OFFICE
FOR
URBANIZATION

RESEARCH REPORT

Climate Futures on the Gulf of Maine Transects

EDITION

2025

CLIMATE FUTURES
ON THE GULF OF MAINE
Transects

What are transects?

The following transects[1] are composite drone photographs that show natural communities and physical infrastructure systems along the rim of the Gulf of Maine.[2] Each transect is constructed from a series of planar drone photographs that are arranged in a straight line that cuts through across adjacent ecological and structural infrastructural systems. These transects reveal the ways that structural infrastructure systems have been developed over, under, above, below, around, through, between, within, in, and on ecological systems.[3]

As an observational tool,[4] these transects translate different systems into a consistent graphic language and are annotated to reveal how these systems are layered in the landscape.

There are two systems of annotation on each of the following transects: ecological systems and structural, or physical infrastructure systems.

Above each transect are a series of color-blocks that represent different natural communities.[5] These communities are the basis of ecological infrastructure systems in the Gulf of Maine. Establishing an ecological baseline is important to gauge future changes in the Gulf of Maine ecosystem, such as the conversion of high marsh grass to low marsh as sea levels rise, and increasing sea surface temperatures, which affect the communities of plants and animals that can live along the Gulf.

There are many different classification systems for natural communities, which themselves are not discrete, and often have messy, overlapping boundaries. Plants grow in communities that are established in specific microclimates where they are best adapted to soil, salinity, wind, and water conditions. Topography and water flow, therefore, are the two primary factors that affect the distribution of these natural communities.[6]

This work uses two classification systems for natural communities based on where each drone transect was taken. Transects taken within the Commonwealth of Massachusetts use the Massachusetts Division of Fisheries and Wildlife system.[7] Transects taken within the State of Maine use the Maine Department of Conservation.[8]

[1] Transects are a method of field analysis to understand the environment in various disciplines including ecology, geography, agriculture, marine biology, archaeology, and geology. The transect was first used by the German geographer Alexander von Humboldt in 1793 as a tool to visualize the relationship between ecology, geology, and climate through a cross-section drawing across South America from the Atlantic to Pacific Oceans. Today, transects are used to describe existing conditions, and are also used as a tool for adaptive design. See SaMin Han, "The Use of Transects for Resilient Design: Core Theories and Contemporary Projects," *Landscape Ecology* 36, no. 5 (2021): 1567–82.

[2] These transects are an example of what landscape architect and scholar Gareth Doherty calls combining vertical (fieldwork) transects with horizontal aerial images to marry ethnographic and geographic approaches to landscape research. Doherty writes that, "the vertical transect allows for a more intimate and nuanced reading of landscape than we can get from aerial images alone." Gareth Doherty, "The Vertical and the Horizontal: Combining Ethnographic and Geographic Methods in Understanding Landscape," in *Routledge Research Companion to Landscape Architecture*, ed. Ellen Braae and Henriette Steiner (New York, N.Y.: Routledge, 2019), 152.

[3] These issues are not unique to the Gulf of Maine. Landscape architect Pierre Belanger writes that, across the world, the development of modern infrastructure has "largely overshadowed the pre-eminence of the biophysical systems that underlie it." Pierre Belanger, *Landscape as Infrastructure* (New York: Routledge, 2017), p. 145.

[4] In this report, physical infrastructure systems refer to the buildings, power, rail, resilience, roads, water, and wastewater infrastructure systems on the Gulf of Maine.

[5] There is overlap between the plants and animals found in different communities, and many plants and animals use many different community types in their habitats. According to the Massachusetts Division of Fisheries and Wildlife, "natural communities are defined as groups of species that are found together over and over again, usually in particular environmental conditions. Occurrences of a community type tend to be in sites with similar chemistry, soils, moisture, slopes, temperature ranges, and other physical conditions. In a given community type, certain species, especially plants, occur together in similar structures and proportions. A particular community type may have species that occur only or primarily in that type of community. When those species are present, they are indicative of the presence of that type of community and are therefore called indicator species." P.C. Swain, *Classification of the Natural Communities of Massachusetts* (Westborough, MA: Natural Heritage & Endangered Species Program, Massachusetts Division of Fisheries and Wildlife, 2020), 1-5.

[6] The Gulf is a hybrid landscape that includes many different species. Some, like saltmarsh grasses and blue mussels, have grown here for thousands of years without human intervention or management. Others, like housecats and hydrangeas, are domesticated and ornamental species that have been introduced by people. Still other species, like European green crabs (*Carcinus maenas*) are advantageous, or invasive species that were introduced by people. These introduced species play an important part in shaping the ecology in the Gulf, though they are not accounted for in assessments of natural communities, which are groups of plants and animals that commonly live together.

[7] P.C. Swain, *Classification of the Natural Communities of Massachusetts* (Westborough, MA: Natural Heritage and Endangered Species Program, Massachusetts Division of Fisheries and Wildlife, 2020).

[8] Susan Gawler and Andrew Cutko, *Natural Landscapes of Maine: A Guide to Natural Communities and Ecosystem* (Augusta: Maine Department of Conservation, 2018).

Structural, or physical infrastructure systems are catalogued below each transect.

These include:

— Buildings (residential, commercial, industrial)

— Power (electric lines, power plants)

— Rail (tracks, culverts, bridges)

— Resilience infrastructure (seawalls, revetments, breakwaters)

— Roads (culverts, bridges)

— Wastewater (treatment plants, sewer pump stations)

— Water (dams, reservoirs)

The following pages present transects taken across the Gulf of Maine.

