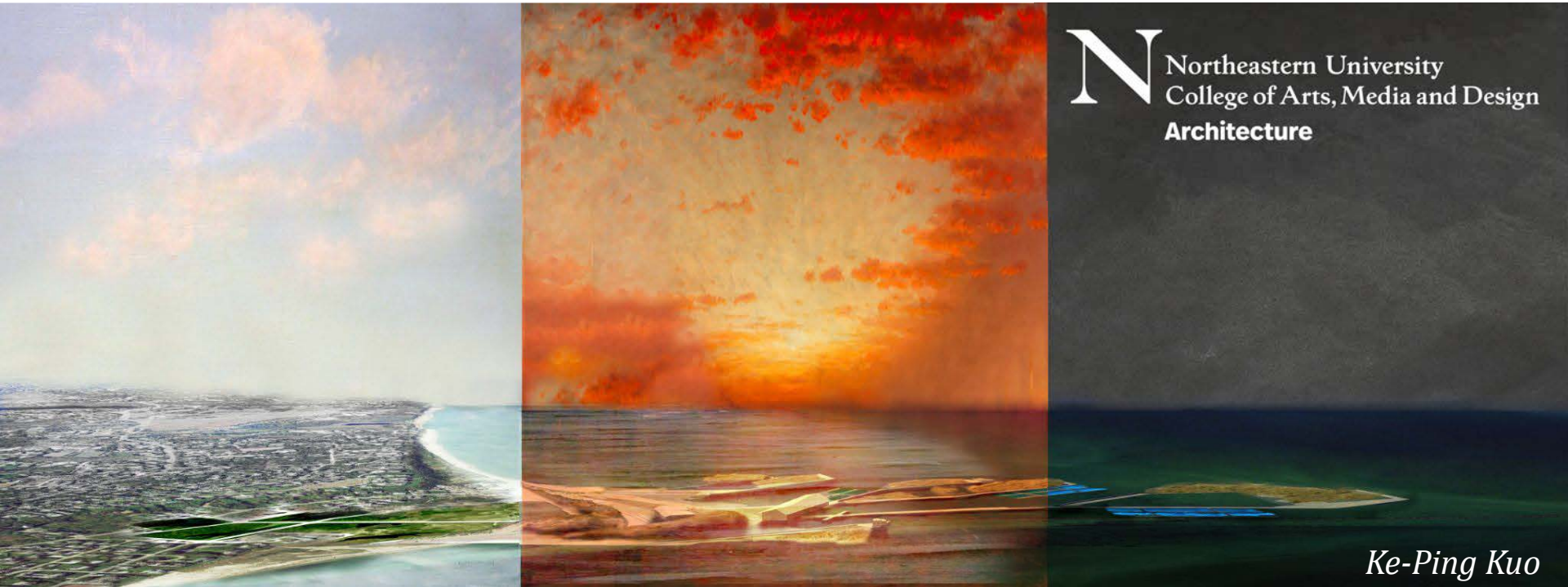
Transitional Ecologies

New Public Infrastructures for Nantucket



Team Composition

Urban Ecologies and Technologies (Cullen)

Interdisciplinary technologies course studying coastal and upland climate change impacts

Designed Urban Ecologies (Sara)

Interdisciplinary studio studying the intersection of social and ecological dynamics

Students - Urban Ecologies and Technologies

Sabrina Dengler-Coletti (MDes, Sustainable Urban Environments)
Yizhou Huang (MDes, Sustainable Urban Environments)
Bhavyasri Kattamudi (MDes, Sustainable Urban Environments)
Daniel Nemec (MArch, Architecture)
Kyle Wire (MDes, Sustainable Urban Environments)
Krystal Cai (BS, Architecture)
Piers Ellis (BS, Architecture)
Melissa Jacobs (BS, Architecture)
Sophia Pinto (BS, Architecture)
Emma Tracy (BS, Architecture)
Emerson Campbell (BS, Architecture)
Noah Wendel (BS, Architecture)

Alex Renaud

Mia Kania

Emma Tracy

Jack Dorland

Evan Bradley

Ke-Ping (Cammy) Kuo

Cassandra Lanson

Jasmin Dickinson

Emerson Campbell

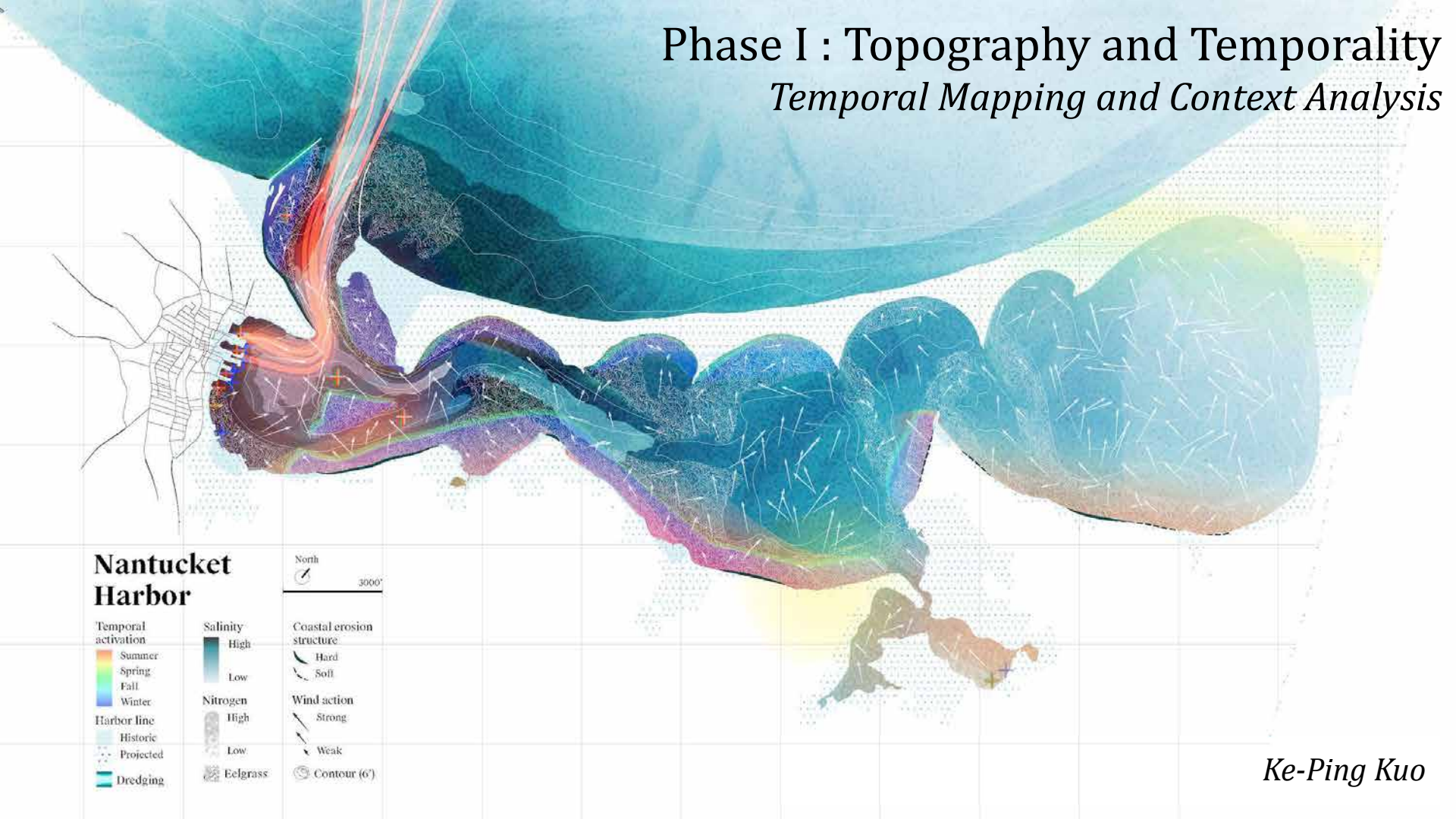
Phillip Bryant

Xueyang (Echo) Zhou

Architecture | Landscape Architecture | Environmental Science | Environmental Engineering | Sustainable Urban Environments

Phase I : Topography and Temporality

Temporal Mapping and Context Analysis



Ke-Ping Kuo

Phase I : Topography and Temporality

Environmental Structures and Technologies

These habitats often see low-lying shrubs, numerous species of wildflowers and limited tree species, which were removed for sheep grazing.

Prescribed Fires

With sheep no longer grazing on the grasslands, prescribed burns are done in order to prevent encroachment and helps perpetuate habitat for rare species.

Soil Survey Says...

The Nantucket series consists of very deep, well drained soils formed in dense glacial till. They are moderately deep to dense till. They are gently sloping to strongly sloping soils on or near terminal moraines. Permeability is moderately rapid in the solum and moderately slow or slow in the substratum.

Soil Profile*

*This is based off of USGS 6001 Soil Location

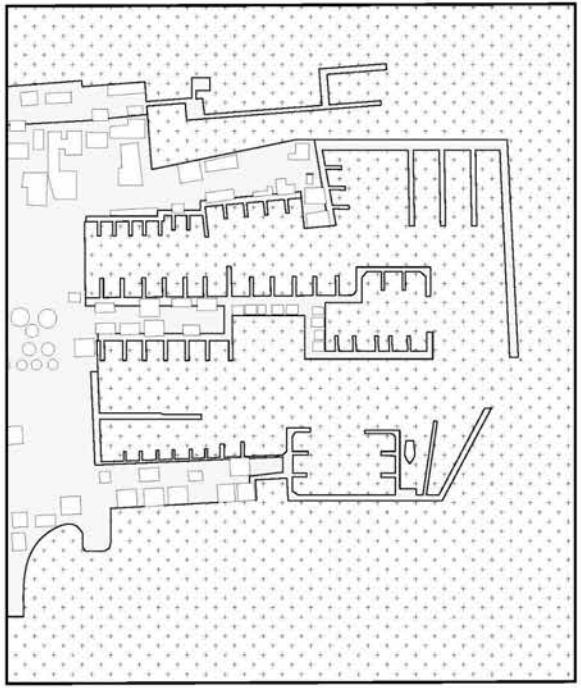
Kyle Wire

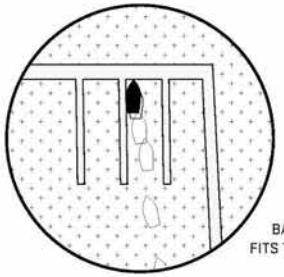
Phase I : Topography and Temporality

Environmental Structures and Technologies

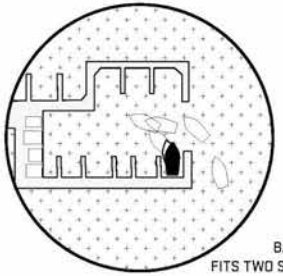
CATCH MY DRIFT?

Boat Parking & Circulation

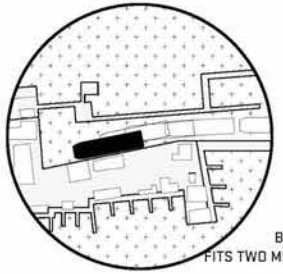




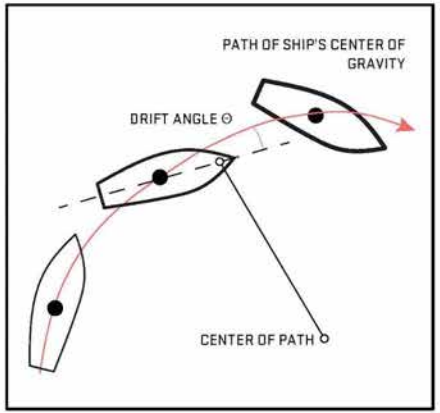
BAY WIDTH = **60 FEET**
FITS TWO MEDIUM SIZED BOATS



BAY WIDTH = 40 FEET
FITS TWO SMALL SIZED BOATS



BAY WIDTH = 65 FEET
FITS TWO MEDIUM SIZED BOATS
ONE LARGE FERRY



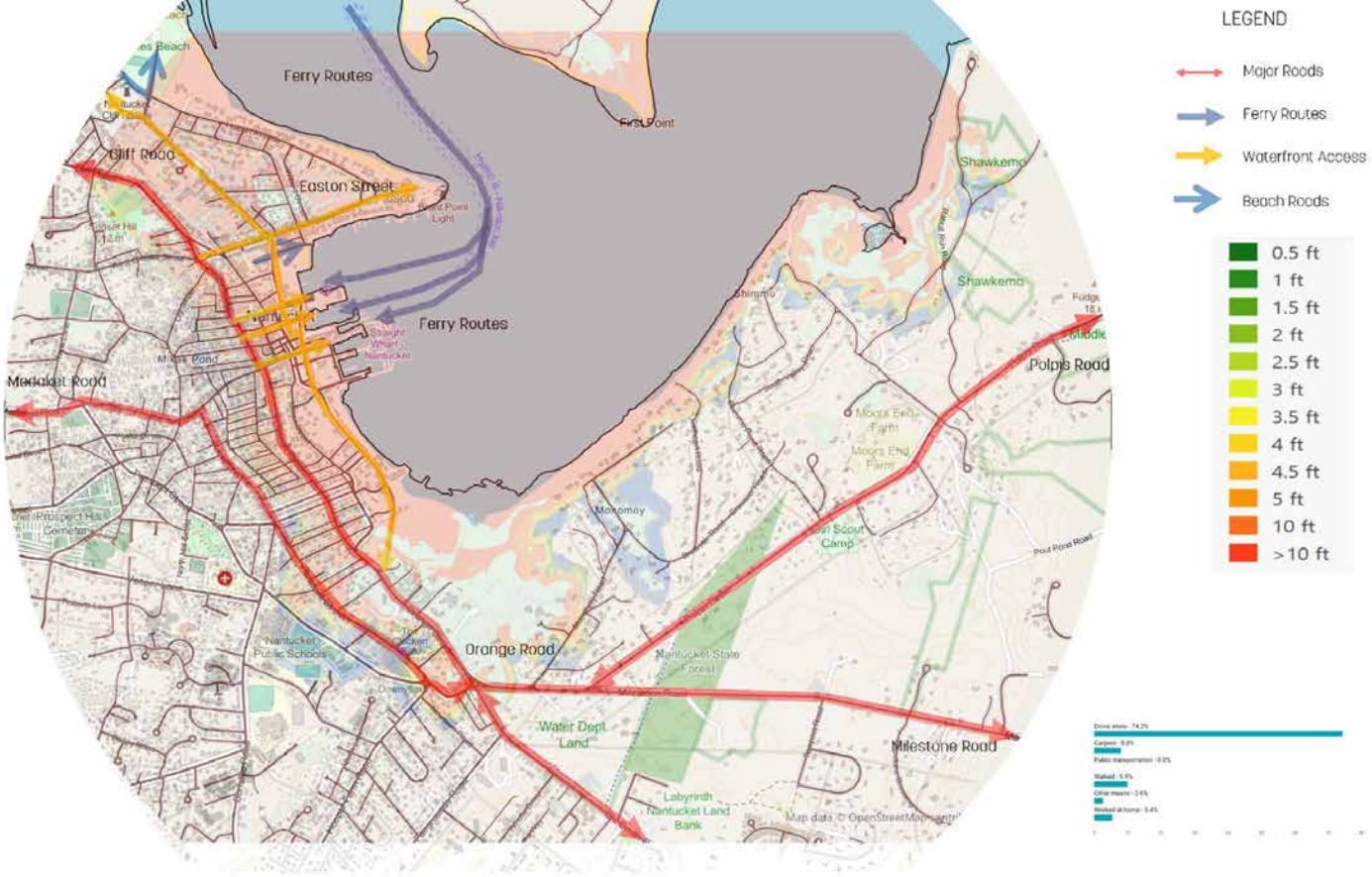
NOTE HOW THE STERN OF THE BOAT HAS A TENDENCY TO TRCK OUTSIDE OF THE TURN

NANTUCKET HAS A SPEED LIMIT OF 6MPH (900 YARDS OFF BREAKWATER LIGHT)

