlands.

Through the use of berms to mitigate coastal flooding and attenuate noise levels and pollution, the wetlands will be able to expand and support more diverse and abundant wildlife. Channeling water from the Los Cerritos Channel to the San Gabriel River will give an outlet for the resulting flooding water to be directed into the channel and away from critical residential areas. Our project seeks to develop a design that addresses the main concerns of sea level rise by attenuating the potential flooding risk, while at the same time creating a diversified ecological wetland system for the community of Long Beach.

Existing habitat types

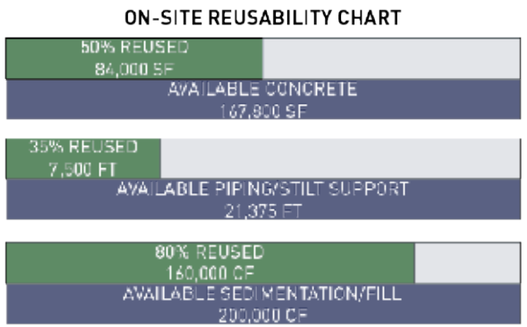
Rip-rap	Southern Coastal Salt Marsh	Mulefat Scrub	Ruderal Wetlands	Development
Subtidal Marine	Salt Flat	Alkali Meadow	Ruderal Uplands	
Mudflat	Southern Willow Scrub	Southern Coastal Brackish Marsh	Vegetation Free Zone	

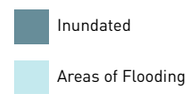
Diagrams

Sea level rise is not an immediate threat to the San Gabriel River, but it is vulnerable to storm surges and king tides today. Through the next century, if we do not plan for sea level rise, we may lose the valuablet estuary all together. Our site plan strives to make major adjustments to the site but not to destroy it, making it so that it will be able to last with the rising sea levels that one will begin to see in the next few decades. Our plan will allow this site to exist a lot longer than it previously would have, and also can provide examples of how people can adjust to the rising sea levels and still allow the environment around it to thrive and adjust with the changing conditions.

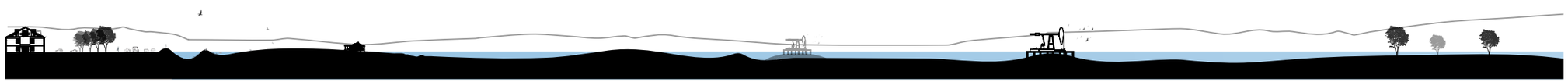
Current Condition

In 30 years

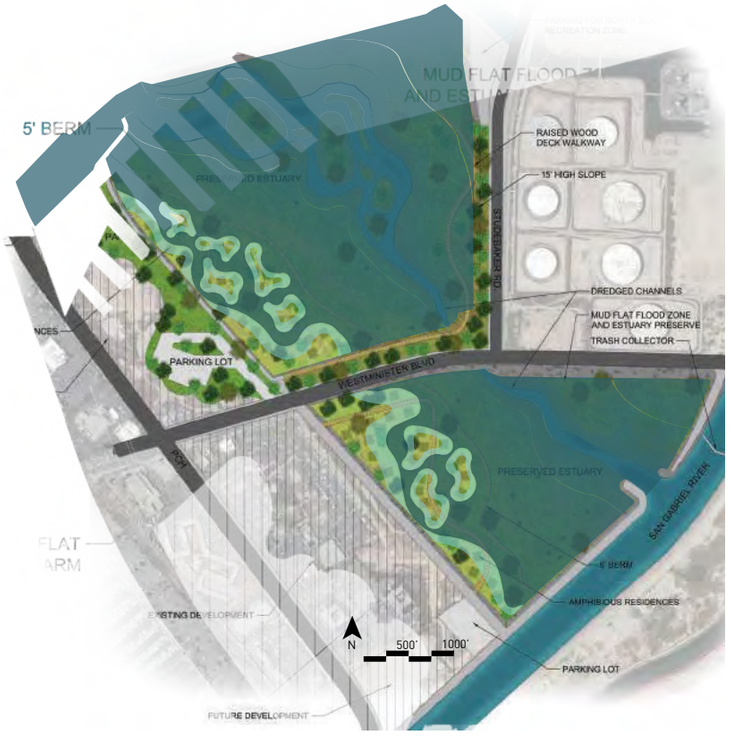




Sections



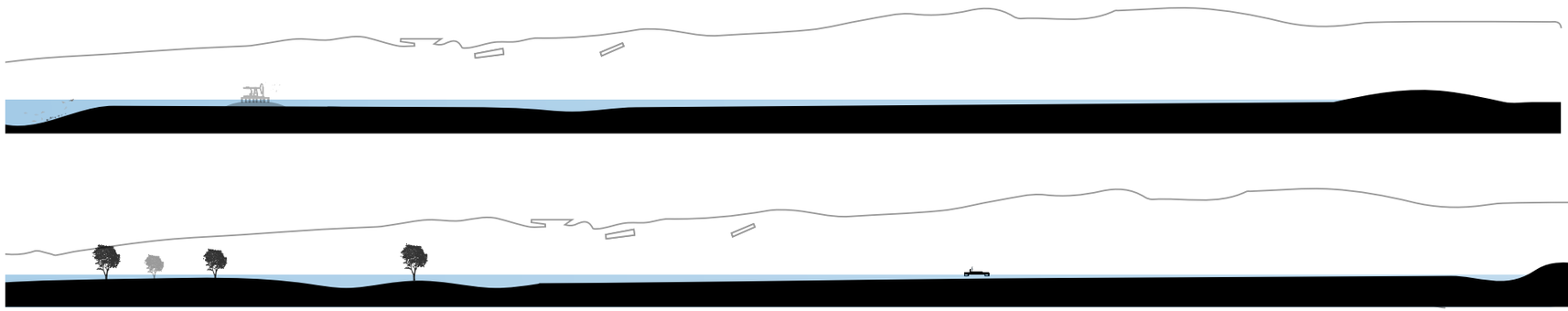
In 60 years



In 90 years

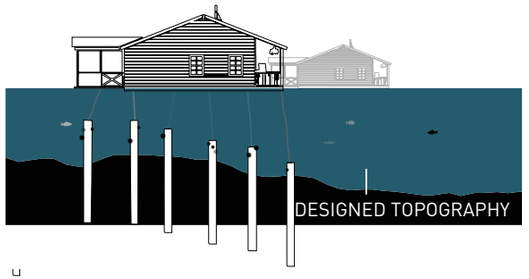
Inundated

Areas of Flooding



Along with making it so that our site will work in stages to adapt to the changes, we also want to take what exists on the site and use as much as we can. By exporting as little waste as possible, the project is utilizing the recycling of on-site materials as an opportunity of minimizing imported material.