Natural Communities

- Marine Intertidal Sand Beach
- Marine Intertidal Rocky Shore
- Salt Marsh
- Brackish Tidal Marsh
- Freshwater Swamp
- Maritime Dune
- Maritime Shrubland
- Coastal Forest
- Maritime Beach Strand Community
- White Pine-Oak Forest
- Fresh/Brackish Tidal Swamp
- Fresh/Brackish Tidal Shrubland
- Low Energy Riverbank Community
- Acidic Pondshore/Lakeshore Community
- Successional Northern Hardwood Forest
- Deep Emergent Marsh
- Acidic Rocky Outcrop/Summit Community
- Coastal Salt Pond
- Interdunal Marsh/Swale
- Coastal Beach
- Rose Maritime Shrubland
- Salt-hay Saltmarsh
- Tall Shrub Fen
- White Pine Forest
- Atlantic White Cedar Bog
- Hardwood Seepage Forest
- Grassy Shrub Marsh
- Mixed Saltmarsh
- Ocean

- Phragmites
- Impervious Surface

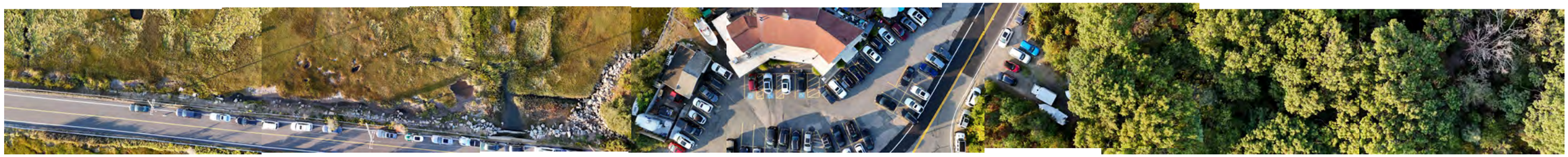
Lobsta Land Restaurant

Lobsta Land Restaurant
Causeway Street
Gloucester, MA 01930
USA

Lobsta Land Restaurant

ECOLOGICAL INFRASTRUCTURE

Salt Marsh | *Impervious Surface* | *Coastal Forest*



Transportation
Causeway Street

Electrical
Power line

Electrical
Power line

Transportation
Culvert

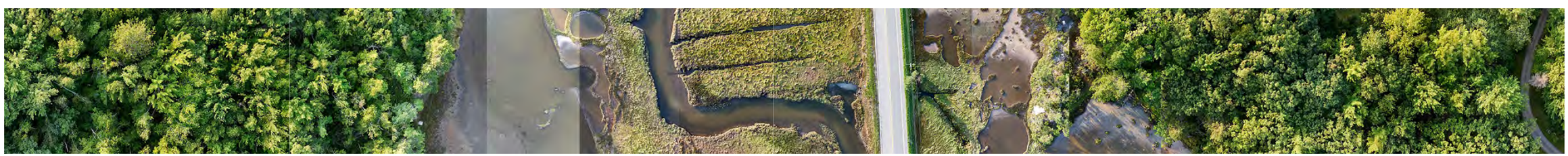
Building
Commercial

Transportation
Rust Island Road

PHYSICAL INFRASTRUCTURE

Lobsta Land Restaurant
Causeway Street
Gloucester, MA 01930
USA

Causeway Street



Causeway Street
West Annisquam
Gloucester, MA 01930
USA

Causeway Street

ECOLOGICAL INFRASTRUCTURE

Impervious Surface

Coastal Forest | *Salt Marsh* | *Coastal Forest*

PHYSICAL INFRASTRUCTURE

Transportation
Boynton Island Causeway

Causeway Street
West Annisquam
Gloucester, MA 01930
USA

Gloucester Wastewater Treatment Plant

Gloucester Wastewater Treatment Plant
Causeway Street
Gloucester, MA 01930
USA

Gloucester Wastewater Treatment Plant

ECOLOGICAL INFRASTRUCTURE

Coastal Forest	Impervious Surface	Maritime Shrubland		Salt Marsh	Salt Marsh	Ocean	Impervious Surface

Building
Residential

Wastewater
Wastewater Treatment Plant

Transportation
Essex Avenue

Transportation
Boat Ramp

Electrical
Telephone Poles

Coastal
Bulkhead

Building
Residential

PHYSICAL INFRASTRUCTURE

Gloucester Wastewater Treatment Plant
Causeway Street
Gloucester, MA 01930
USA

Gloucester Wastewater Treatment Plant

Gloucester Wastewater Treatment Plant
Causeway Street
Gloucester, MA 01930
USA

Gloucester Wastewater Treatment Plant

ECOLOGICAL INFRASTRUCTURE

Impervious Surface

Salt Marsh

Salt Marsh

Coastal Resilience
Dredged Channel

Transportation
Essex Avenue

Transportation
Culvert

Coastal Resilience
Mosquito ditch

PHYSICAL INFRASTRUCTURE

Gloucester Wastewater Treatment Plant
Causeway Street
Gloucester, MA 01930
USA

Causeway Brook

Causeway Brook
Manchester-by-the-Sea, MA 01944
USA

Causeway Brook

ECOLOGICAL INFRASTRUCTURE

Impervious Surface *Impervious Surface*

White Pine-Oak Forest	*Fresh/Brackish Tidal Swamp*	*Fresh/Brackish Tidal Swamp*	*Salt Marsh*	*White Pine-Oak Forest*