Piers Ellis

Phase II : Virtual Grounding

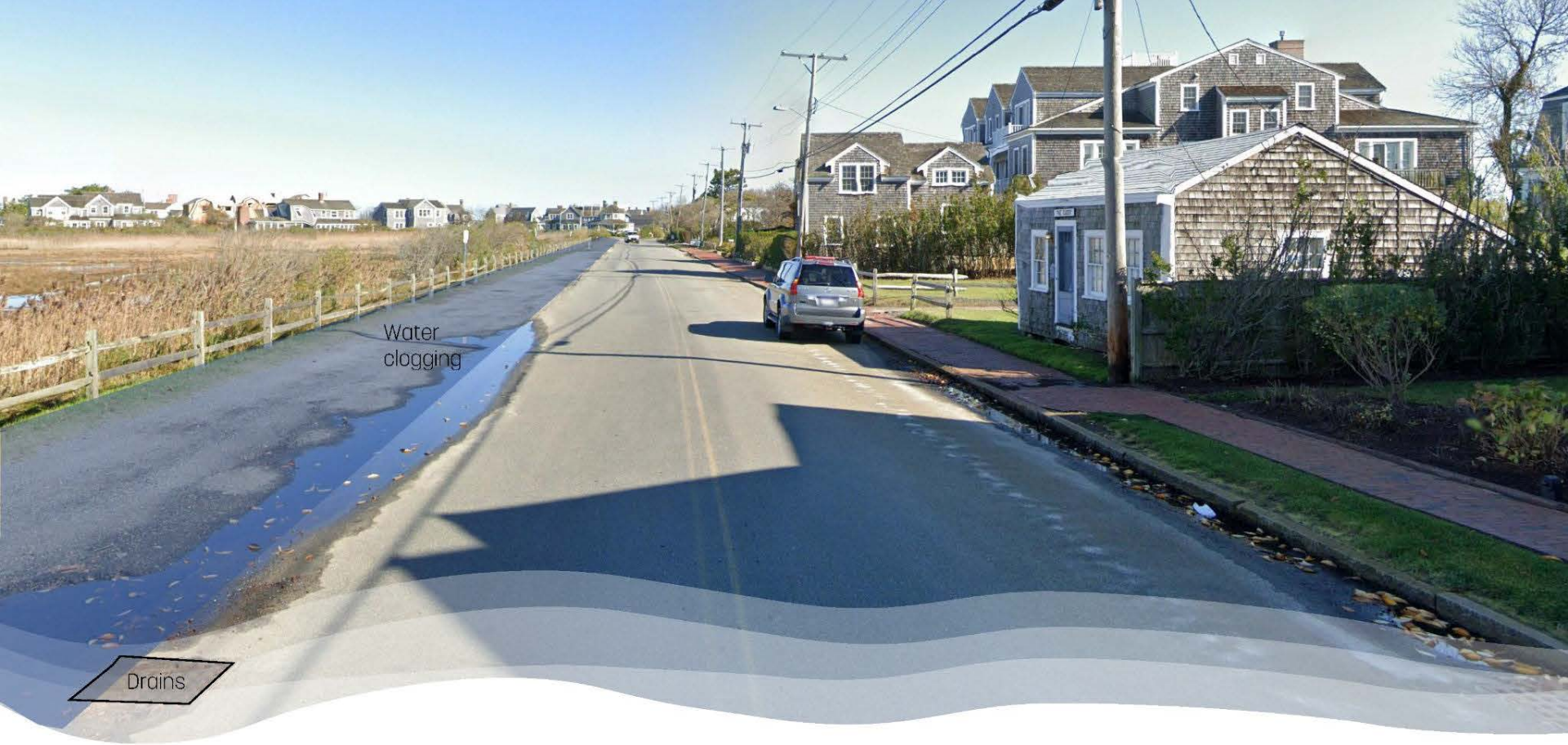
Vulnerability Analyses



The highlighted red roads are the main road access and high frequency roads to the Nantucket town, Brant Point and Ferry. The transportation mode in this area is highly single drove cars and surprisingly 0% public transportation use. The yellow highlighted roads are the roads leading to waterfront access. The blue are beach roads and ferry routes.

ROAD NETWORK AT VULNERABILITY

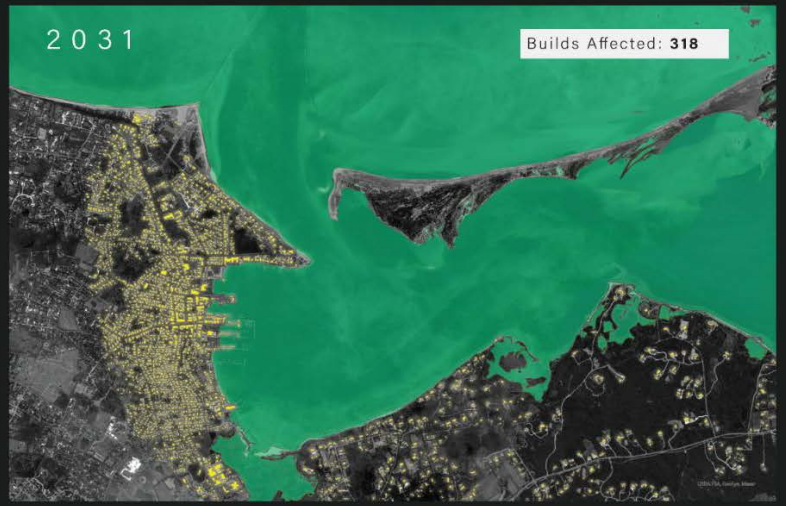
Bhavya Kattamudi



Clogging of roads, lack of storm water infrastructure .
Same level of housing to the roads increase the chance of flooding of these structures.

Bhavya Kattamudi


2021
Builds Affected: 69

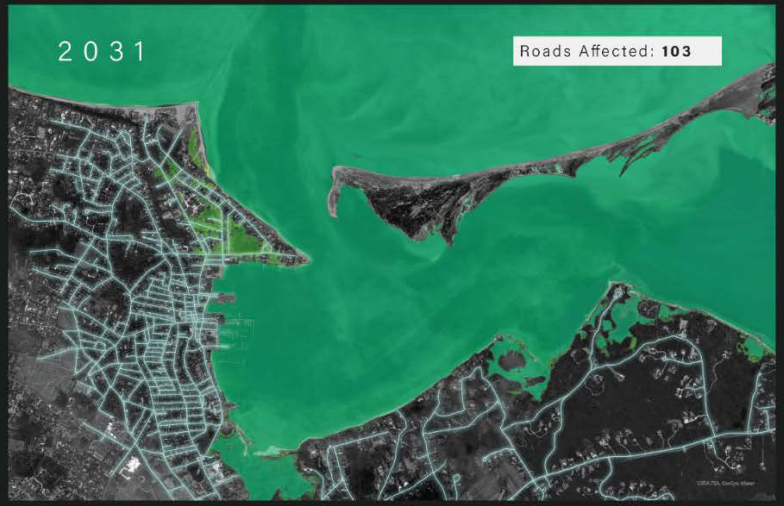

2031
Builds Affected: 318


2071
Builds Affected: 895


2091
Builds Affected: 1226

Kyle Wire


2021
Roads Affected: 22


2031
Roads Affected: 103


2071
Roads Affected: 312


2091
Roads Affected: 395

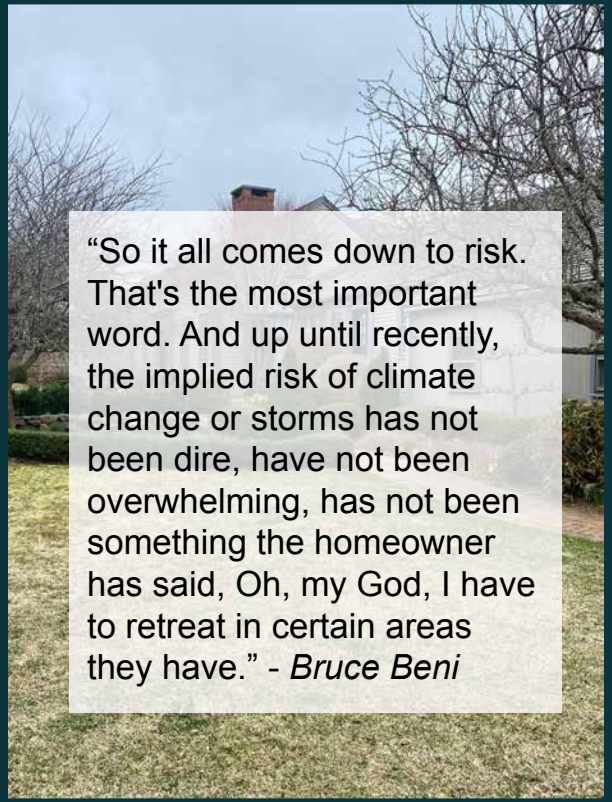
Kyle Wire

Phase II : Virtual Grounding

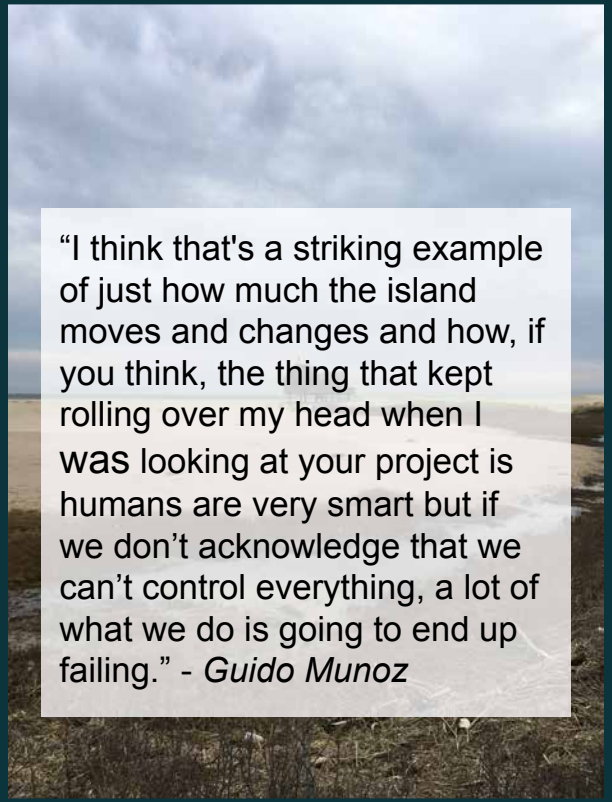
Photovoice

Phase II : Virtual Grounding

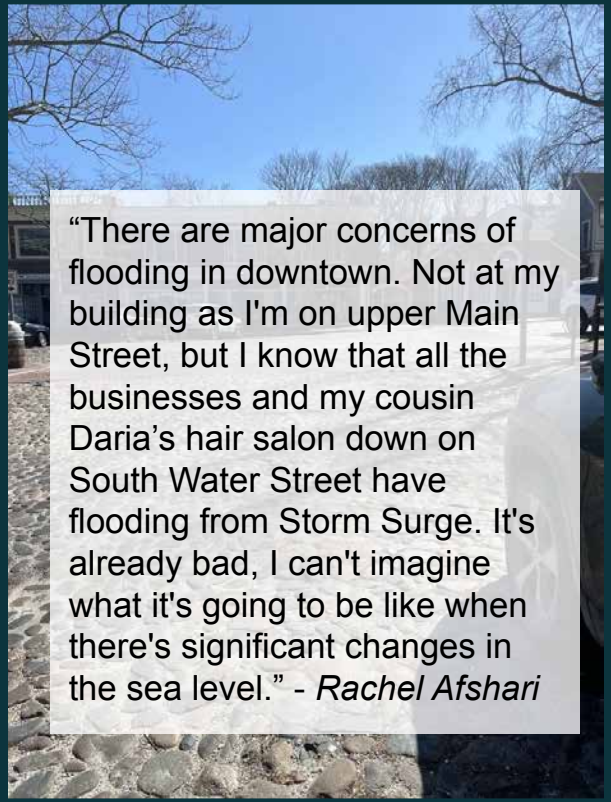
Photovoice



“So it all comes down to risk. That's the most important word. And up until recently, the implied risk of climate change or storms has not been dire, have not been overwhelming, has not been something the homeowner has said, Oh, my God, I have to retreat in certain areas they have.” - *Bruce Beni*



“I think that's a striking example of just how much the island moves and changes and how, if you think, the thing that kept rolling over my head when I was looking at your project is humans are very smart but if we don’t acknowledge that we can’t control everything, a lot of what we do is going to end up failing.” - *Guido Munoz*

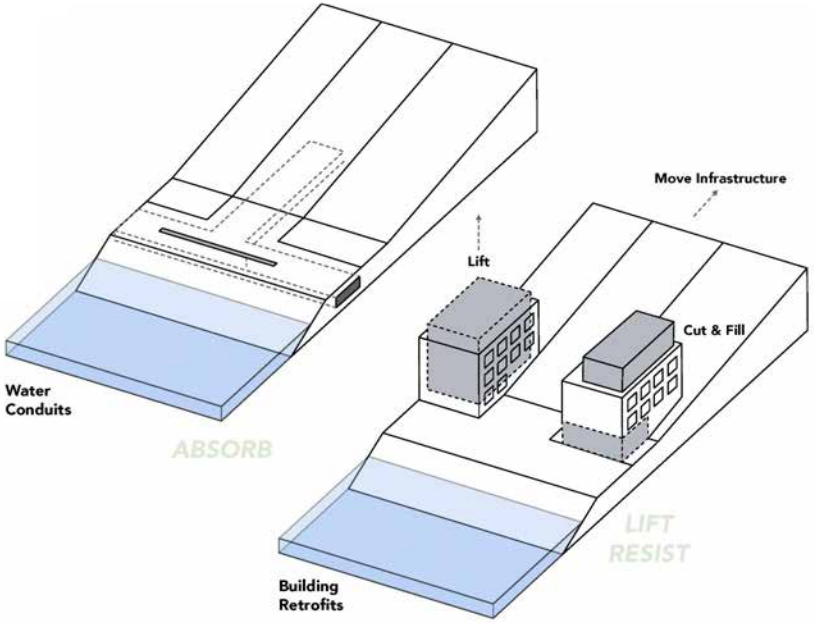


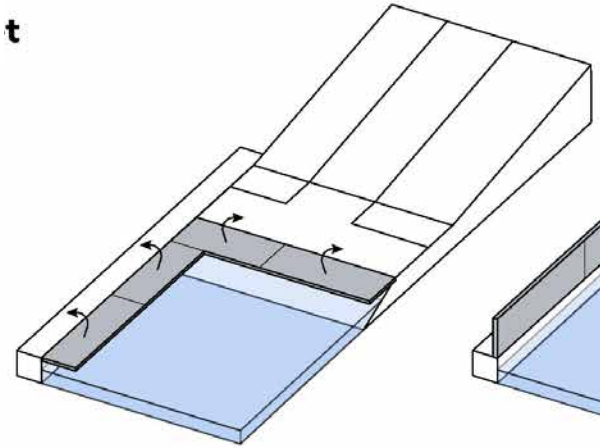
“There are major concerns of flooding in downtown. Not at my building as I'm on upper Main Street, but I know that all the businesses and my cousin Daria’s hair salon down on South Water Street have flooding from Storm Surge. It's already bad, I can't imagine what it's going to be like when there's significant changes in the sea level.” - *Rachel Afshari*