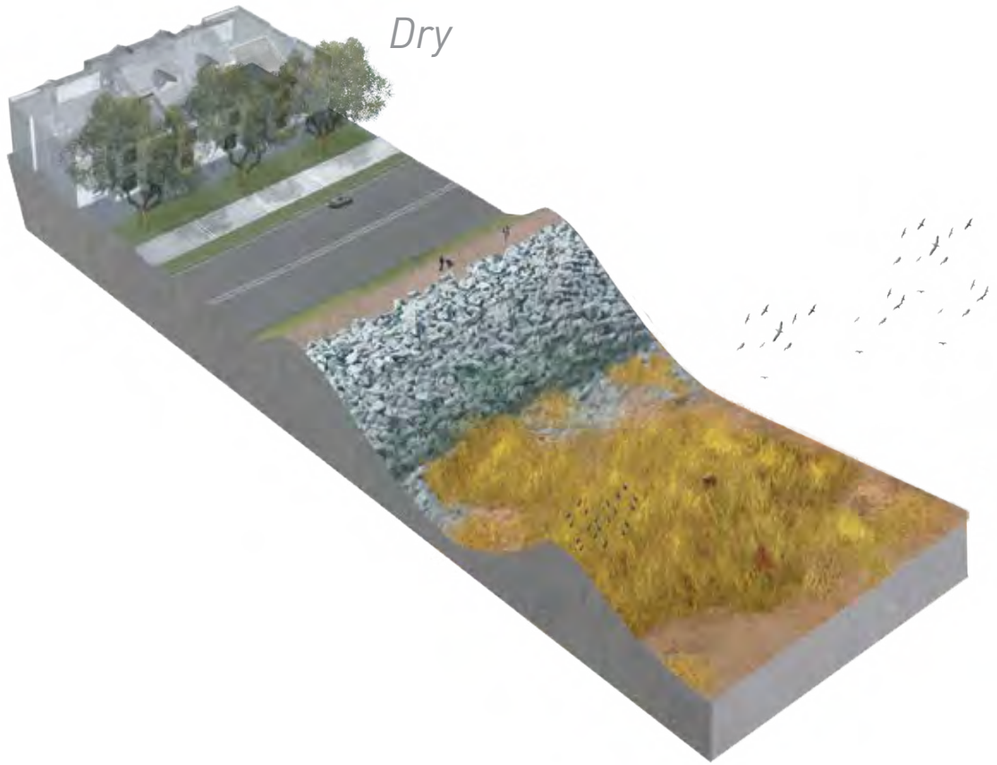
We have made this design site-specific, but with the goal that these typologies and ideas could be taken and implemented elsewhere, eligible to restore environments similar along the coast and create space for people to occupy.