Transportation
Causeway Brook

Transportation
Route 127

Transportation
Commuter Rail

PHYSICAL INFRASTRUCTURE

Causeway Brook
Manchester-by-the-Sea, MA 01944
USA

Conomo Point

Conomo Point
Essex, MA 01929
USA

Conomo Point

ECOLOGICAL INFRASTRUCTURE

Impervious Surface

Coastal Resilience
Mosquito Ditches

Transportation
Conomo Point Road

Transportation
Beach Circuit

PHYSICAL INFRASTRUCTURE

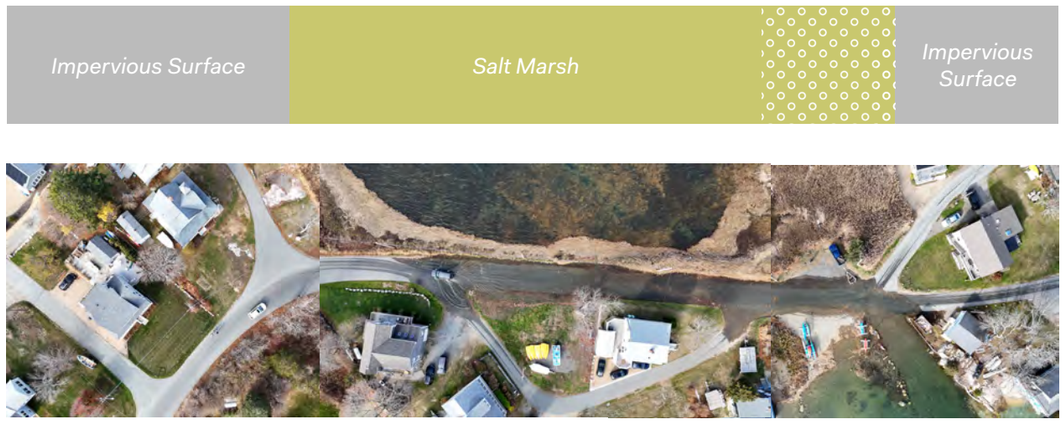
Conomo Point
Essex, MA 01929
USA

Conomo Point Road

Conomo Point Road
Conomo Point
Essex, MA 01929
USA

Conomo Point Road

ECOLOGICAL INFRASTRUCTURE



Transportation
Conomo Point Road

Electrical
Telephone Pole

Social
Clammers Beach

PHYSICAL INFRASTRUCTURE

Conomo Point Road
Conomo Point
Essex, MA 01929
USA

Conomo Point

Conomo Point
Essex, MA 01929
USA

Conomo Point

ECOLOGICAL INFRASTRUCTURE