Phase III: Proposals

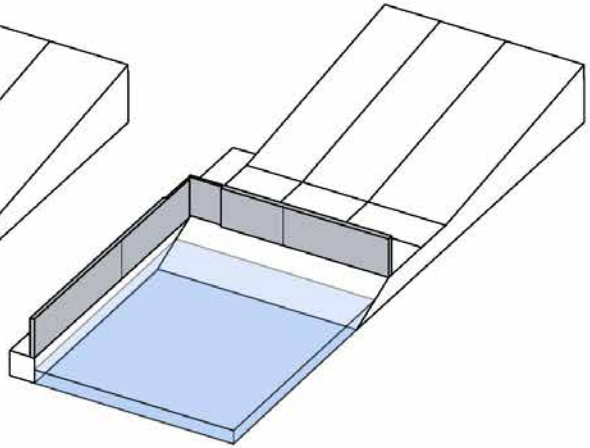
1 Study Area	2 Realm of Intervention	3 Strategy
Downtown	Street Networks	Resistance
Brant Point	Public/Green Spaces	Resilience
Washington St.	Coastal/Marine	Response
		(and combinations thereof)

Theme I: Hybrid Engineering

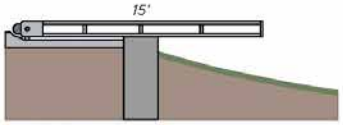




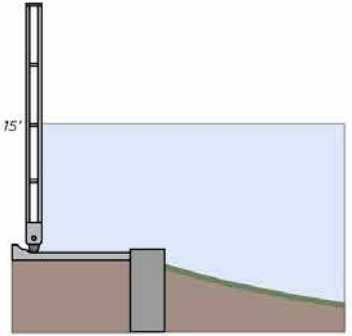
Boardwalk as Deployable Barrier



Boardwalk as Deployable Barrier *(Deployed)*

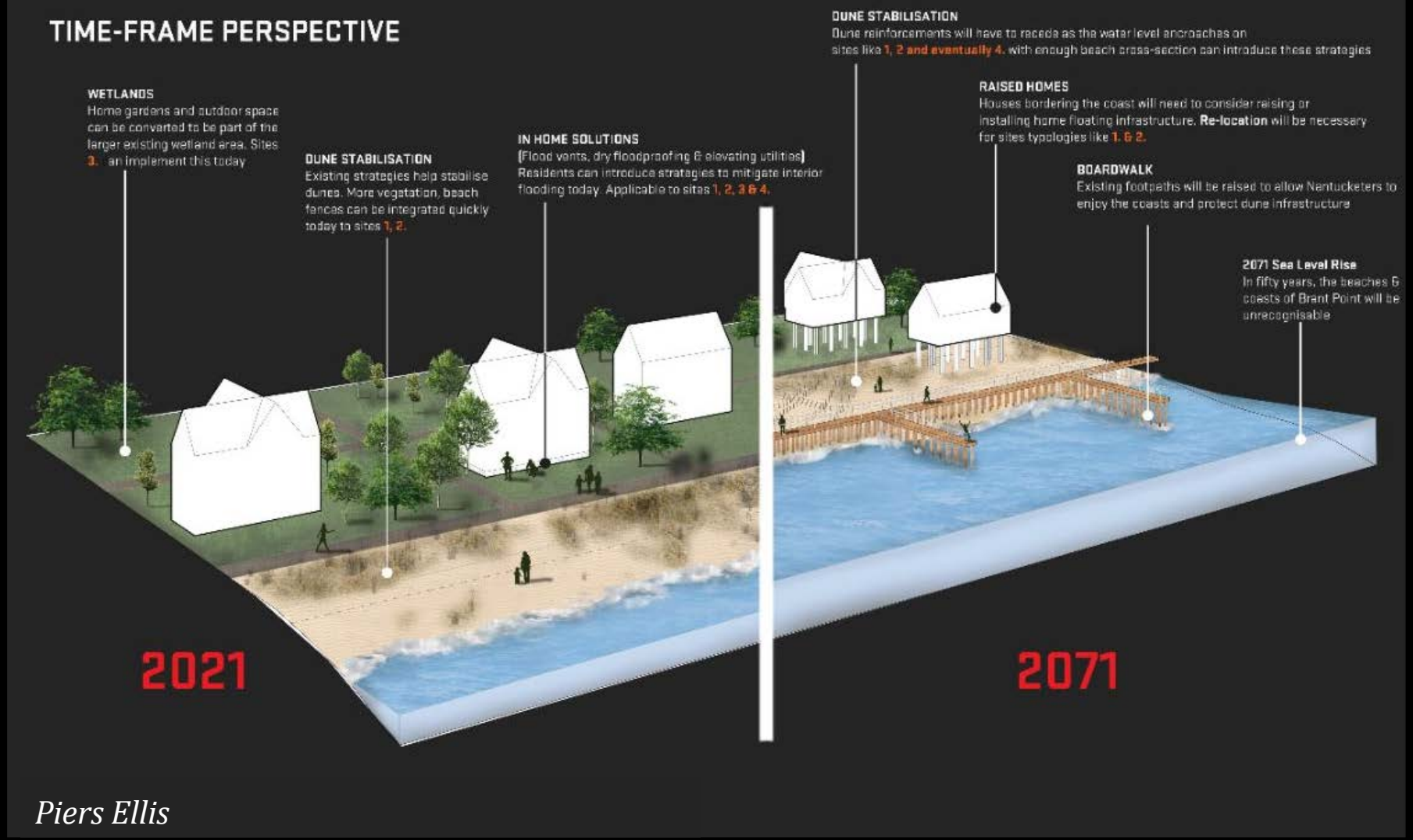


Boardwalk as Deployable Barrier

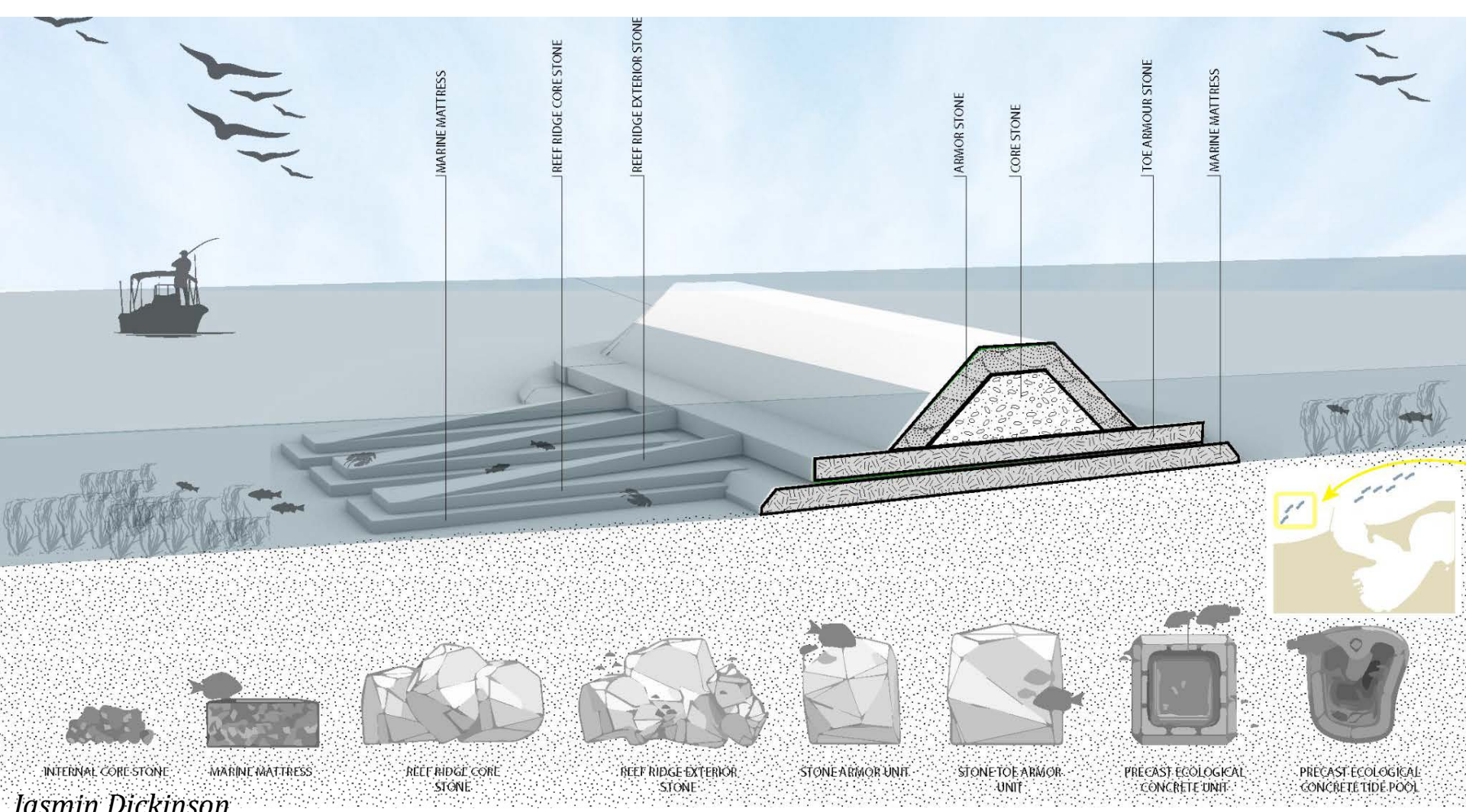


Boardwalk as Deployable Barrier
(Deployed)

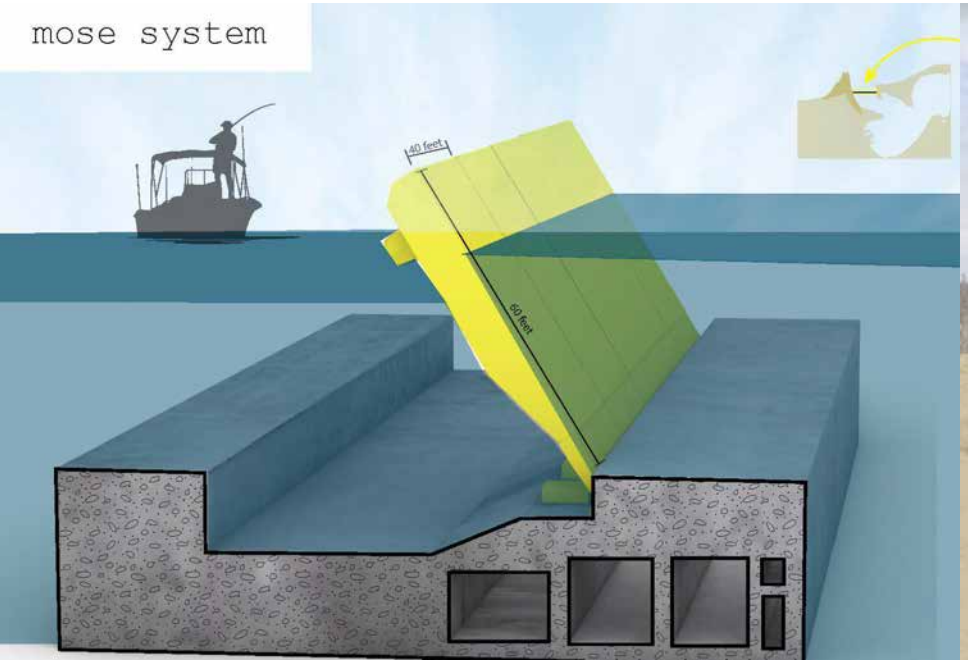
Evan Bradley

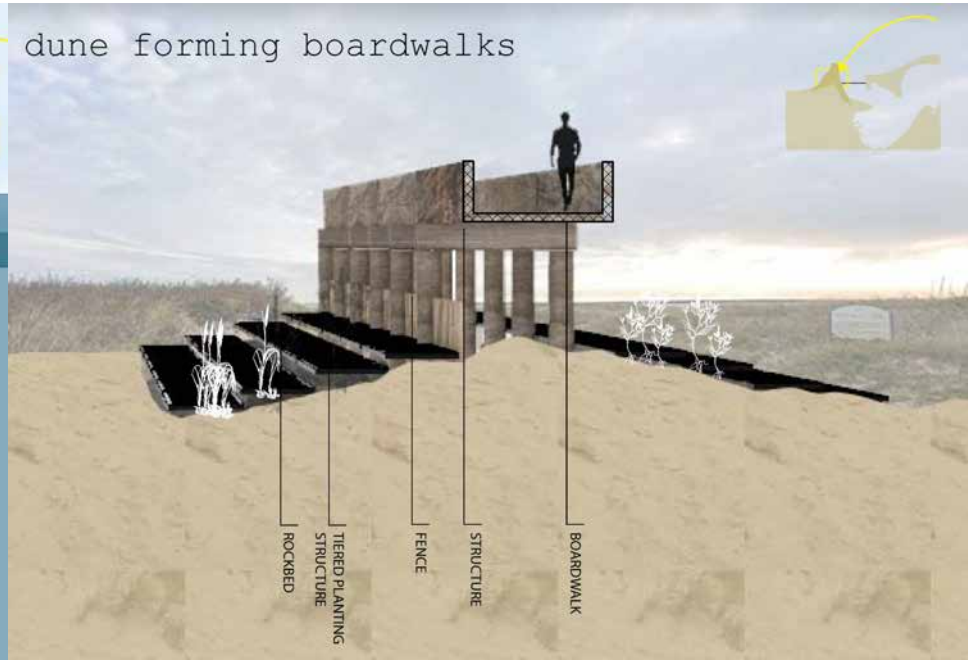

TIME-FRAME PERSPECTIVE
WETLANDS
Home gardens and outdoor space can be converted to be part of the larger existing wetland area. Sites 3. an implement this today
DUNE STABILISATION
Existing strategies help stabilise dunes. More vegetation, beach fences can be integrated quickly today to sites 1, 2.
IN HOME SOLUTIONS
(Flood vents, dry floodproofing & elevating utilities)
Residents can introduce strategies to mitigate interior flooding today. Applicable to sites 1, 2, 3 & 4.
DUNE STABILISATION
Dune reinforcements will have to recede as the water level encroaches on sites like 1, 2 and eventually 4. with enough beach cross-section can introduce these strategies
RAISED HOMES
Houses bordering the coast will need to consider raising or installing home floating infrastructure. Re-location will be necessary for sites typologies like 1. & 2.
BOARDWALK
Existing footpaths will be raised to allow Nantucketers to enjoy the coasts and protect dune infrastructure
2071 Sea Level Rise
In fifty years, the beaches & coasts of Brant Point will be unrecognisable
2021
2071

Piers Ellis

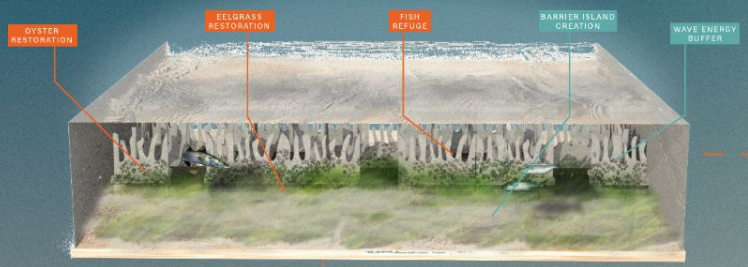


Jasmin Dickinson





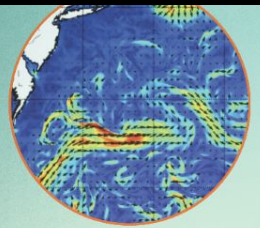
Jasmin Dickinson

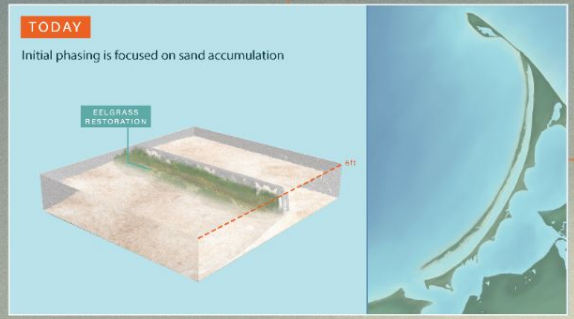


Wave Energy and Depth

To develop this secondasry barrier island, it is critical to understand the movement of wave energy throughout time. The patterns of currents shift throughout the day along with the wind patterns. This information is important becuase it will highlight areas of erosion and also lend an insight of how to design the intervention to make sure that sand will accumulate.