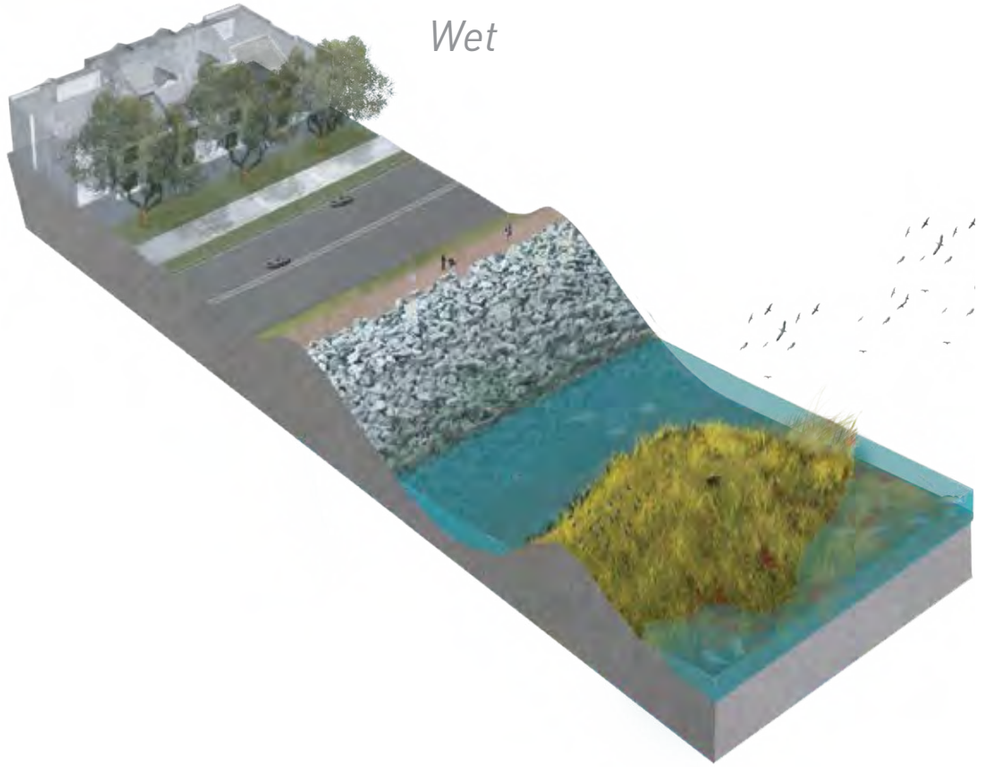


Future Scenario of Amphibious Housing Floating Resort

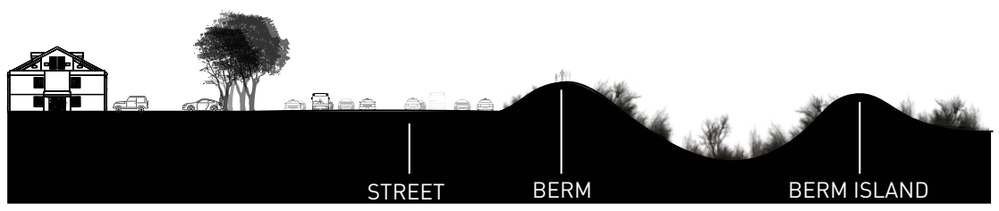
Typologies

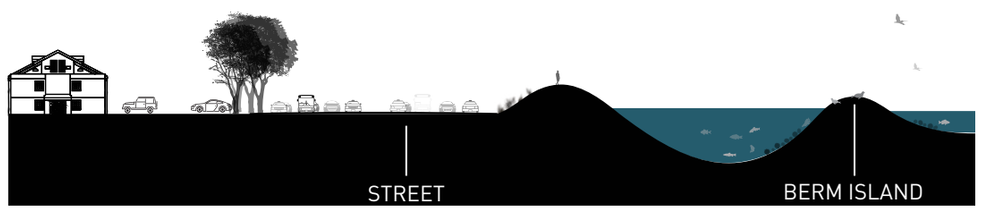
Berm and Island Mounds



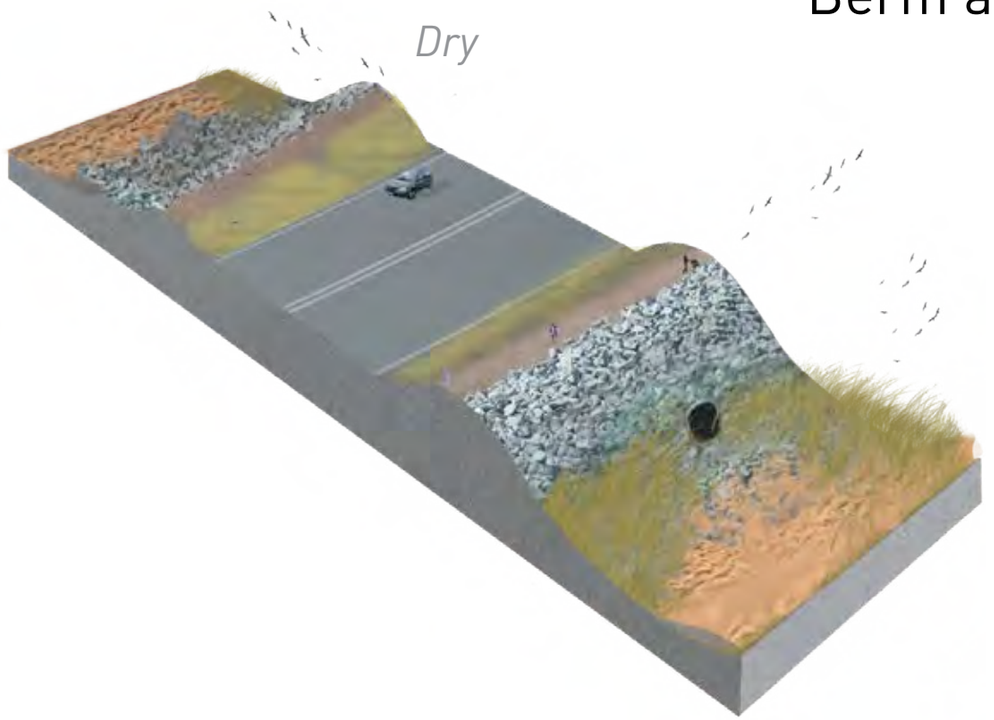


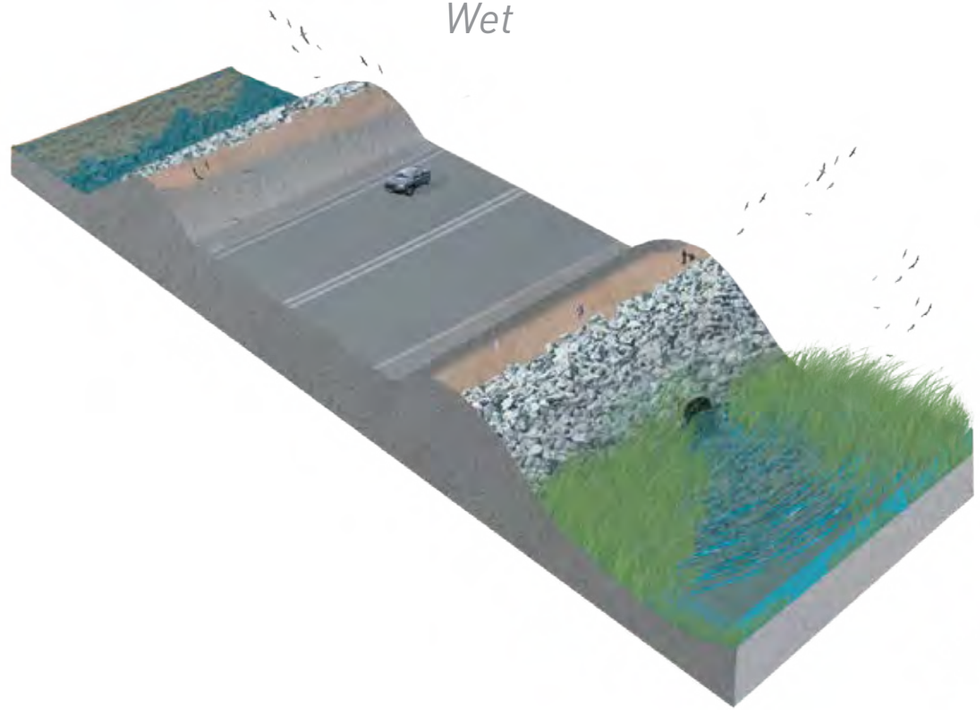
Berms made up of either Rip-rap or Oyster (Oyster-tecture) prevent the flooding of the seawater onto the PCH (Pacific Coast Highway). Currently, the seasonal flooding rises up one to two feet, but within the next one hundred years, due to melting glaciers and global warming, the water level will rise to six feet. The extrusion of the berms will prevent future overspill inland as well as provide a safe pathway for pedestrians to stroll on. The islands on the other hand create wildlife space, allowing sea creatures to settle on and for birds to rest/nest there. Purposefully located further away from the pedestrian pathway, the island can benefit wildlife when the area is flooded.