Maritime Shrubland

Impervious Surface

Salt Marsh

Fresh/Brackish Tidal Forest

White Pine/Oak Forest

Fresh/Brackish Tidal Forest

White Pine/ Oak Forest

White Pine/Oak Forest

PHYSICAL INFRASTRUCTURE

Transportation
Cogswell Road

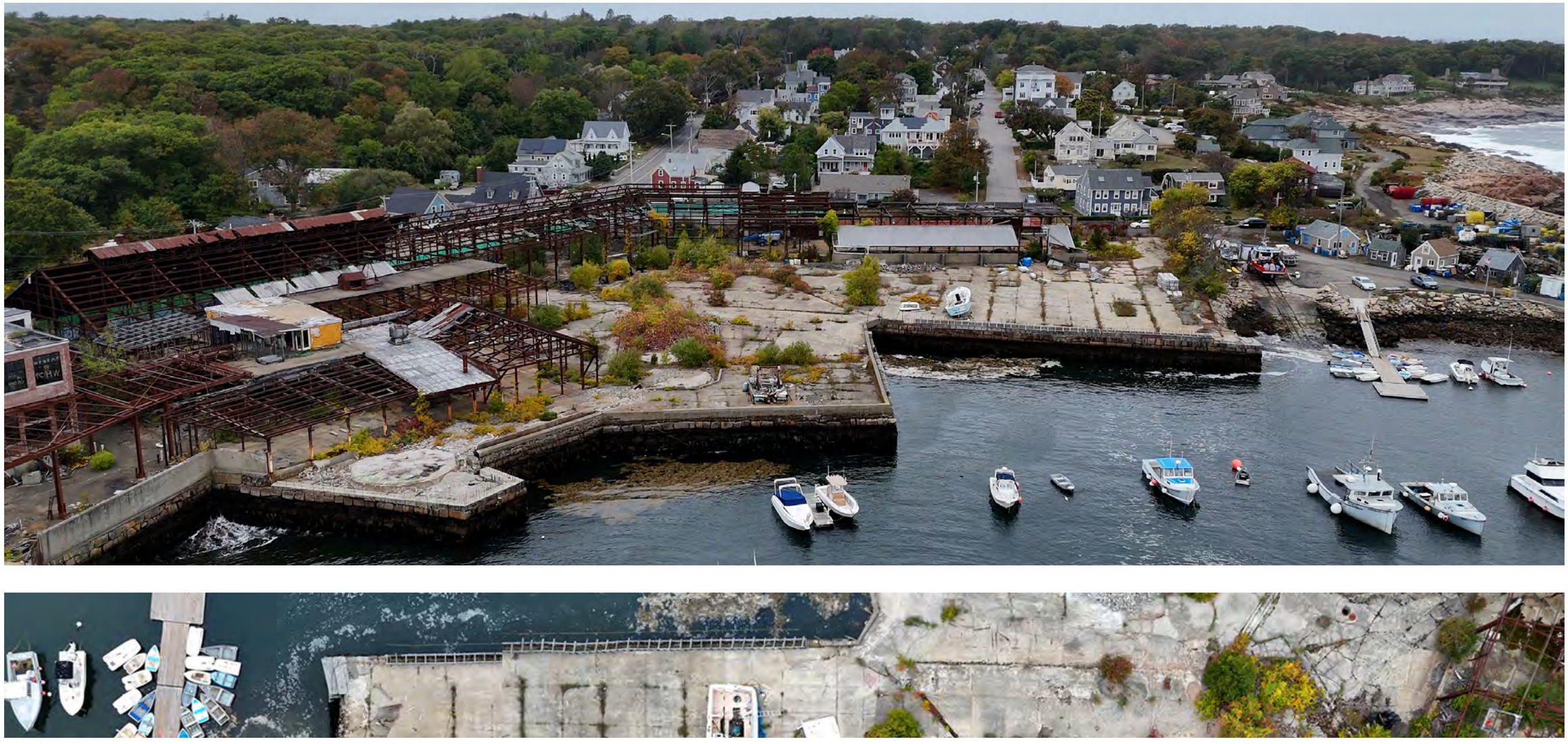
Transportation
Town Farm Road

Transportation
Ellis Drive

Transportation
Conomo Point Road

Conomo Point
Essex, MA 01929
USA

Cape Ann Tool Company



Cape Ann Tool Company
Pigeon Cove
Rockport, MA 01966
USA

Cape Ann Tool Company

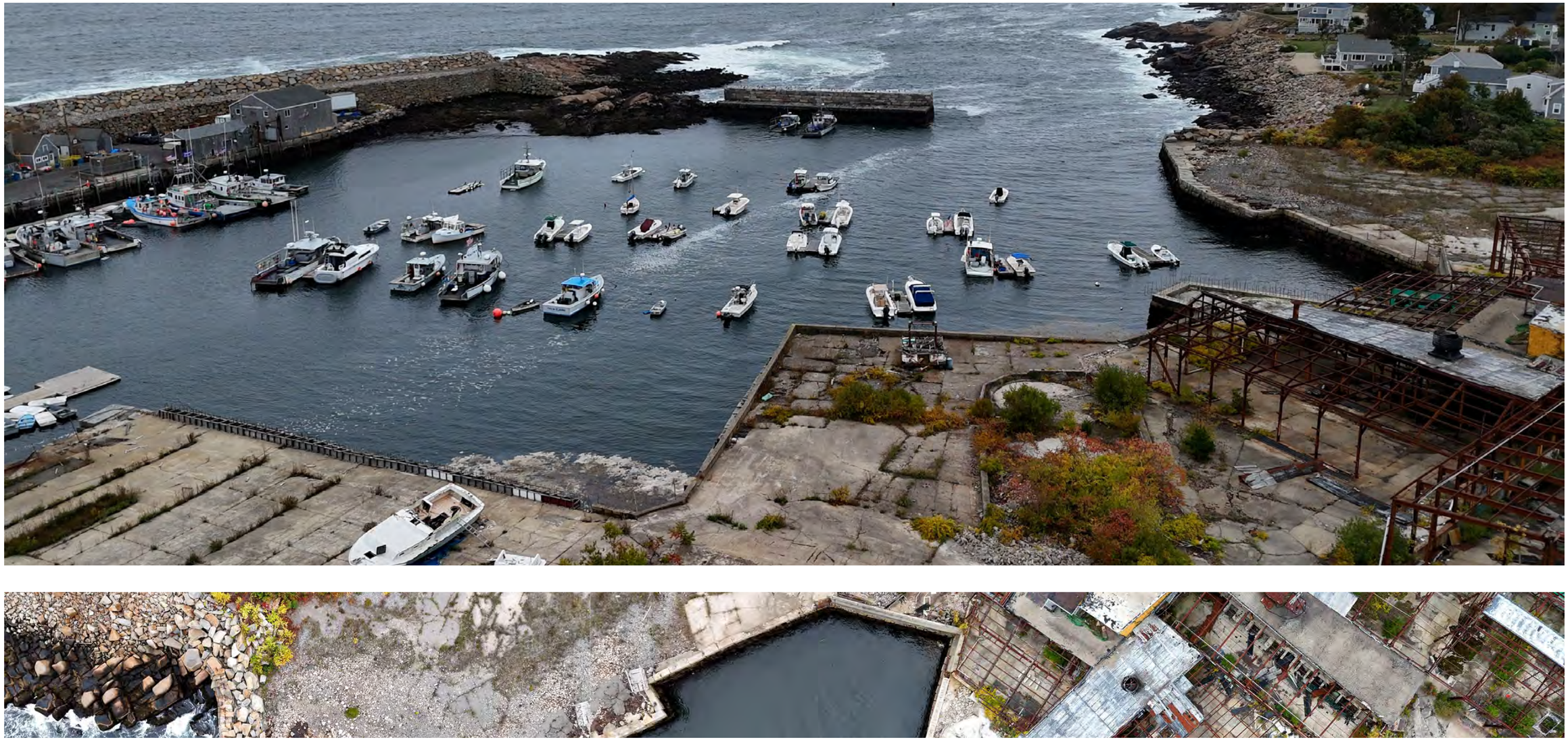
ECOLOGICAL INFRASTRUCTURE

Ocean | *Impervious Surface*

PHYSICAL INFRASTRUCTURE

Cape Ann Tool Company
Pigeon Cove
Rockport, MA 01966
USA

Cape Ann Tool Company

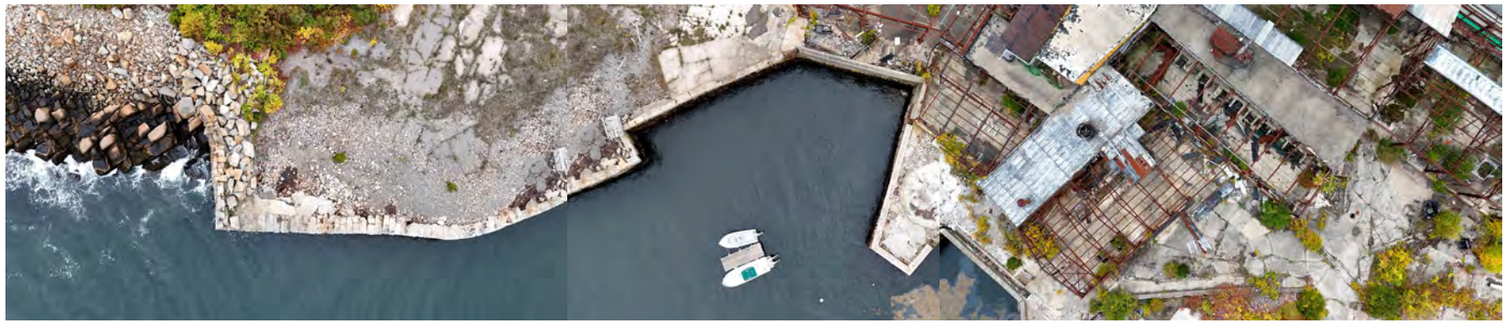


Cape Ann Tool Company
Pigeon Cove
Rockport, MA 01966
USA

Cape Ann Tool Company