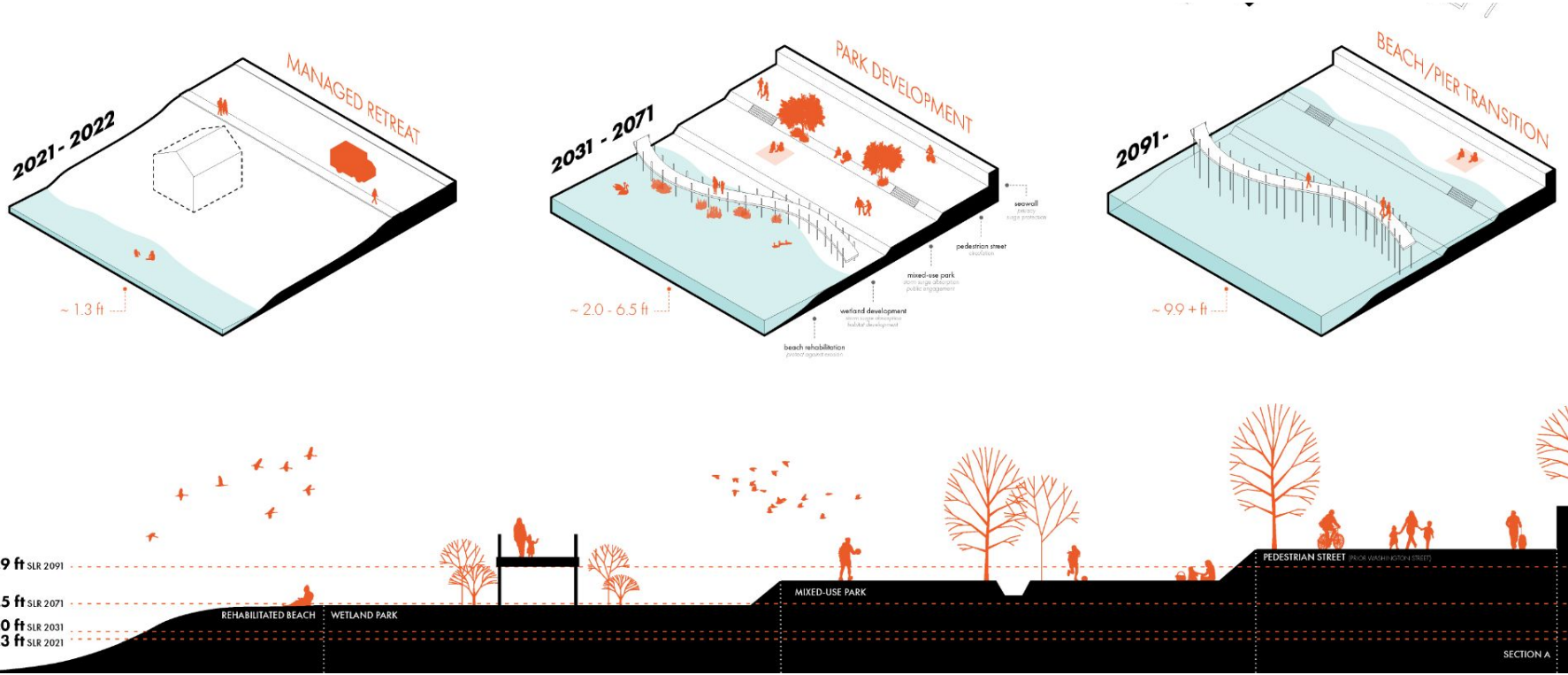
There is a steep drop off from Coatue Beach because of the land formed during glacial periods and this information will show where these artificial barrier islands systems can be created.