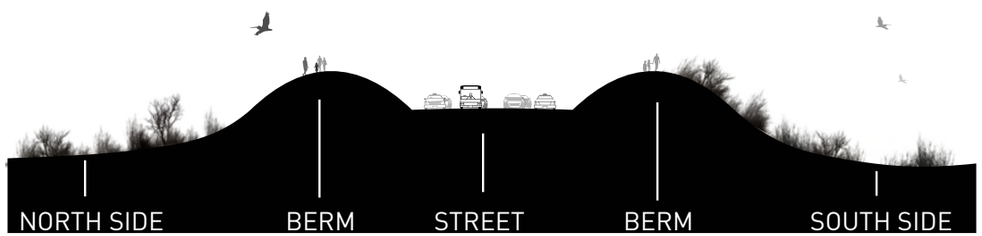


Berm and Division of Wetland

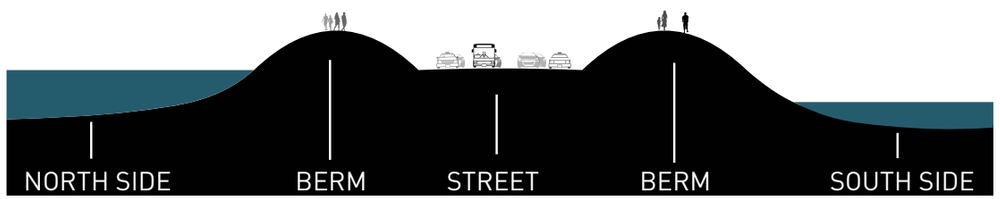




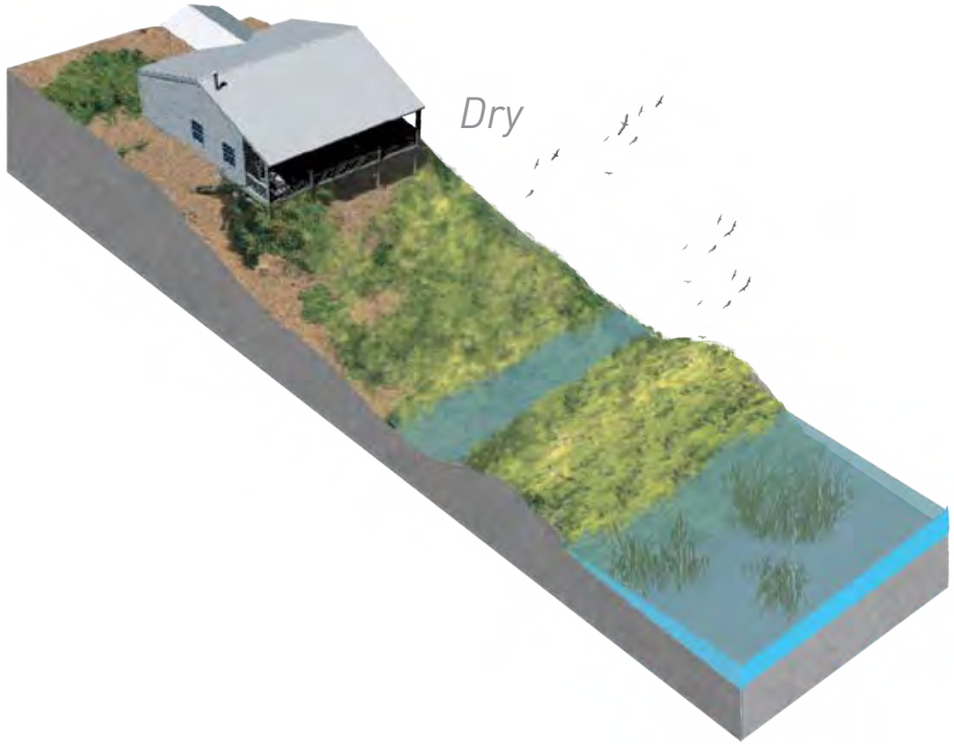
2nd Street splits the site in two, creating a north and south side of the wetland. Each side has extruded berms of about six feet high, ensuring safety and flood prevention for the next century.

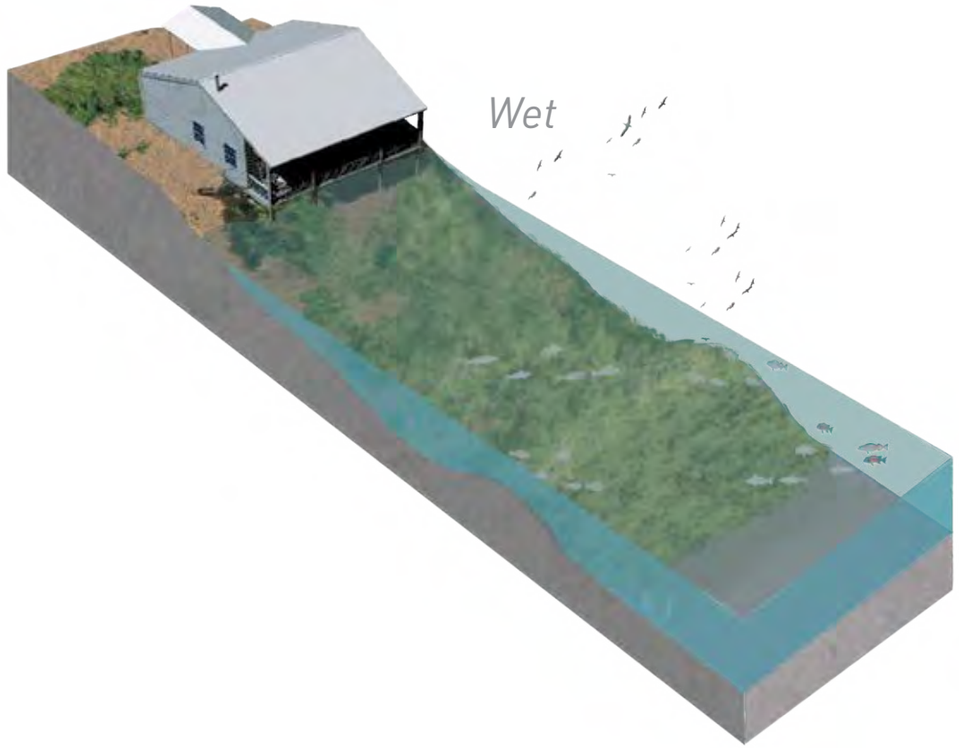


Although the berm splits the site in two, the channeling of the flood appears as if the gradual pooling of the water is flowing through a stream, even if the water ends at the 2nd street road on both sides. The two sides are not connecting in order to prevent water from washing away into the ocean, and instead, they separated to maintain the natural condition of the existing wetland.