ECOLOGICAL INFRASTRUCTURE

Maritime Beach Strand | *Maritime Shrubland* | *Impervious Surface*



PHYSICAL INFRASTRUCTURE

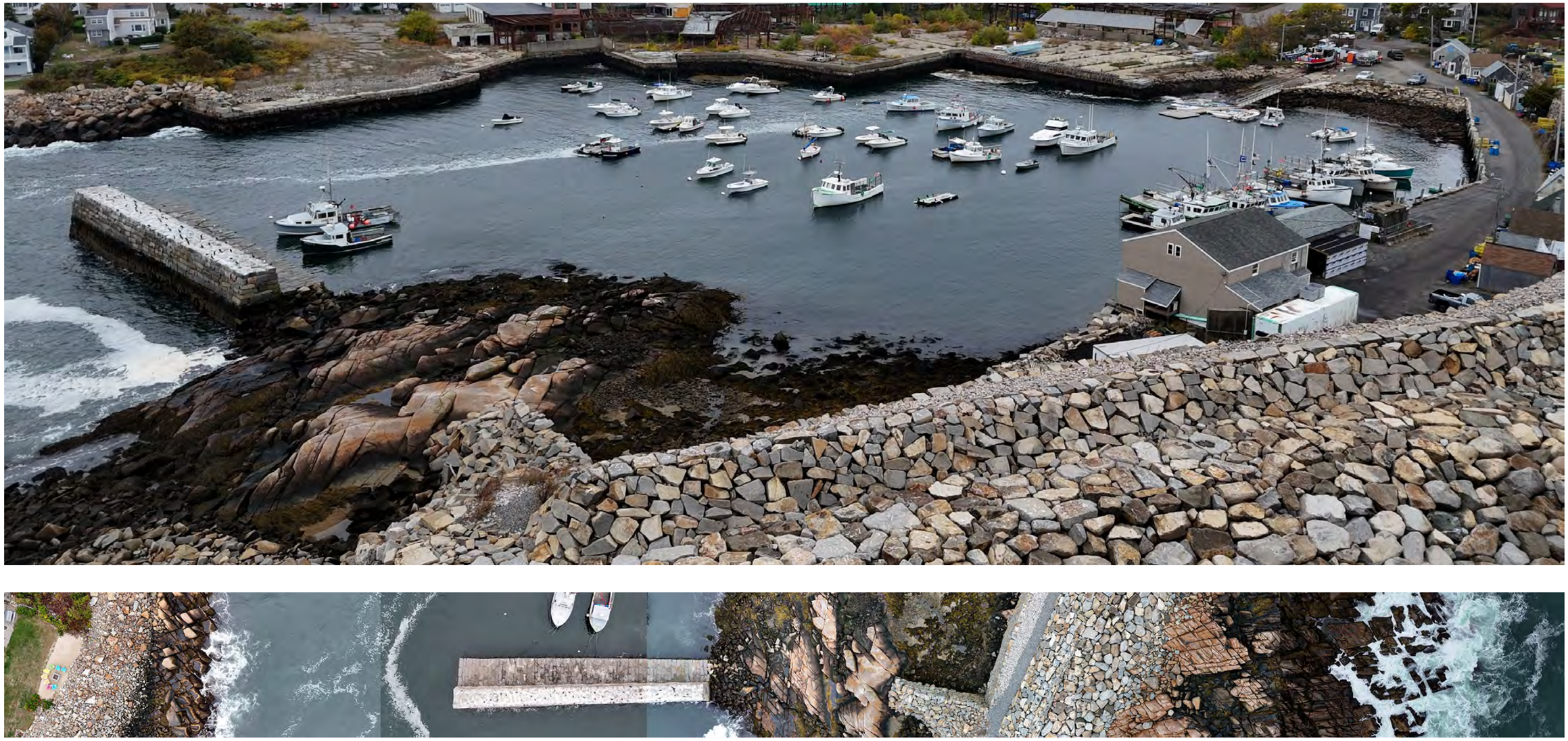
Coastal Resilience
Revetment

Coastal Resilience
Bulkhead

Building
Cape Ann Tool Company

Cape Ann Tool Company
Pigeon Cove
Rockport, MA 01966
USA

Pigeon Cove Wharf



Pigeon Cove Wharf
Pigeon Cove
Rockport, MA 01966
USA

Pigeon Cove Wharf

ECOLOGICAL INFRASTRUCTURE

Maritime Shrubland	Impervious Surface	Ocean	Impervious Surface	Ocean

Coastal Resilience
Revetment

Coastal Resilience
Seawall

Coastal Resilience
Breakwater

PHYSICAL INFRASTRUCTURE

Pigeon Cove Wharf
Pigeon Cove
Rockport, MA 01966
USA

Long Beach

Long Beach
Rockport, MA 01966
USA

Long Beach

ECOLOGICAL INFRASTRUCTURE

Ocean | *Marine Intertidal Sand Beach* | *Impervious Surface* | *Coastal Forest* | *Salt Marsh*