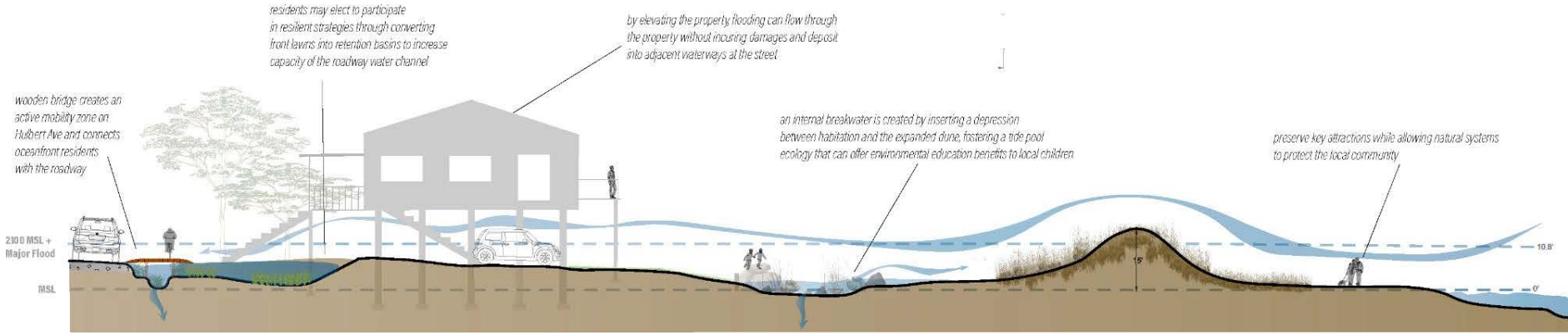
Kyle Wire

Theme II: Domestic Scales



Melissa Jacobs

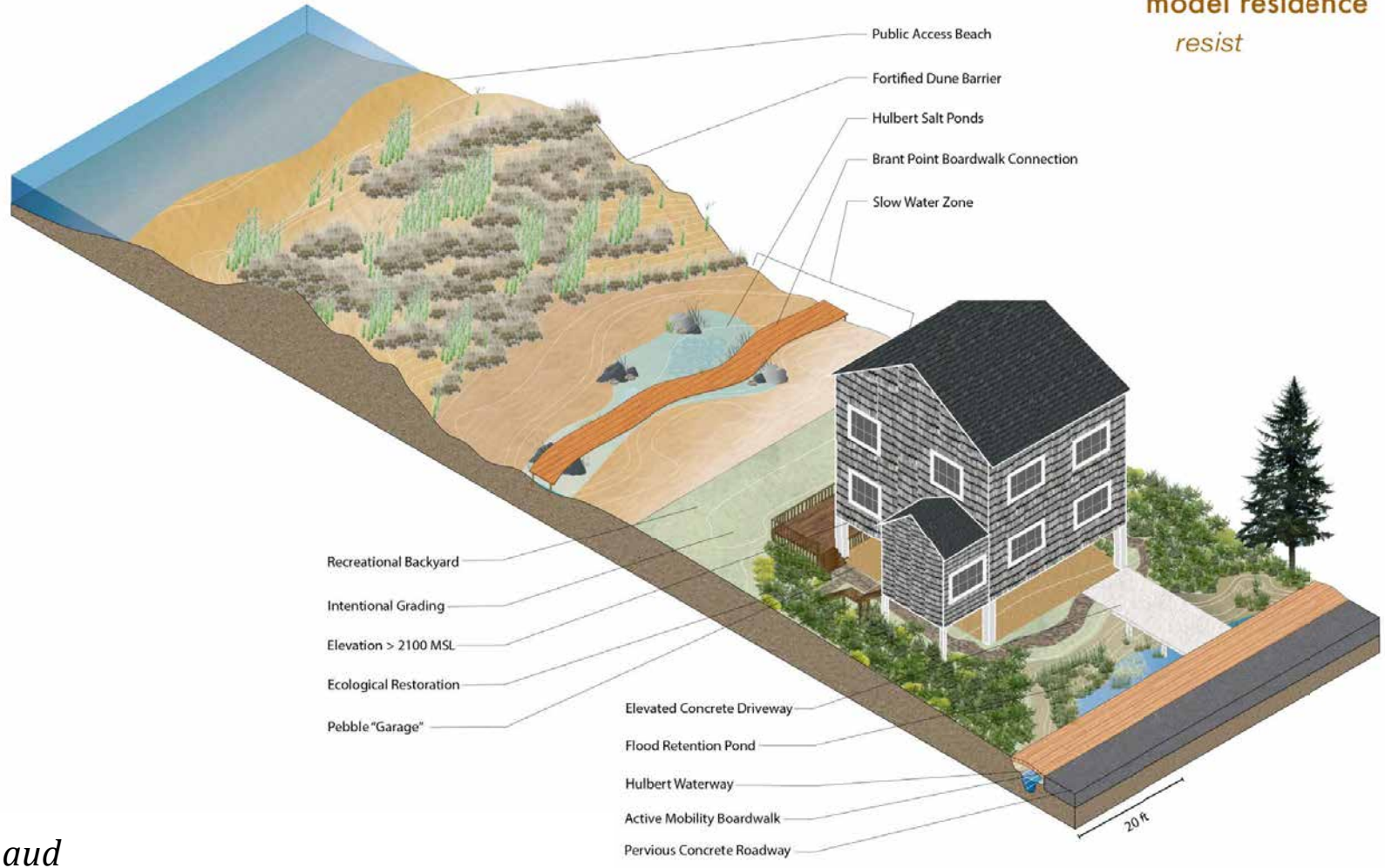
Emma Tracy



Alex Renaud

model residence

resist

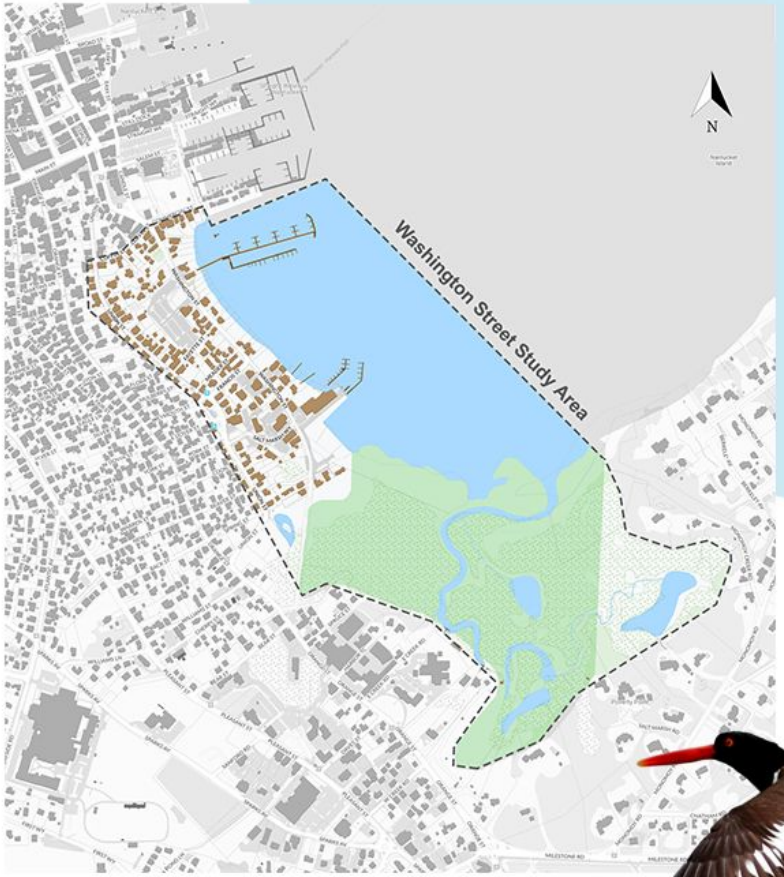


Alex Renaud

Theme II: Transitional Ecologies

Emma Tracy

THE POCKET ECOLOGY



Cassandra Lanson
BS Landscape Architecture and Environmental Science

Sara Carr
LARC 2140

THE POCKET ECOLOGY *Ecological Context*

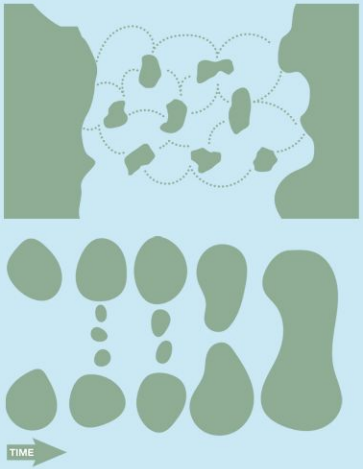
Suburban

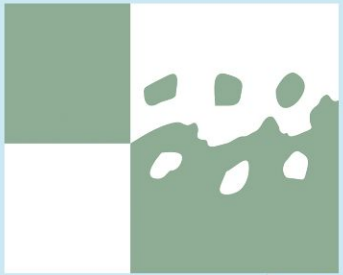
Focus Area: TPE

Marsh

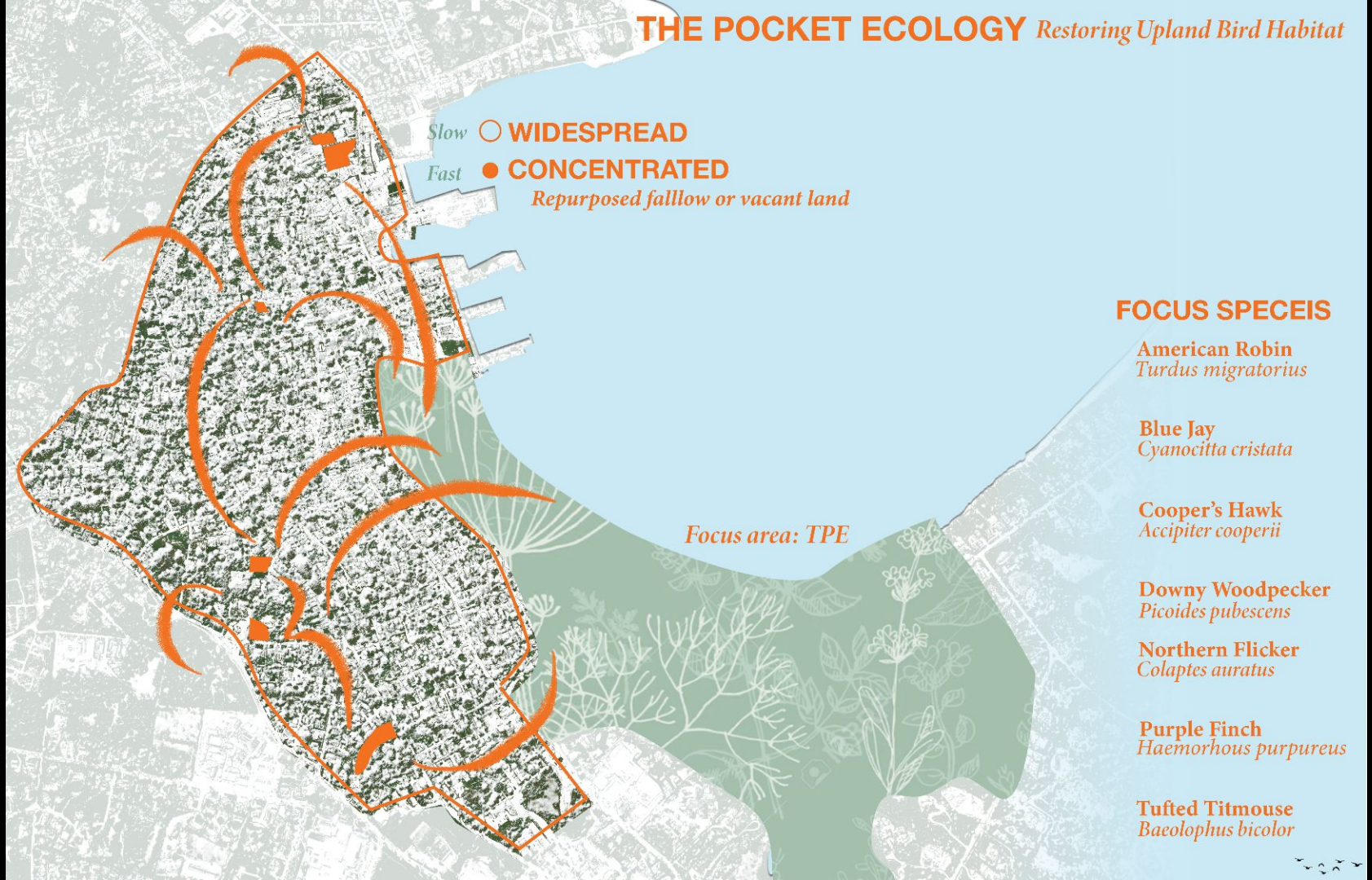
Semi-covered

Fragmentation and Patches





THE POCKET ECOLOGY *Restoring Upland Bird Habitat*



FOCUS SPECEIS

American Robin
Turdus migratorius

Blue Jay
Cyanocitta cristata

Cooper's Hawk
Accipiter cooperii

Downy Woodpecker
Picoides pubescens

Northern Flicker
Colaptes auratus

Purple Finch
Haemorhous purpureus

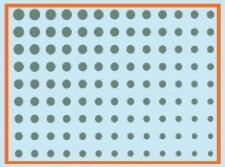
Tufted Titmouse
Baeolophus bicolor

THE POCKET ECOLOGY *Restoring Upland Bird Habitat*

COLLISION PREVENTION

Glass Intervensions

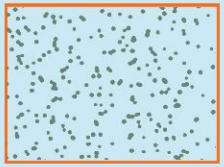
Problem: Transparency



Screen

Visual noise, UV pattern, decals

Problem: Reflection



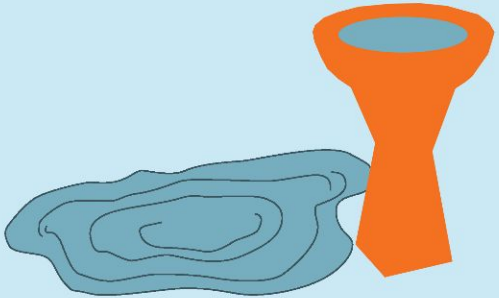
Non-reflective surfaces

Vegetation near building

RESOURCE SUPPLY

Bird nesting boxes and feeders

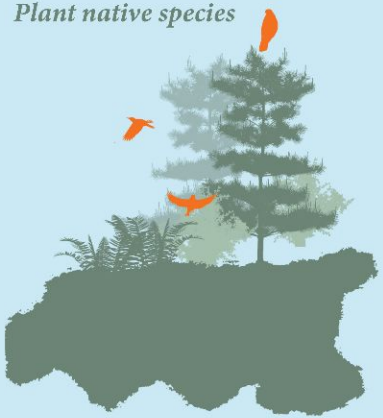
Birds baths and natural puddles



MAXIMUM HABITAT

Avoid accessive pruning and mowing

Dense, layered planting
Plant native species



Bird species interactive passport
Use and vlaue diversity

Sanctuary ranger program
Use and value renewable services

House plaque memorial intallation
Integrate rather than segrgate

Multi-use viewing platforms
Observe and interact

The pocket community
Obtain a yield

Backyard bird planting plans
Small and slow solutions

Social & Cultural

WHY BIRDS?

- *Important ecosystem indicator*
- *Coastal ecosystem fragementation is a protective threat*
- *Restoration of bird habitat weaves the coast back together*
- *Unique social opportunities*

THE POCKET ECOLOGY

How does building bird habitat benefit the social and ecological fabric of Nantucket?

Ecological & Protective

Controled retreat
Use edges and value the marginal

Wetland succession typology
Use and value renewable resources

Nesting habitat for species of conservation concern
Design from patterns to details

Sea level rise and storm surge sponge
Creativity use & respond to change

Ecosystem service application
Catch and sotre energy

THE POCKET ECOLOGY

Sea Level Rise and Neighborhood Vulnerability

Houses as debris

Marshes as buffer

2040 — 2100

1ft — 5ft

THE POCKET ECOLOGY *Bird Ecosystem and Nesting*

Moving outward, the radial graphs orders the species of conservation concern on Nantcuket from greatest to least.

SHOREBIRDS

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

American Oystercatcher
Piping Plover
Roseate Tern
Sanderling
Dunlin
Least Tern
Semipalmated Sandpiper
Semipalmated Plover
Herring Gull

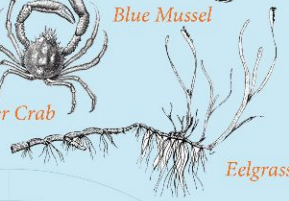
FOOD


Herring


Blue Mussel


Spider Crab


Bay Scallop


Eelgrass

MARSH BIRDS

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Black Tern
Least Sandpiper
Canadian Goose
Northern Harrier
Common Eider

HABITAT

Saltmarsh dieback and dune expansion has greatly reduced the habitat of essential shore and marsh birds. Preserving mudflats and beaches while planting marsh grasses is paramount for the return of ıelthy bird popualtions.


Saltgrass


Saltmarsh Rush

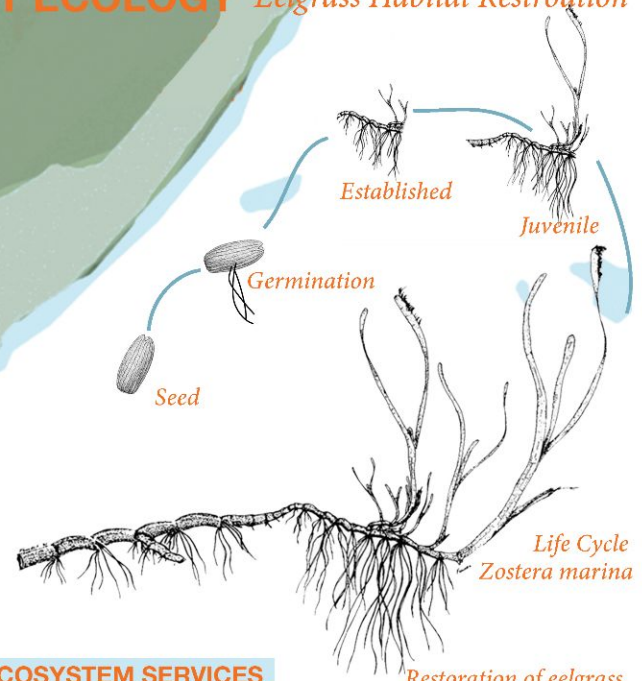

Smooth Cordgrass

THE POCKET ECOLOGY *Eelgrass Habitat Restroation*

Main areas of eelgrass die-off

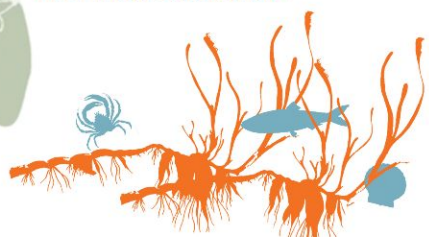
Focus Area: TPE

1995 2019



ECOSYSTEM SERVICES

CARBON SEQUESTRATION
SUBSTRATE SECURITY
TIDAL HABITAT
FOUL FOOD SOURCE



Restoration of eelgrass will provide an extra vegetative coastal buffer. The plants are effective carbon sequesterers. Eelgrass also provides habitat for marine species that coastal birds depend on as a food source.

MARSH FOREST

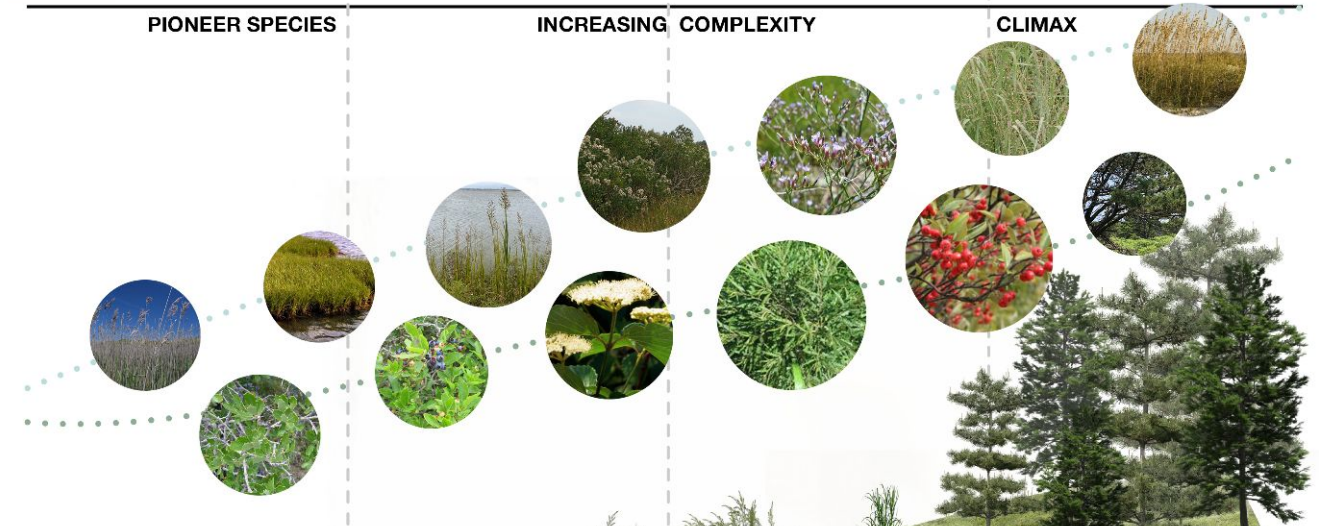
THE POCKET ECOLOGY *Wetland Services*

ECOLOGICAL SERVICES

PIONEER SPECIES

INCREASING COMPLEXITY

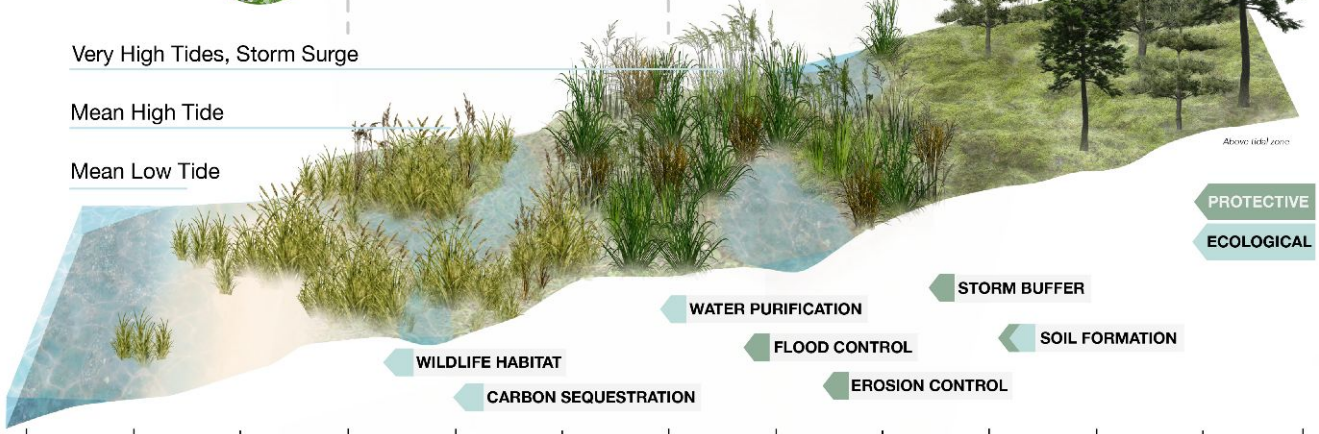
CLIMAX



Very High Tides, Storm Surge

Mean High Tide

Mean Low Tide



YR 1 YR 3 YR 5 YR 8

The previously existing roads are eliminated to prevent habitat fragmentation.

Rerouting heavy traffic roads opens space to create a connected sanctuary, while acting as a barrier between Nantucket and the protected ecology.

THE POCKET ECOLOGY *Site Plan*

Multifunctional community pocket

Restored eelgrass buffer

Feeding habitat

Nesting habitat

BEACH	*Intertidal zone, dialy submersion*
LOW	*Wet planting mix, frequent submersion*
HIGH	*Damp planting mix, less frequent submersion*
UPLAND	*Soil stabilization, urban screening*
GRAVEL	*Rocky habitat for nesting birds*
ARTIFICIAL	*Nesting box sites*
BLINDS	*Wooden fence structures*
PLATFORM	*Community spaces*
EELGRASS	*Restored natural buffer*

THE POCKET ECOLOGY *Marsh Planting Guide*

UPLAND

Quercus alba	White Oak
Juniperus virginiana	Eastern Red Cedar
Ilex opaca	American Holly
Myrica pensylvanica	Northern Bayberry
Iva annua	Marsh Elder
Spartina patens	Salt Meadow Cordgrass

HIGH MARSH

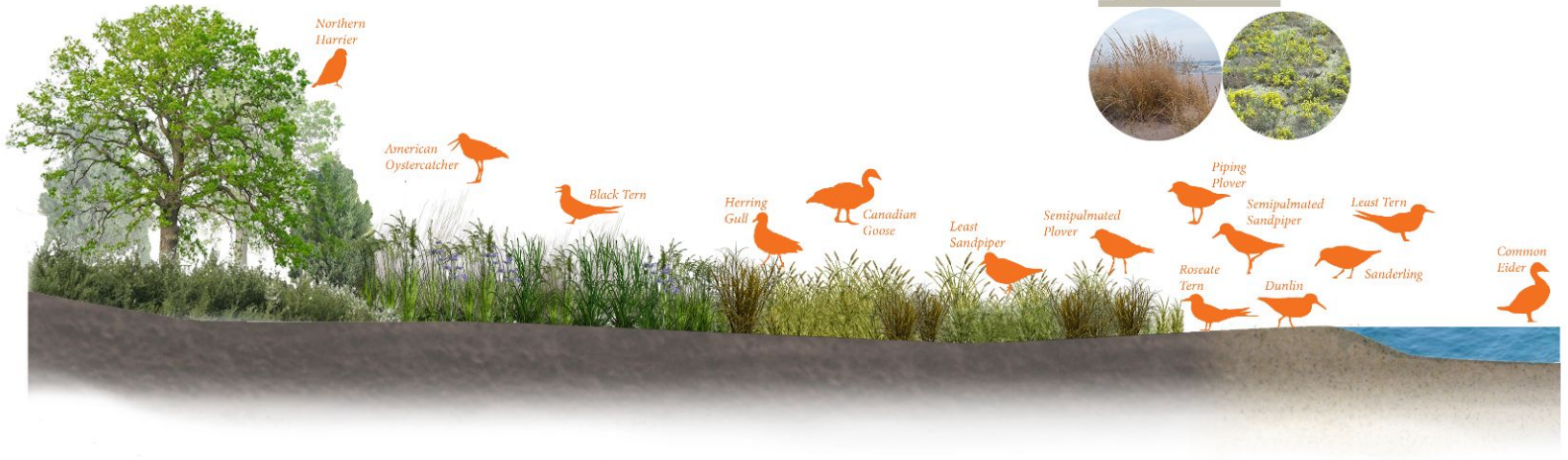
Iva annua	Marsh Elder
Spartina patens	Salt Meadow Cordgrass
Uniola paniculata	Sea Oats
Panicum virgatum	Switch Grass
Symphyotrichum tenuifolium	Saltmarsh Aster
Limonium sinuatum	Sea Lavender
Distichlis spicata	Saltgrass