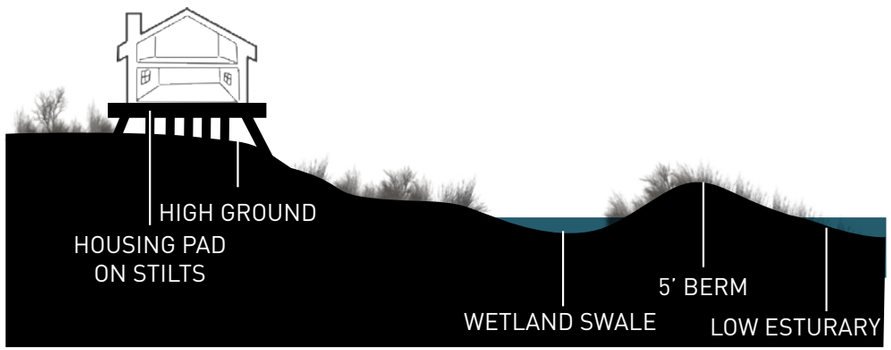


Stilted Home on High Ground with Berm Protection

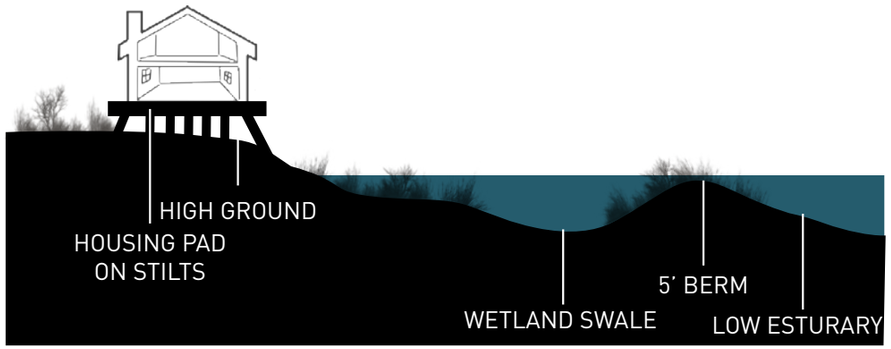




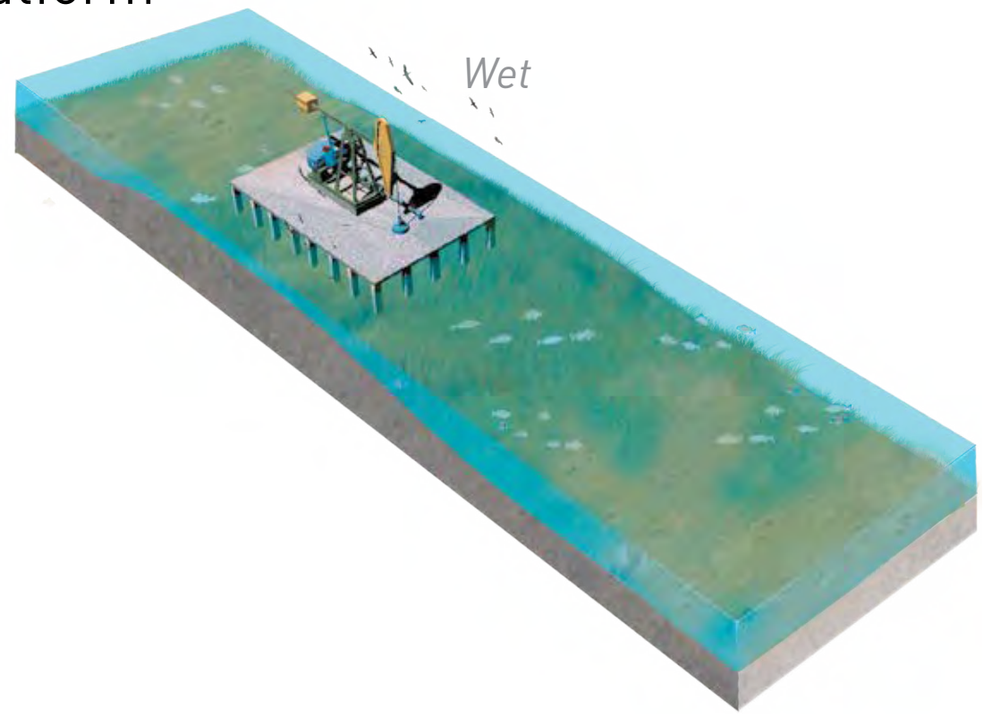
This is an opportunity for people to settle in even during the flooding seasons. Surrounded by water during a flood and when the sea level rises approximately 6 feet in a hundred years, the housing will remain safe and standing due to the stilts, allowing the structure to remain on a higher elevation.



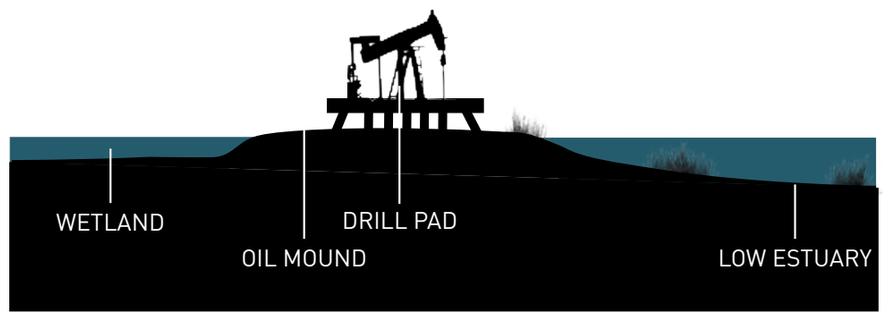
As a safe precaution, the amphibious housing have foam base and possibly pontoons to allow the house to float if the water level exceeds. Even after hundred years, if the sea level continues to rise, there is an opportunity to turn the house into a resort, which is another opportunity of income to Long Beach.