PHYSICAL INFRASTRUCTURE

Coastal Resilience
Stone apron

Coastal Resilience
Seawall

Public Safety
Firebreak

Housing
Cottage

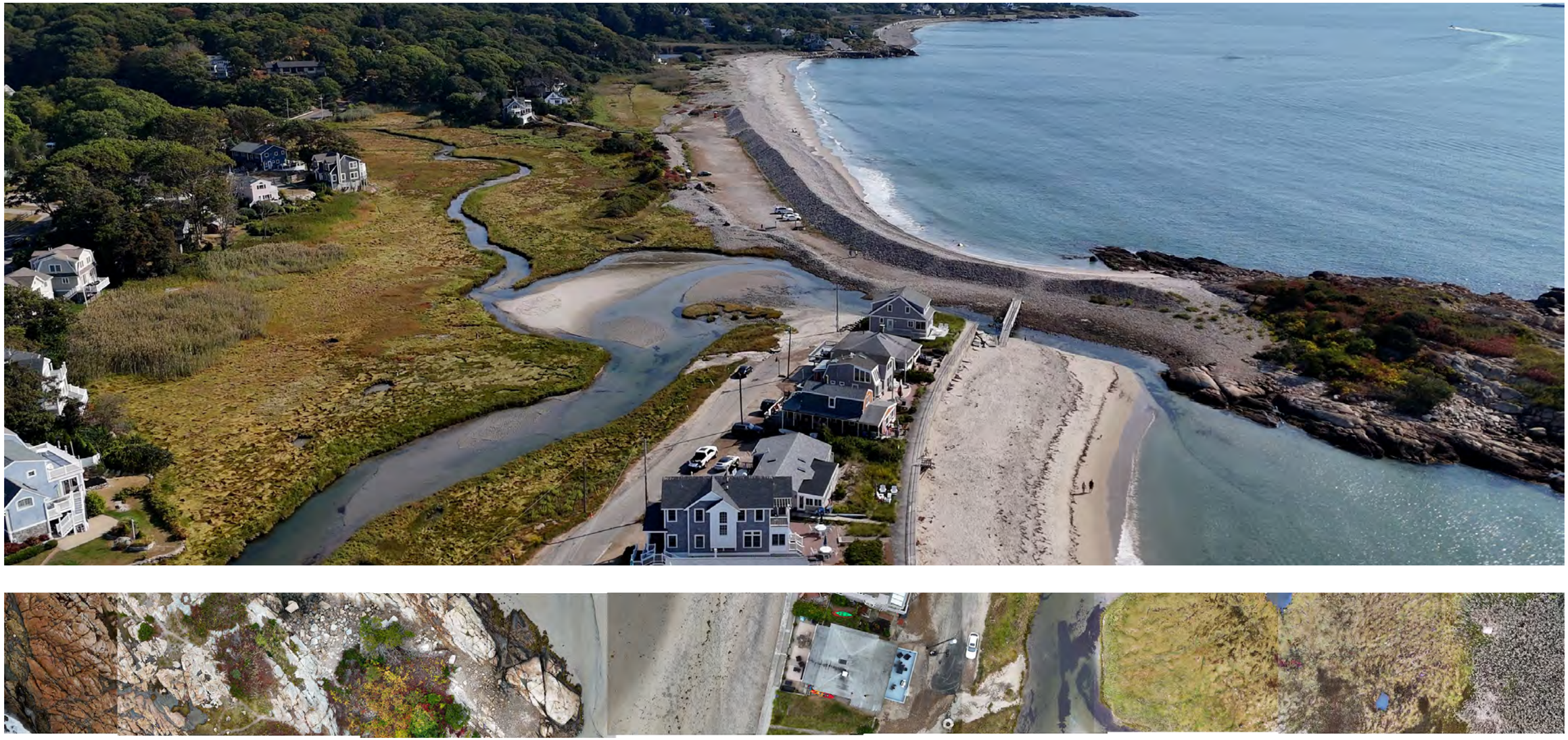
Transportation
Old County Road

Electrical
Power Line

Coastal Resilience
Mosquito ditch

Long Beach
Rockport, MA 01966
USA

Long Beach



Long Beach
Rockport, MA 01966
USA

Long Beach

ECOLOGICAL INFRASTRUCTURE

Impervious Surface

Salt Marsh | *Maritime Dune* | *Marine Intertidal Sand Beach* | *Marine Intertidal Rocky Shore* | *Ocean*

Housing
Year-Round Residence

Transportation
Old County Road

Wastewater
Manhole Cover

Electrical
Power Line

Coastal Resilience
Seawall

Housing
Cottage

PHYSICAL INFRASTRUCTURE

Long Beach
Rockport, MA 01966
USA

Long Beach

Long Beach
Rockport, MA 01966
USA

Long Beach

ECOLOGICAL INFRASTRUCTURE

Impervious Surface *Impervious Surface* *Impervious Surface*

Ocean | *Marine Intertidal Sand Beach* | *Maritime Dune* | *Salt Marsh* | *Coastal Forest* | *Coastal Forest*

Coastal Resilience
Seawall

Coastal Resilience
Stone apron

Housing
Cottage

Public Safety
Firebreak

Transportation
Old County Road

Transportation
Old County Road

PHYSICAL INFRASTRUCTURE

Long Beach
Rockport, MA 01966
USA

Ocean Street

Ocean Street
Manchester-by-the-Sea, MA 01944
USA

Ocean Street

ECOLOGICAL INFRASTRUCTURE

Impervious Surface

Salt Marsh	*Maritime Shrubland*		*Maritime Beach Strand*	*Marine Intertidal Sand Beach*	*Ocean*

Coastal Resilience
Mosquito Ditch

Transportation
Ocean Street

PHYSICAL INFRASTRUCTURE

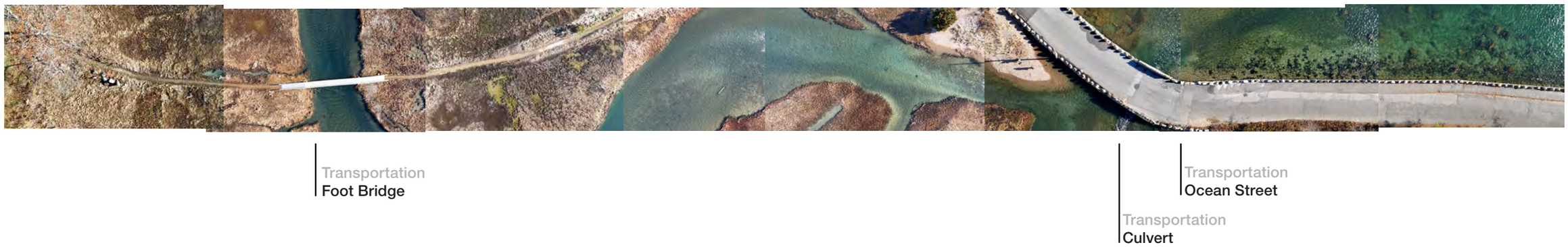
Ocean Street
Manchester-by-the-Sea, MA 01944
USA