LOW MARSH

Spartina alterniflora	Smooth Cordgrass
Juncus maritimus	Black Sea Rush
Bolboschoenus maritimus	Saltmarsh Bulrush
Spartina cynosuroides	Big Cordgrass

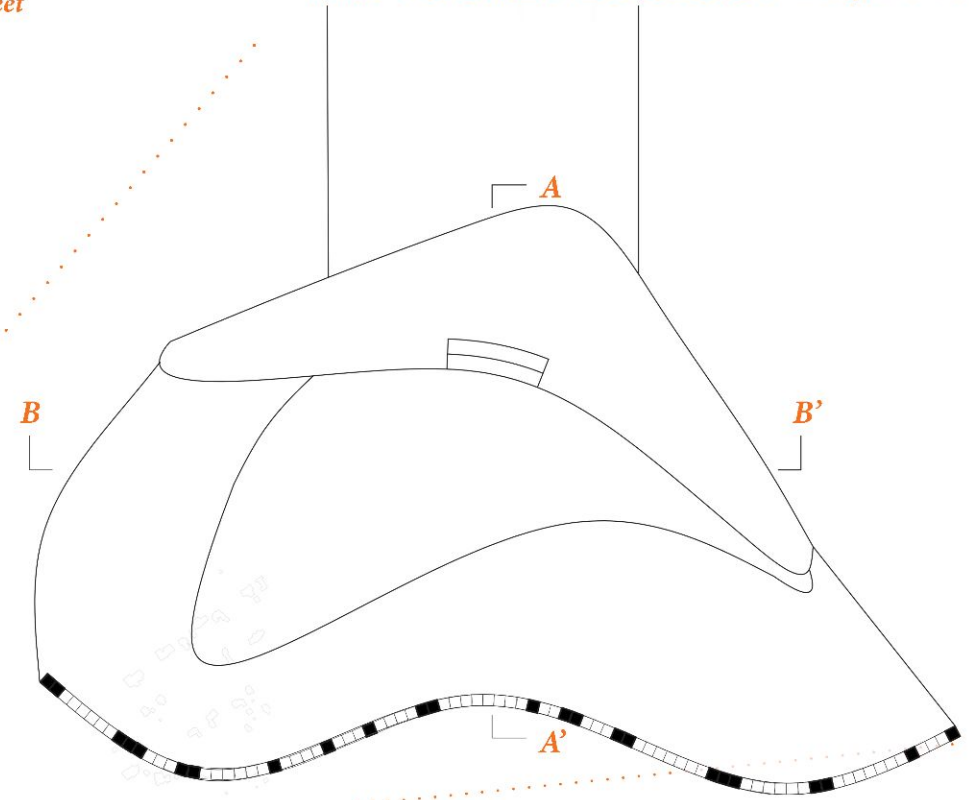
BEACH

Ammophila breviligulata	American Beach Grass
Hudsonia tomentosa	Beach Heather



THE POCKET ECOLOGY *Platform Plan*

The community platforms are located where roads meet the sanctuary boundary. Cars can be driven up to the platforms.



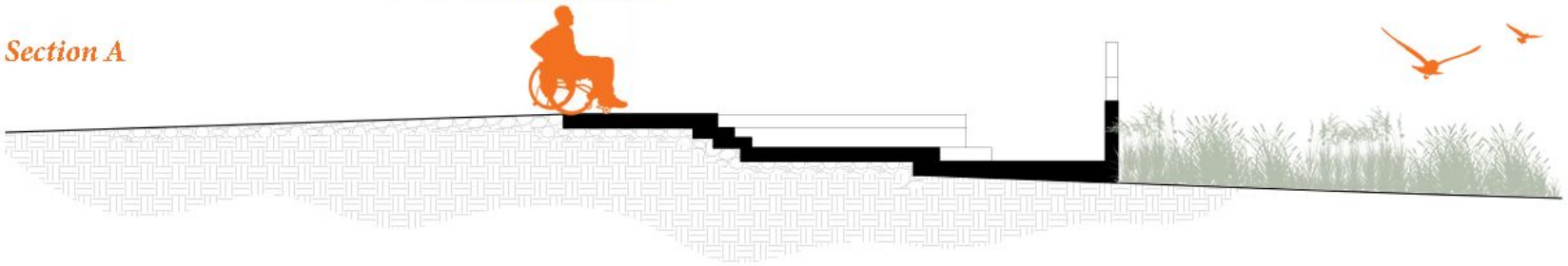
Scale: 1/4" = 1'-0"

The community platforms allow people to occupy the boundary between existing and newly conserved land.

THE POCKET ECOLOGY *Platform Sections*

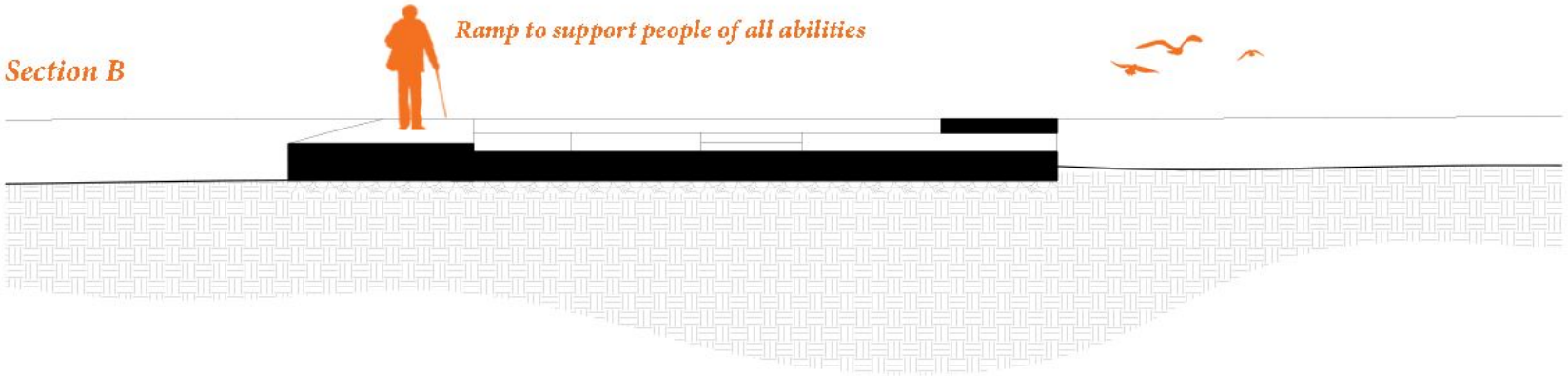
Grade change for easy access

Section A

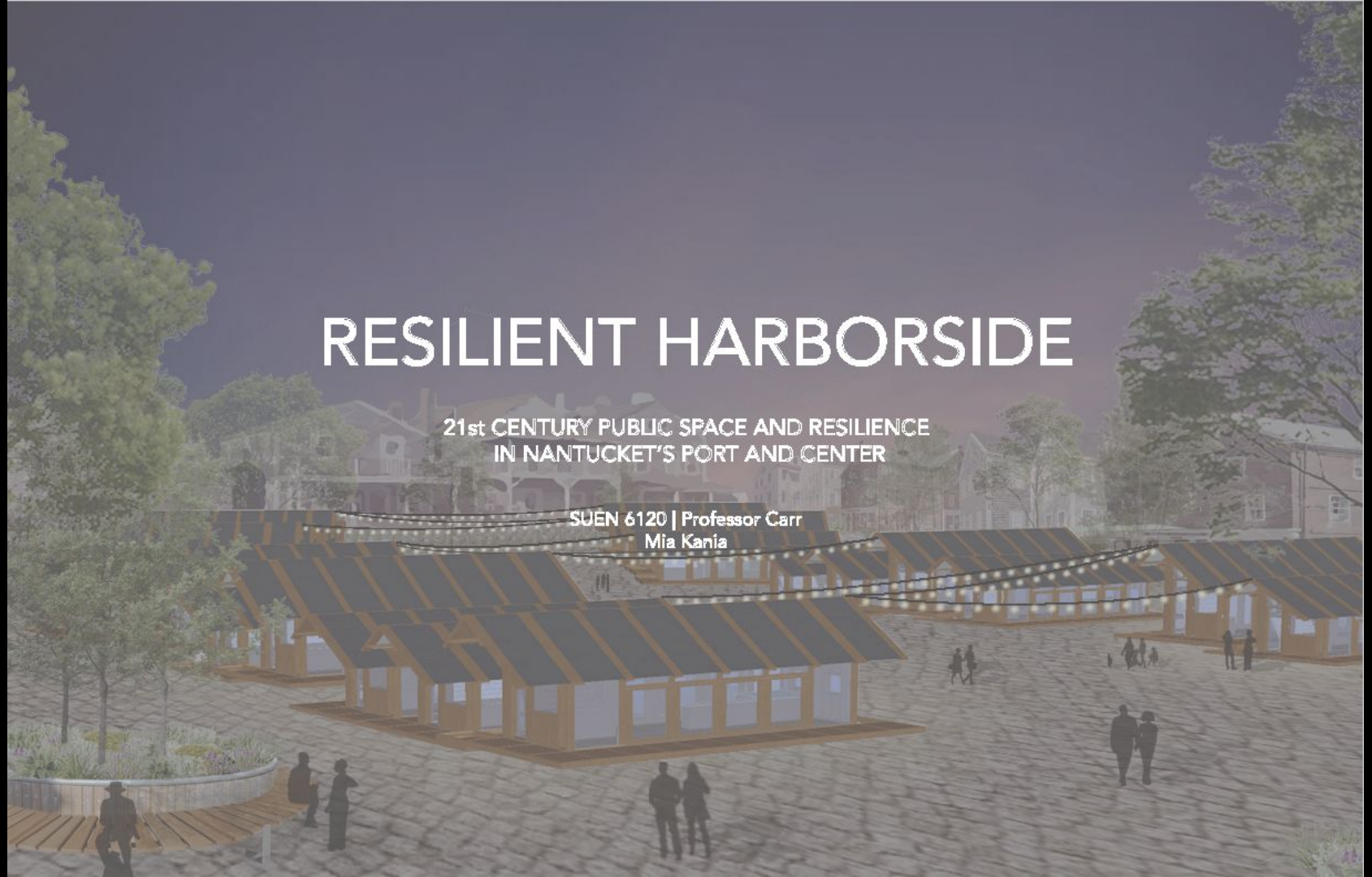


Ramp to support people of all abilities

Section B



Scale = 1/4" = 1'-0"