Mound and Stilted Oil Platform

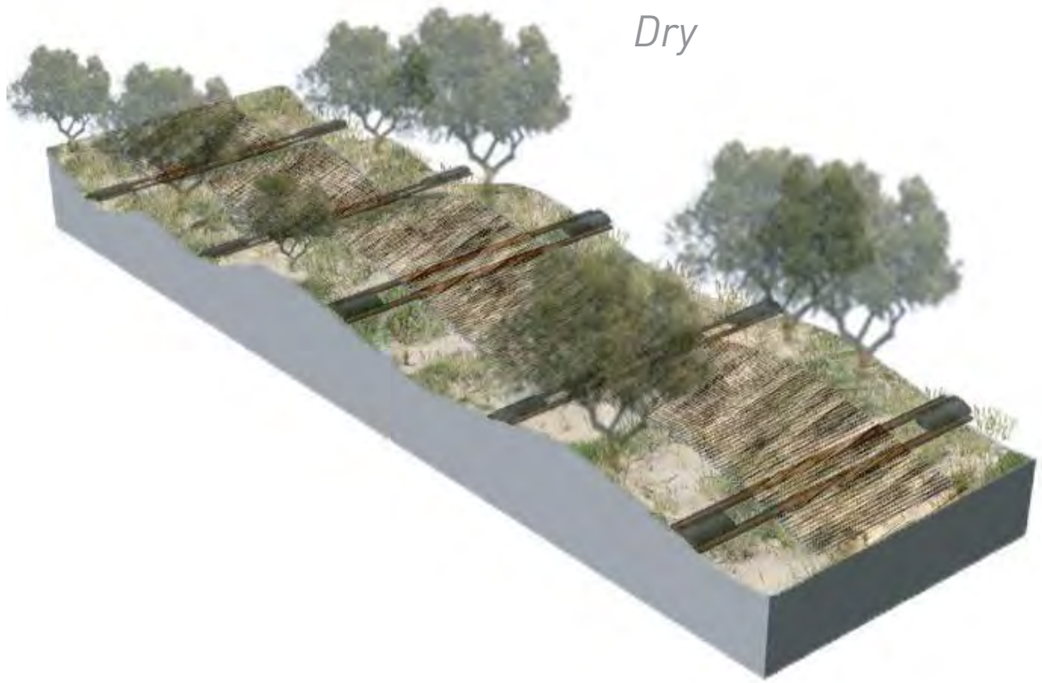


Although there have been some mentioning of the oil rigs being removed in the future, they were put into minor consideration. Stilts were implemented to allow water to flood without overflowing onto the rig while providing a place for birds to rest.