Ocean Street

Ocean Street
Manchester-by-the-Sea, MA 01944
USA

Ocean Street

ECOLOGICAL INFRASTRUCTURE



Transportation
Foot Bridge

Transportation
Ocean Street

Transportation
Culvert

PHYSICAL INFRASTRUCTURE

Ocean Street
Manchester-by-the-Sea, MA 01944
USA

Alan Brooks Salt Pond Preserve

Alan Brooks Salt Pond Preserve
Lubec, ME 04652
USA

Alan Brooks Salt Pond Preserve

ECOLOGICAL INFRASTRUCTURE

PHYSICAL INFRASTRUCTURE

Alan Brooks Salt Pond Preserve
Lubec, ME 04652
USA

Lubec Bay

Lubec Bay
Lubec, ME 04652
USA

Lubec Bay

ECOLOGICAL INFRASTRUCTURE

Tall Shrub Fen

Salt-hay Saltmarsh

PHYSICAL INFRASTRUCTURE

Transportation
Culvert

Transportation
South Lubec Road

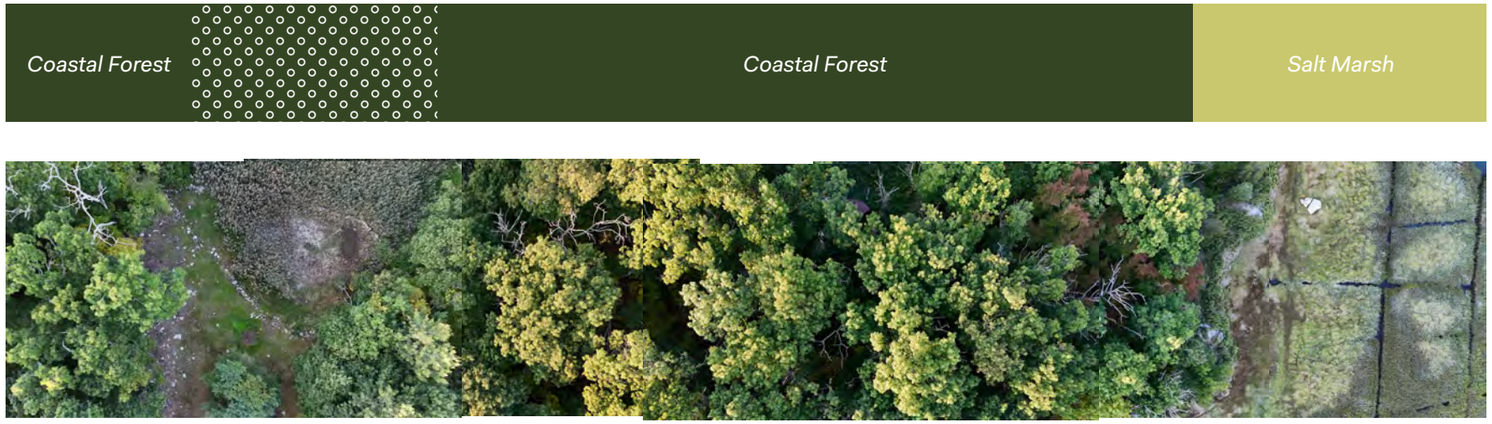
Lubec Bay
Lubec, ME 04652
USA

The Great Marsh

The Great Marsh
West Annisquam
Gloucester, MA 01930
USA

The Great Marsh

ECOLOGICAL INFRASTRUCTURE



Coastal Resilience
Mosquito Ditch

PHYSICAL INFRASTRUCTURE

The Great Marsh
West Annisquam
Gloucester, MA 01930
USA

Apple Street

Apple Street
Essex, MA 01929
USA

Apple Street

ECOLOGICAL INFRASTRUCTURE

White Pine/Oak Forest

PHYSICAL INFRASTRUCTURE

Transportation
Apple Street

Apple Street
Essex, MA 01929
USA

Bethel Brook

Bethel Brook
Bethel, ME 04217
USA

Bethel Brook

ECOLOGICAL INFRASTRUCTURE

White Pine Forest	*Impervious Surface*	*White Pine Forest*	*Hardwood Seepage Forest*	*White Pine Forest*	*Hardwood Seepage Forest*

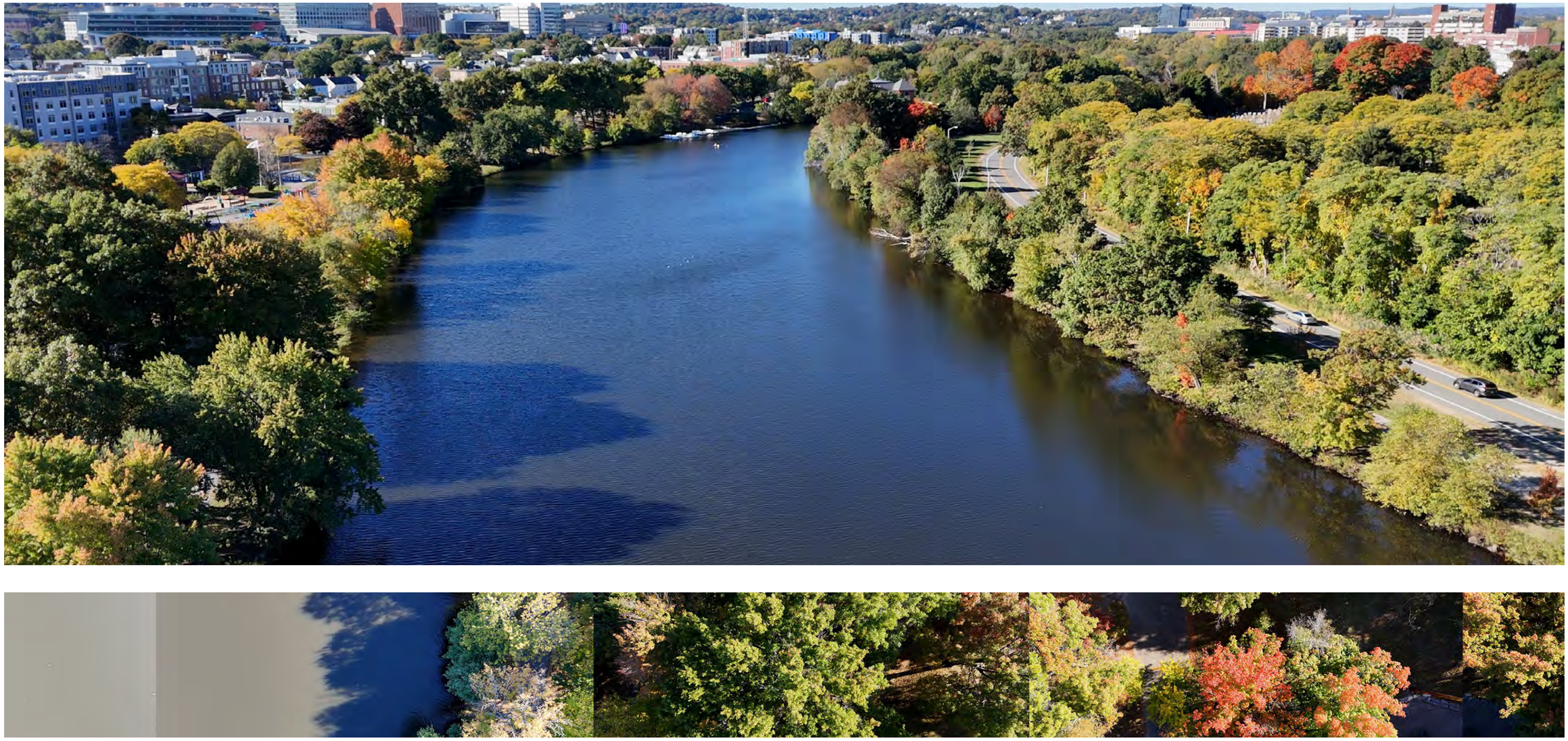
Building
Residential

Transportation
Road

PHYSICAL INFRASTRUCTURE

Bethel Brook
Bethel, ME 04217
USA

Herter Park



Christian Herter Park
Boston, MA 02134
USA

Herter Park

ECOLOGICAL INFRASTRUCTURE

Impervious Surface

Fresh/Brackish Tidal Swamp		*Fresh/Brackish Tidal Shurbland*	*Low-energy Riverbank*	*Fresh/Brackish Tidal Shurbland*	*Fresh/Brackish Tidal Swamp*	*Impervious Surface*