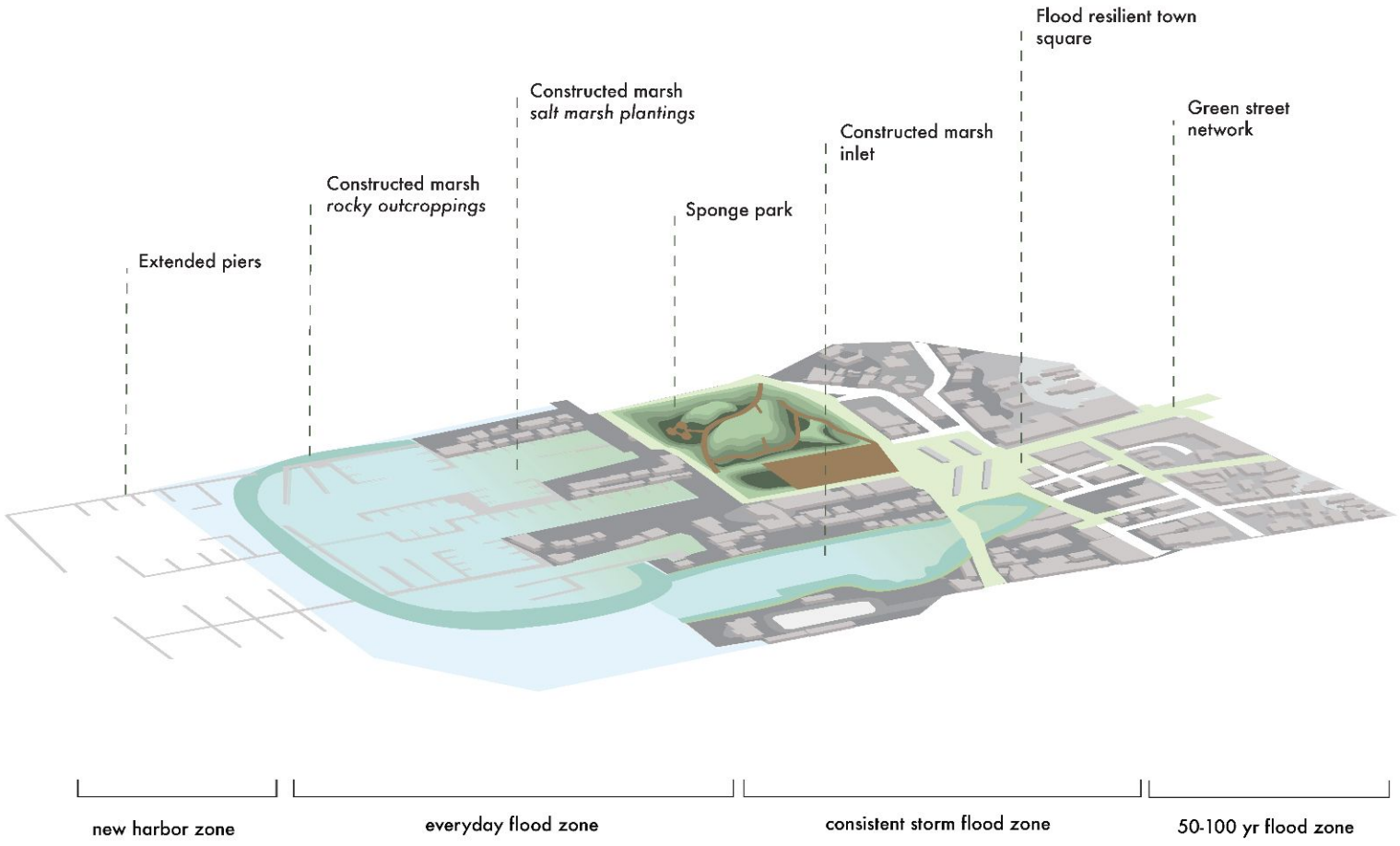
RESILIENT HARBORSIDE

21st CENTURY PUBLIC SPACE AND RESILIENCE IN NANTUCKET'S PORT AND CENTER

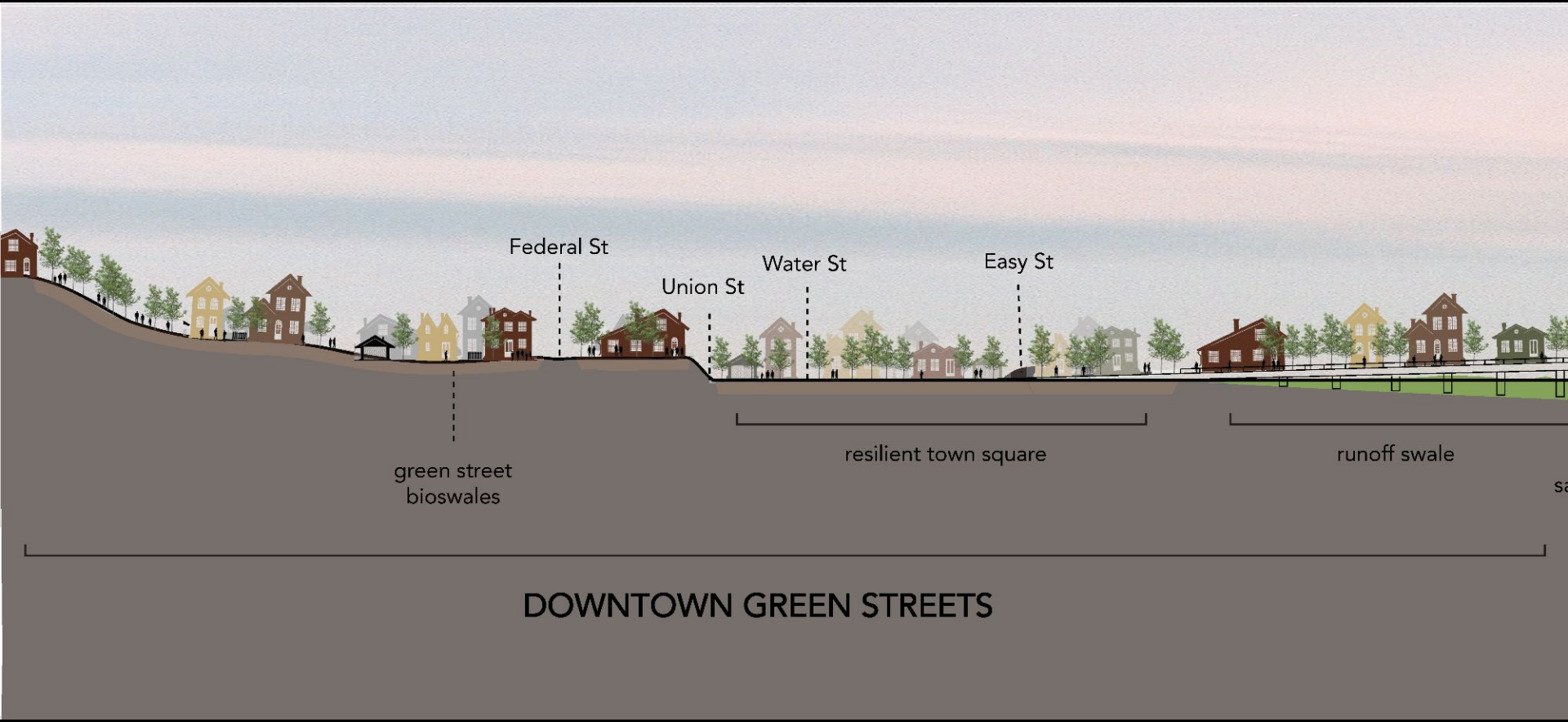
SUEN 6120 | Professor Carr
Mia Kania

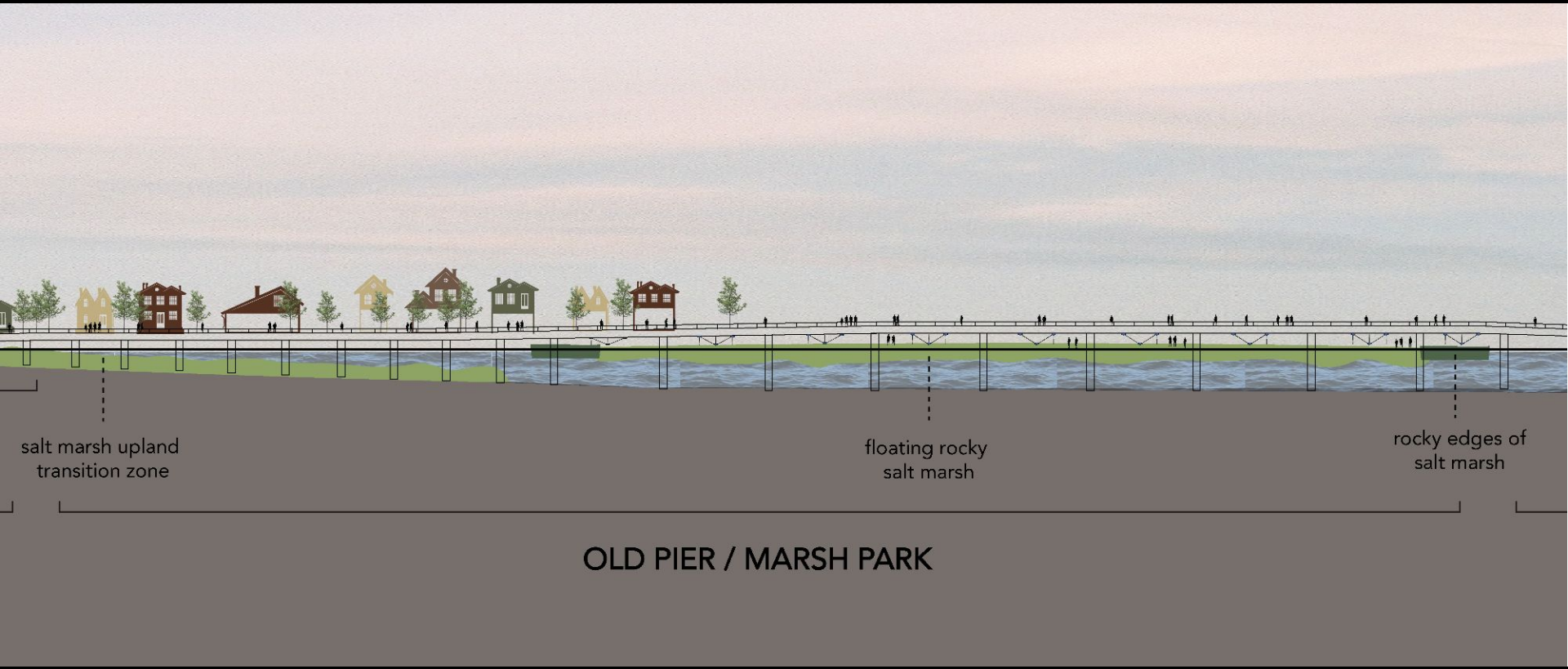

PROJECTED SEA LEVEL RISE
1 ft sea level rise
2 ft sea level rise
3 ft sea level rise
4 ft sea level rise
5 ft sea level rise
6 ft sea level rise
7 ft sea level rise
8 ft sea level rise
9 ft sea level rise
10 ft sea level rise


CURRENT BUILDING USE
Restaurant
Boutique Shopping
Residential
City buildings
Hotel
Office space
Misc. Business
Broad St
S Water St
Easy St
Federal St
Centre St
Main St
Washington St
Candle St
Orange St
Union St


Flood resilient town square
Constructed marsh
salt marsh plantings
Green street network
Constructed marsh inlet
Constructed marsh
rocky outcroppings
Sponge park
Extended piers
new harbor zone
everyday flood zone
consistent storm flood zone
50-100 yr flood zone


Federal St
Union St
Water St
Fosy St
green street bioswales
resilient town square
runoff swale
salt marsh upland transition zone
floating rocky salt marsh
rocky edges of salt marsh
DOWNTOWN GREEN STREETS
OLD PIER / MARSH PARK
NEW PIER

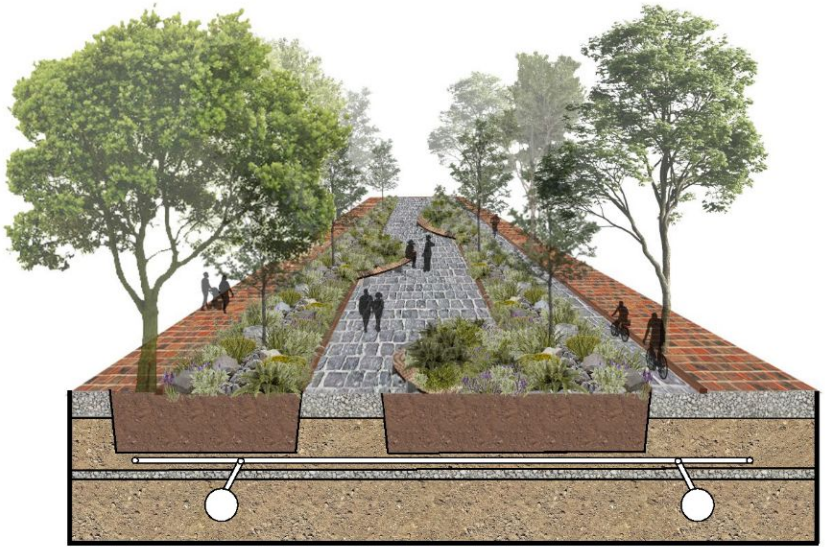

Federal St
Union St
Water St
Easy St
green street
bioswales
resilient town square
runoff swale
DOWNTOWN GREEN STREETS



OLD PIER / MARSH PARK


rocky edges of
salt marsh
NEW PIER

60′ WIDE GREEN STREET



Pedestrian walkway, 10′ wide

Bioswale, 12.5′ wide

Pedestrian zone, 30′ wide

Bioswale, 6.5′ wide

Bike path 6′ wide

Pedestrian walkway, 10′ wide

Gravel filtration

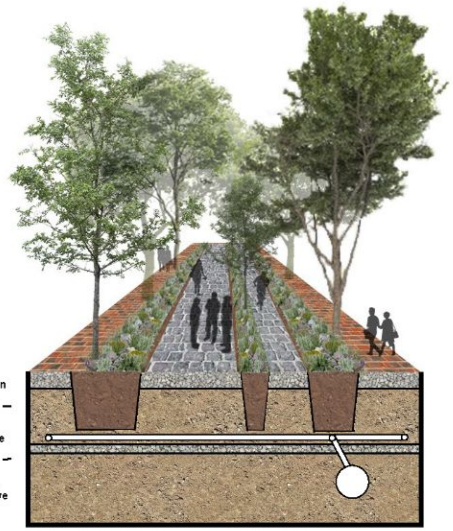
Bioretention soil fill

Perforated pipe

Gravel base

Undisturbed native soil

40′ WIDE GREEN STREET



Sidewalk, 5′

Bioswale 3′

Ped walkway & seating, 3′

Bioswale 3′

Bike path, 5′

Bioswale 3′

Sidewalk, 5′

0′ 10′ 20′

scale: 1″ = 10′

Emergent Aquatic Ecologies

Encouraging the Transformation and Health of Brant Point's Coastal Communities through Adaptation and Productivity

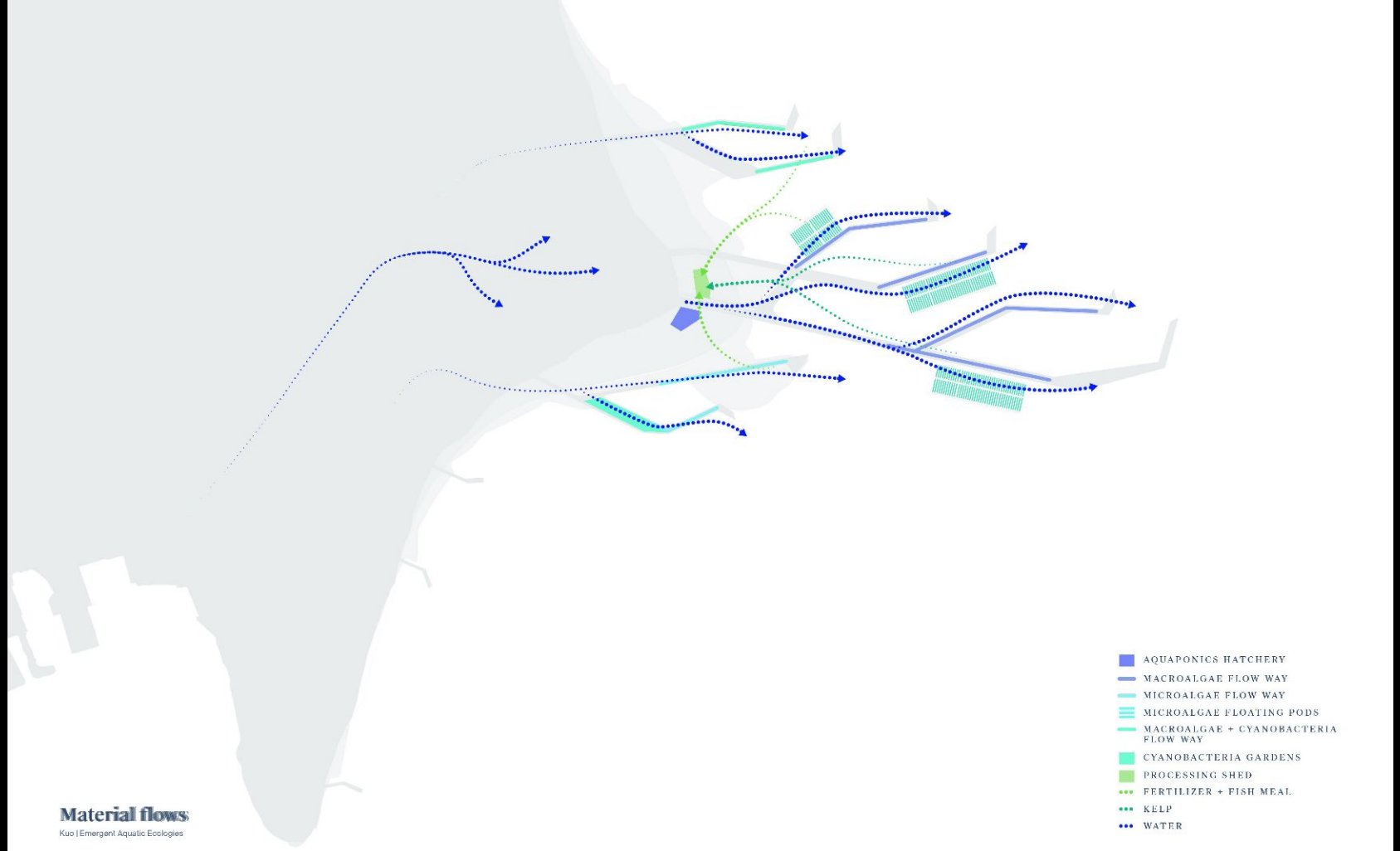
Northeastern University
B.LA in Urban Landscape '21

Cammy Kuo

Comprehensive Design Studio
LARC 5120: Island Ecologies
27 April 2021


N
Kyle Emergent Aquatic Ecologies


JETTIES BEACH
THE COURTS
KAYAK DOCK
BIODIGESTER
PROCESSING FACILITY
URBAN DUNES
AQUAPONICA FISH HATCHERY
ALGAE GROIN-FLOW WAYS
EDUCATION + RESEARCH FACILITY
THE DUNES
OMEGA ALGAE FLOATING PODS
MARINE GARDENS
MOORING GROINS
Kuo | Emergent Aquatic Ecologies