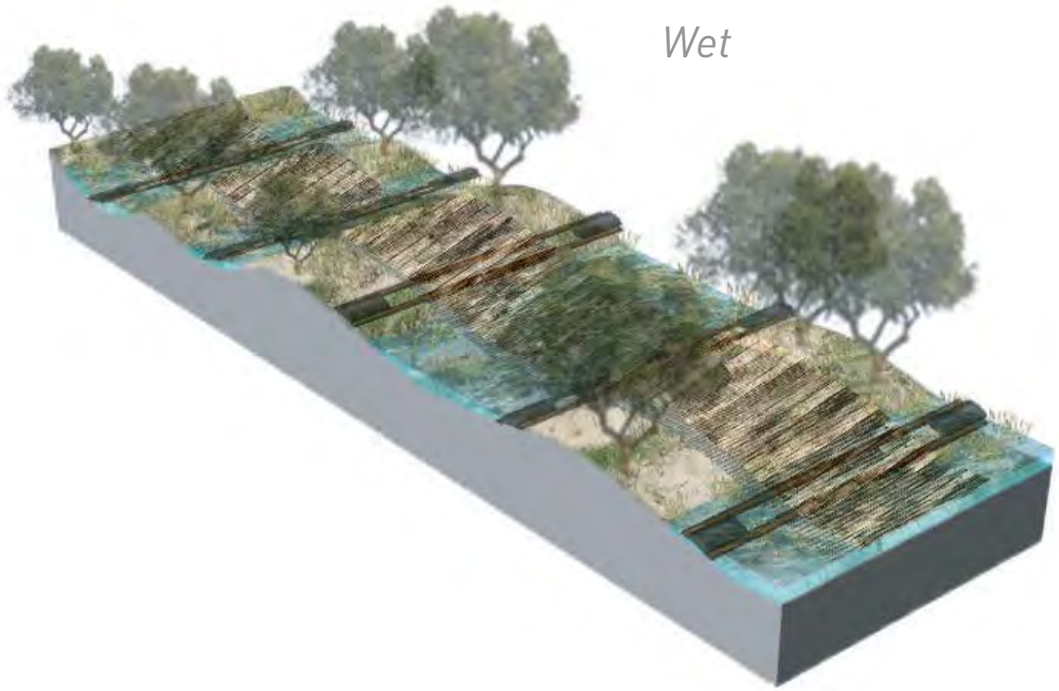


Wave Bridge

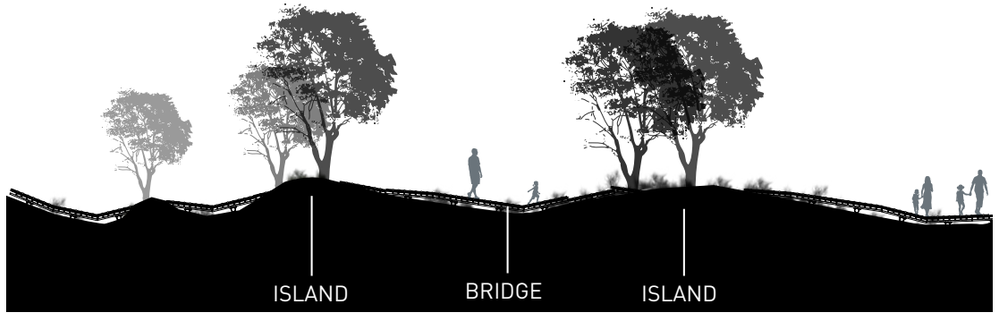
Dry

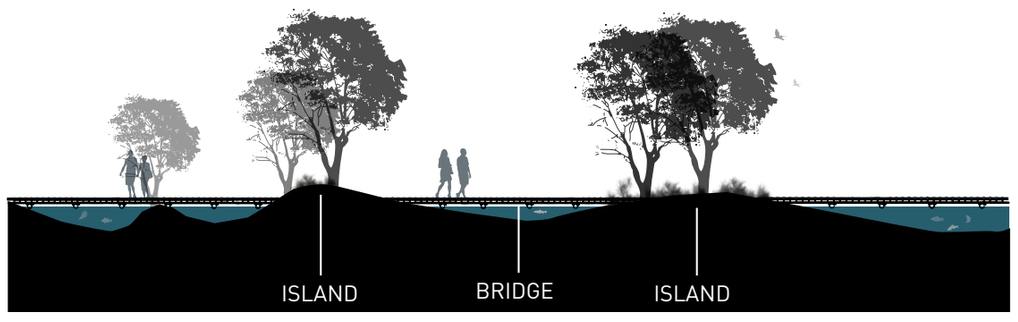


Wet



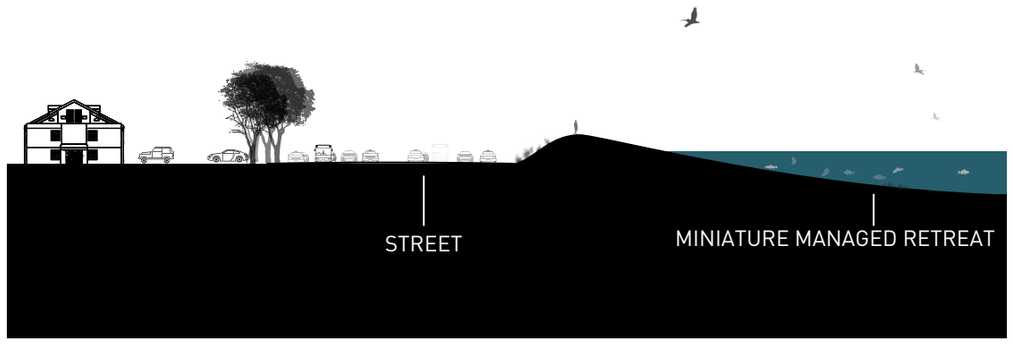
The floating bridge stay afloat during a flood allowing pedestrians to have access close to wildlife, but not close enough to interfere. When water is not present, the bridge rests along the topography creating undulating paths, which is great for play and exercise. Due to the fluidity of the bridge, there is an opportunity to transform the bridge into an energy- generating bridge/attenuator hybrid.



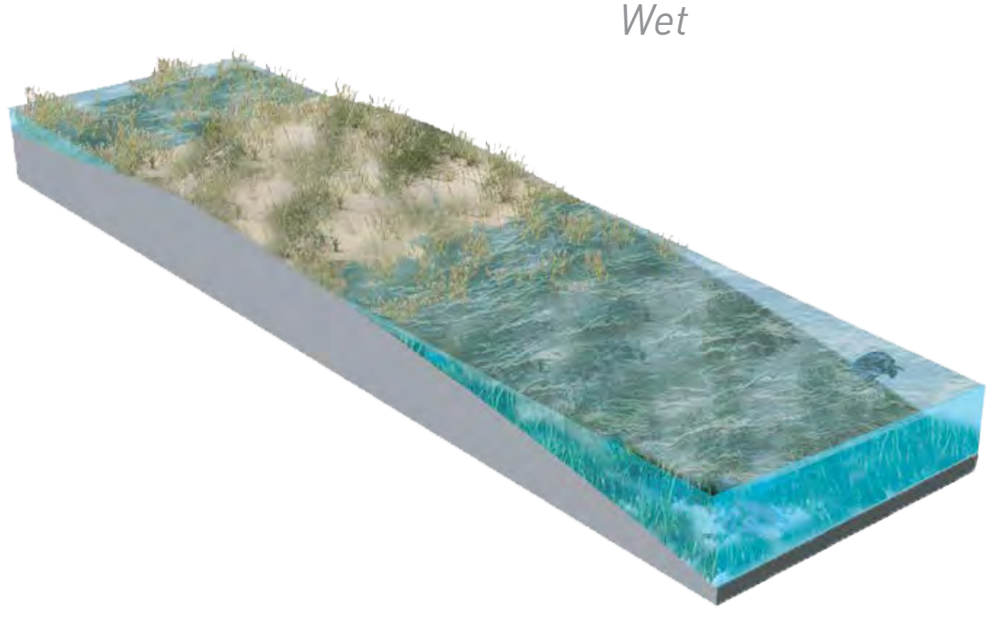


Berm and Gradual Slope

This strategy is similar to the berm except the elevation gradually drops down allowing the flooding of the sea water spread and gradually fill. The slope can visually help one to identify whether the water level is rising.



Island Reserve



Island Reserve Wet

Source: Google Earth

Data CSUMB SFML, CA OPC

Data USGS

Google™ ea

Appendices

About: AHBE Landscape Architects

CALVIN ABE, FASLA, RLA
FOUNDING PARTNER & PRESIDENT
Calvin Abe brings to the firm over 30 years of professional experience in a wide range of landscape architectural and urban design projects. He is noted for his ability to transform conceptual design ideas into creative and artful built forms. He is a team player and works closely with consulting architects and designers to formulate innovative and technically sound ideas.

Calvin Abe received his Master of Landscape Architecture degree from Harvard University Graduate School of Design and his Bachelor of Science degree in Landscape Architecture from California State Polytechnic University, Pomona. He established Calvin R. Abe Associates, Inc. (now AHBE) in 1987 and is a registered licensed Landscape Architect. In addition to his practice, Calvin Abe also teaches design in the Department of Landscape Architecture at UCLA Extension School, is a visiting critic at many Southern California schools, lectures nationally on design and landscape architecture, and participates in a wide range of organizations.

http://www.ahbe.com/principals

AHBE's 100-year Initiative

At AHBE Landscape Architects, we believe in the power of innovation and are committed to generating, developing and implementing long-term adaptations to our changing planet. Climate change necessitates radical alterations to the built environment and we see our role as designers as critical in imagining and communicating possible future scenarios based on the latest scientific predictions related to population, water supply, temperature increases, sea rise, species extension and the chemical composition of our atmosphere and water. While we are looking to the future, we are firmly grounded in the present and what can be done today to strengthen and transform the places to be inherited by others in the decades and centuries to come.

AHBE LAB

AHBE LAB is a forum for exploration, inquiry, and collaboration. It is a place to share who we are, what inspires us, what we are dreaming about. We hope you enjoy this glimpse into our design process.