Material flows

Kuo | Emergent Aquatic Ecologies


JETTIES BEACH
THE COURTS
KAYAK DOCK
BIODIGESTER
PROCESSING FACILITY
URBAN DUNES
AQUAPONICS FISH HATCHERY
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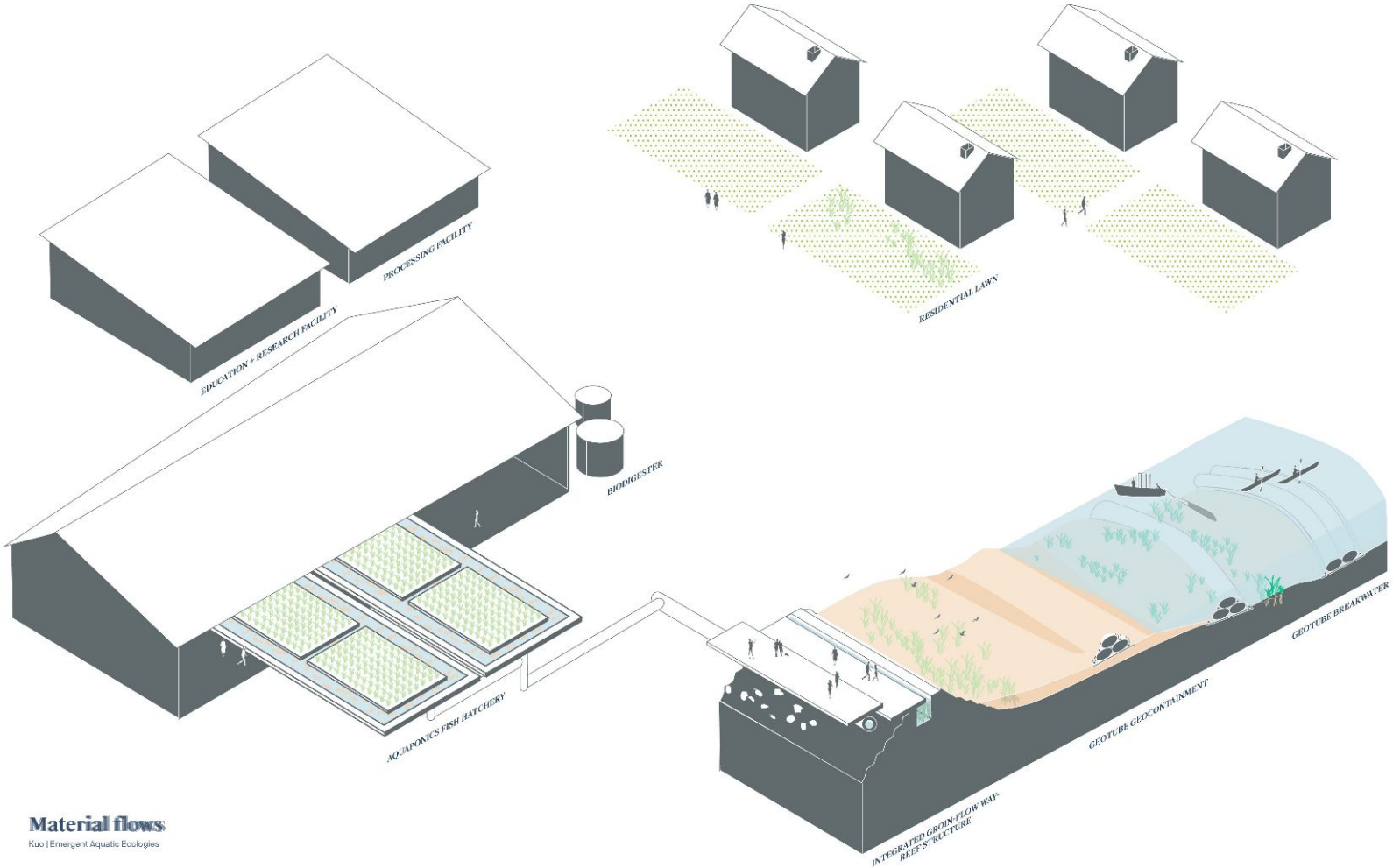
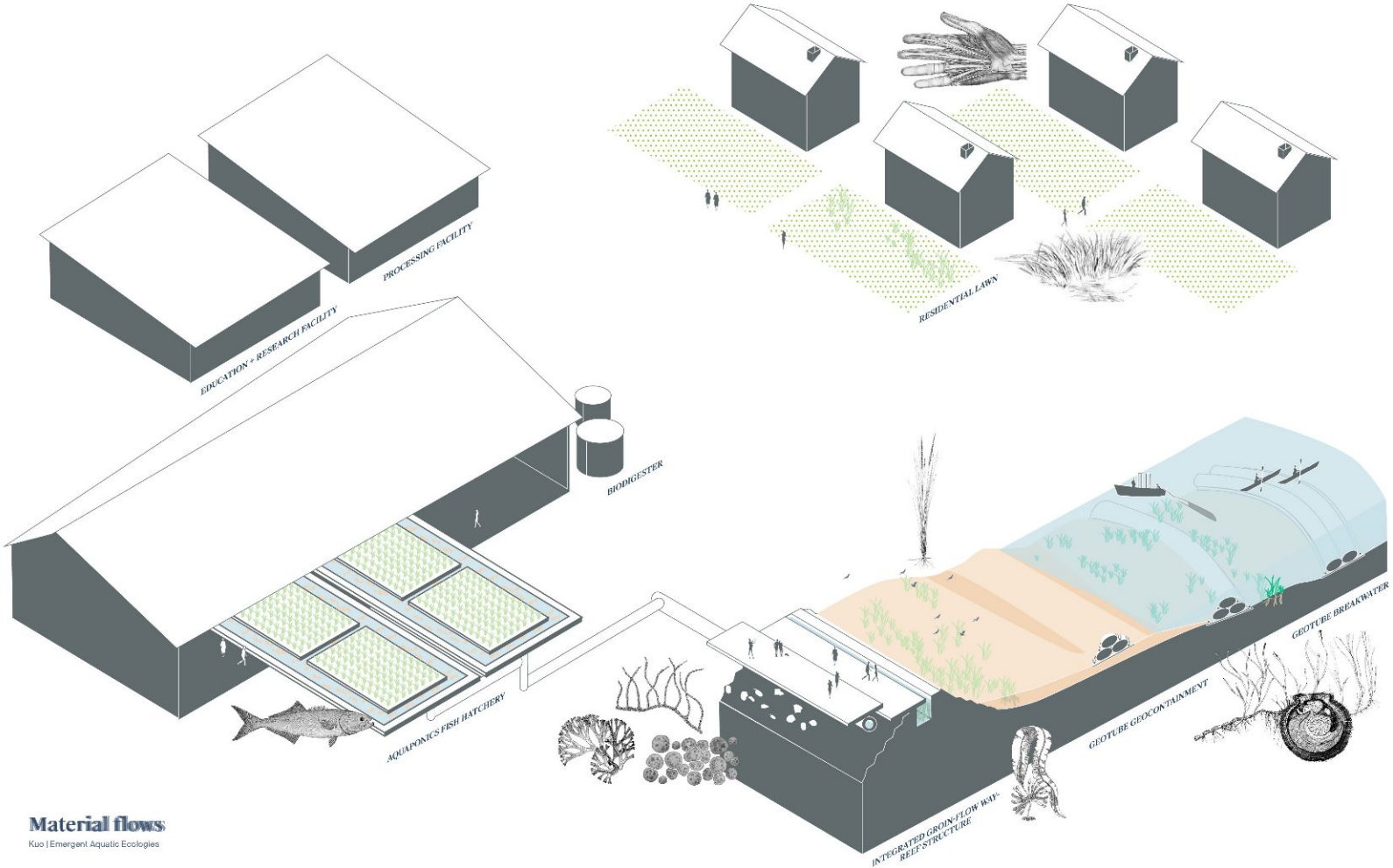
Kuo | Emergent Aquatic Ecologies



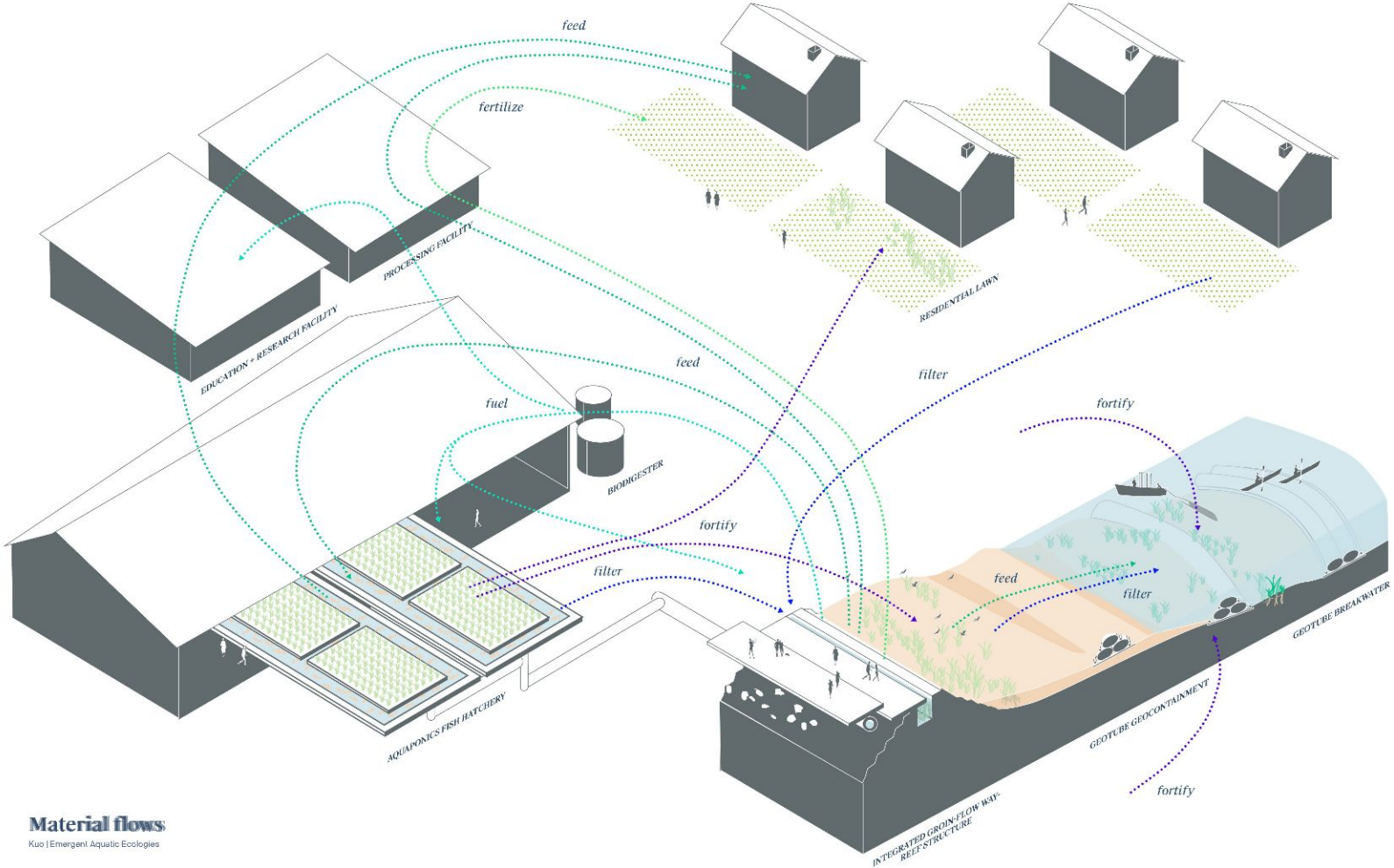
Material flows

Kuo | Emergent Aquatic Ecologies



Material flows

Kuo | Emergent Aquatic Ecologies



Material flows

Kuo | Emergent Aquatic Ecologies


JETTIES BEACH
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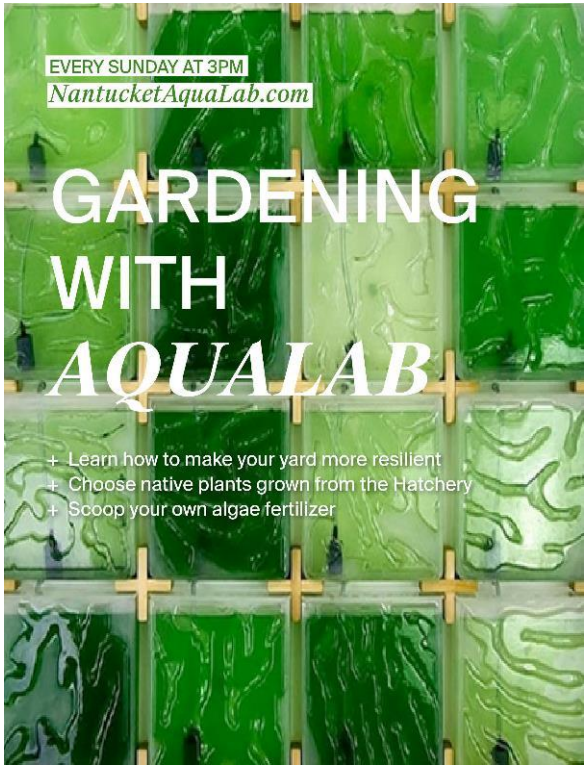
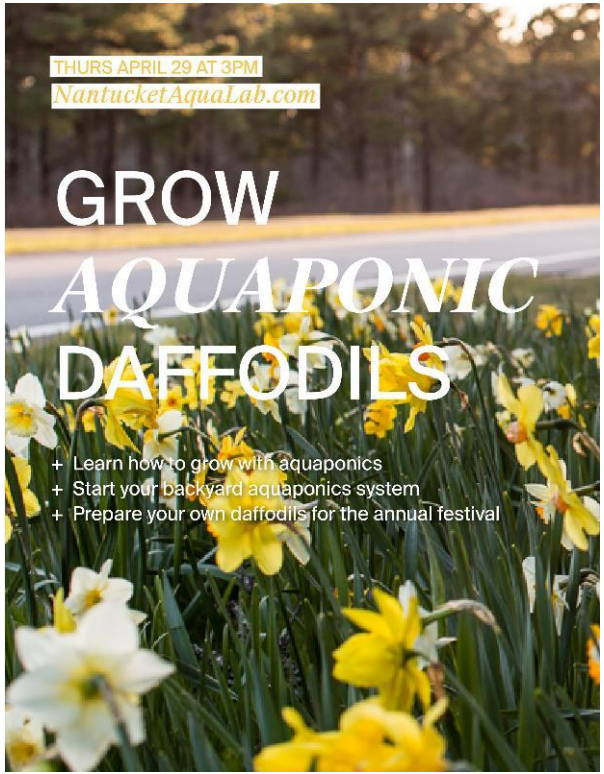

EVERY SUNDAY AT 3PM
NantucketAquaLab.com
GARDENING WITH AQUALAB
+ Learn how to make your yard more resilient
+ Choose native plants grown from the Hatchery
+ Scoop your own algae fertilizer


FILL OUT AN APPLICATION AT
NantucketAquaLab.com
JOIN THE MARINE GARDENS
+ Reserve a pond at the Gardens today
+ Start growing spirulina for next month


THURS APRIL 29 AT 3PM
NantucketAquaLab.com
GROW AQUAPONIC DAFFODILS
+ Learn how to grow with aquaponics
+ Start your backyard aquaponics system
+ Prepare your own daffodils for the annual festival