Students in LA402L contributed guest blog posts to AHBE LAB documenting their design process.

https://ahbelab.com/

About Prof. Lehrman

Barry Lehrman is a landscape futurist, landscape architect (MN license# 47285), artist, and author. An Assistant Professor of Landscape Architecture at California State Polytechnic University - Pomona, he teaches about the poetic integration of infrastructure into our cities, resilience, future scenarios, prototyping responsive landscape elements, and environmental sensing and landscape performance metrics.

Student projects from his 2016 Land Art Generator Initiative Competition Studio were selected for publication in *Powering Places: Land Art Generator Initiative, Santa Monica*, (edited by Robert Ferry & Elizabeth Monoian). Lehrman also contributed a chapter 'Los Angeles Aqueductsheds & Energysheds'.

Lehrman's Recharge City project placed 3rd in the 2015 Dry Futures Competition Pragmatic category for the strategies to reuse the 502 million gallons of treated water that are dumped into the pacific every day in Los Angeles County. This work was refined and presented at the 2016 Landscape Necessity Conference and 2017 California Water Reuse Conference.

As the principal investigator of the Aqueduct Future Project (2012 onwards), Lehrman has been addressing the century of antagonism and disenfranchisement wrought by the City of Los Angeles upon the Owens Valley. With the assistance of 175 students and counting, the project created exhibitions for Los Angeles Contemporary Exhibitions in Hollywood (2015) and the Bridge Gallery in Los Angeles City Hall (2013). His scholarship into the Los Angeles Aqueduct started with his 2005 MLA/ MArch thesis at the University of Pennsylvania, where he proposed an alternative dust control landscape for Owens Lake, CA.

Prior to teaching, Lehrman worked on projects around the world. He learned the craft of telling stories as a set designer and art director in Hollywood (1995 – 2001).

Prof. Lehrman websites:
www.infrascapedesign.com
www.aqueductfutures.com

Prof. Lehrman can be reached via email:
blehrman@cpp.edu

Prof. Lehrman giving a tour of the After the Aqueduct exhibit at Los Angeles Contemporary Exhibitions.

Cal Poly Pomona Department of Landscape Architecture

CPPLA is celebrating our 60th anniversary in 2017, and is the oldest Landscape Architecture program in Southern California.

https://env.cpp.edu/la/la

Mission:

The Department of Landscape Architecture at Cal Poly Pomona prepares students to resolve the ecological and social challenges of the 21st century, by instilling the theoretical and technical knowledge base of landscape architecture, creative and critical thinking skills, and a sense of social responsibility.

Department Vision + Values:

The Department of Landscape Architecture at Cal Poly Pomona explicitly recognizes the serious challenges facing human kind in the 21st century: rapidly expanding population pressures in the context of finite, non-renewable resources; and an increasingly multicultural society. We believe that these issues are fundamental, placing concepts of regeneration, livability, justice and sustainability at the forefront of the environmental design agenda.

In many respects, the Los Angeles region is a bellwether, an early indicator of issues, patterns and processes that will become prevalent in many parts of the world during this century. As such, the department is uniquely situated to be a leader in "Re-generating L.A." and educating future landscape architectural professionals to meet these challenges. To this end, **the Department strives to be a center of creative excellence in landscape architecture, internationally recognized for communicating values of ecological and social sustainability to students and the community.**

The department has developed five strategies that are intended serve as the long-range goals for the department, connecting our mission and vision, and guiding future decisions and directives. These strategies are broad with the specific intention of flexibility; allowing the program to respond to trends within our context, both administratively and geographically.

Support a strong undergraduate program focusing on the development of sound thinking skills and personal vision, in the context of the broad range of landscape architectural activities and technical skills.

Support a strong graduate program focusing on the development of sound thinking skills, personal vision, and contribution to the discipline's knowledge base, with a particular emphasis on human ecosystematic design principles.

Foster an outstanding and well-rounded cadre of faculty who contribute to the department's mission through teaching, research, community service, and professional practice.

Recruit and retain a critical mass of high-caliber, diverse students for graduate and undergraduate study.

Maintain a respected and influential role within the college, university, profession, and region.

Standard 1: Local Context

Establish a fundamental understanding of the local context through immersion of place.

Cultivate a fundamental understanding and appreciation of local context complexity in order to respond with authenticity to ecological, social, and formal qualities.

Discern patterns and systems at all scales.

Recognize resources and inequities.

Standard 2: Ethics

Develop (foster) within students the professional values and ethics to critically assess actions and implications.

Develop and refine ethical system regarding environmental alteration and management.

Develop an understanding of the ethical implications of short and long-term decision-making concerning the environment.

Develop a process of assessing values and their effect on environmental and landscape quality.

Standard 3: Critical Thinking

Foster critical thinking that enables creative and balanced judgments in:

Inclusive investigation that engages the sciences and arts.

Appropriate and defensible applications.

Reflective criticism that drives creative problem solving

Standard 4: Vision

Maintain a "contemporary" curriculum that facilitates the recognition of the dynamic relationships and long-term consequences of complex systems that produce emergent visions of landscape. In order to critically assess these visions and communicate them to others, the curriculum shall promote appropriate representation.

Engage the greater influence of the arts (including but not limited to painting, sculpture, installation, photography, collage, poetry, literature and film).

Employ relevant methods of communication from the kindred arts and sciences.

Engage innovative professional tools and materials.

Provide a comprehensive understanding of histories and theories.

Recognize that visionary results stem from persistence - doing your homework - as well as recognizing opportunities.

Standard 5: Enterprise

Establish a mentality that supports the notion that individuals should possess the tools and resources to recognize systems and connections and to act as an agent for change.

Appraise opportunities in the context of ethical concerns.

Comprehend the issue of risk in enterprise, as both a necessity and management responsibility.

Understand that the issues of creative enterprise must engage inclusiveness in the distribution of gains.

Standard 6: Collaboration

Recognize that landscape problems extend across multiple geographical, cultural, and disciplinary boundaries. By working with individuals and groups towards common goals, we realize values, broaden resources and enrich experiences. Effective problem-solving requires the ability to see different viewpoints, to engage interfaces, and to exchange ideas.

Provide cross-cultural experiences.

Encourage inter-disciplinary collaboration.

Create team-work opportunities.

Stress communication skills between disciplines.

Cultivate open minds and broadened viewpoints

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