Transportation
Soldiers Field Road

Transportation
Memorial Drive

PHYSICAL INFRASTRUCTURE

Christian Herter Park
Boston, MA 02134
USA

Dogtown Common

Dogtown Common
Rockport, MA 01966
USA

Dogtown Common

ECOLOGICAL INFRASTRUCTURE

Impervious Surface

Impervious Surface

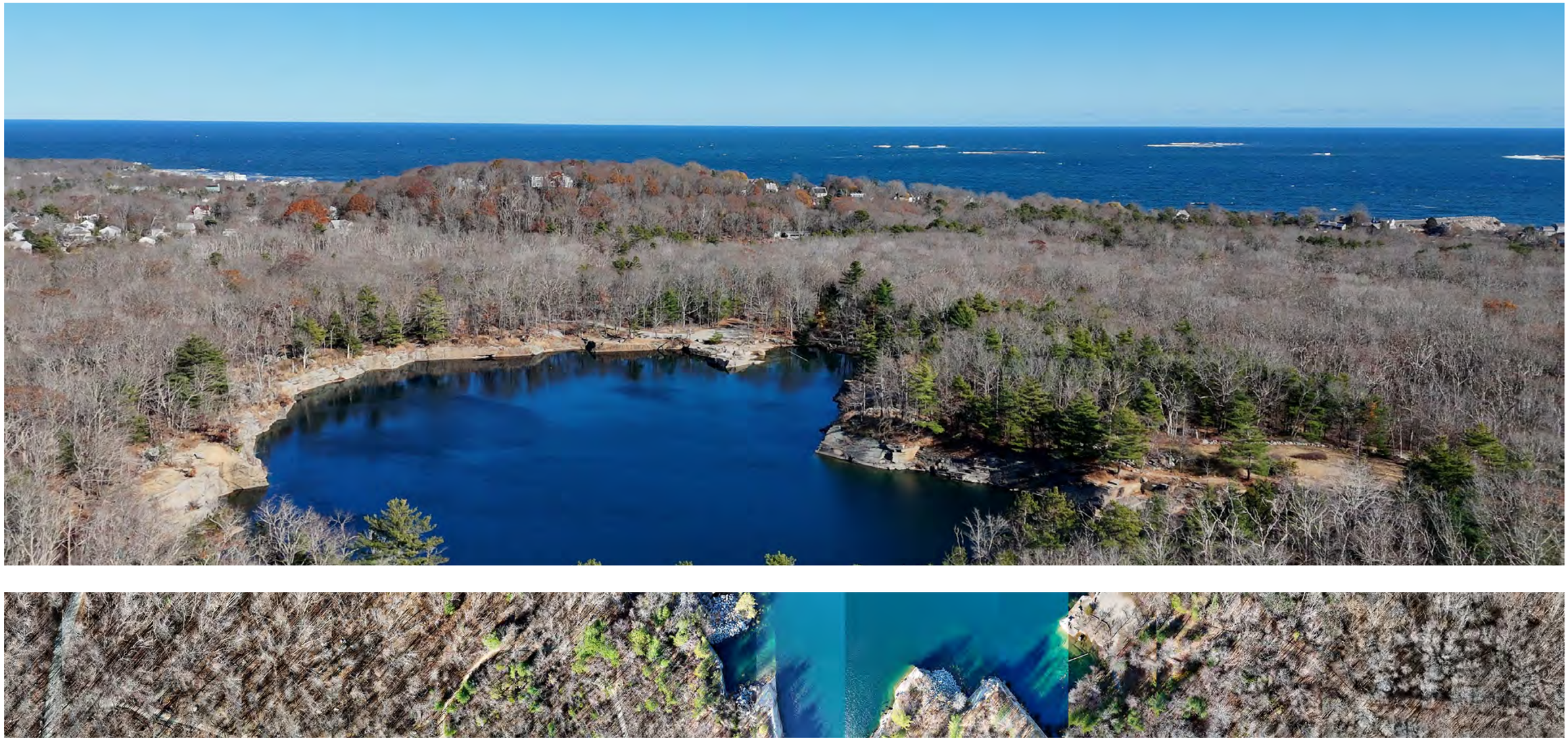
Successional Northern Hardwood Forest

Transportation
Road

PHYSICAL INFRASTRUCTURE

Dogtown Common
Rockport, MA 01966
USA

Carlson's Quarry



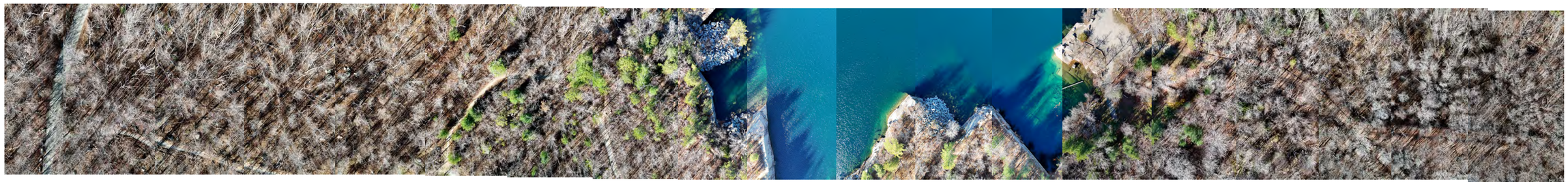
Carlson's Quarry
Dogtown Common
Rockport, MA 01966
USA

Carlson's Quarry

ECOLOGICAL INFRASTRUCTURE

Impervious Surface

Successional Northern Hardwood Forest | *Acidic Pondshore/Lakeshore* | *Successional Northern Hardwood Forest*



Transportation
Quarry Road

PHYSICAL INFRASTRUCTURE

Carlson's Quarry
Dogtown Common
Rockport, MA 01966
USA

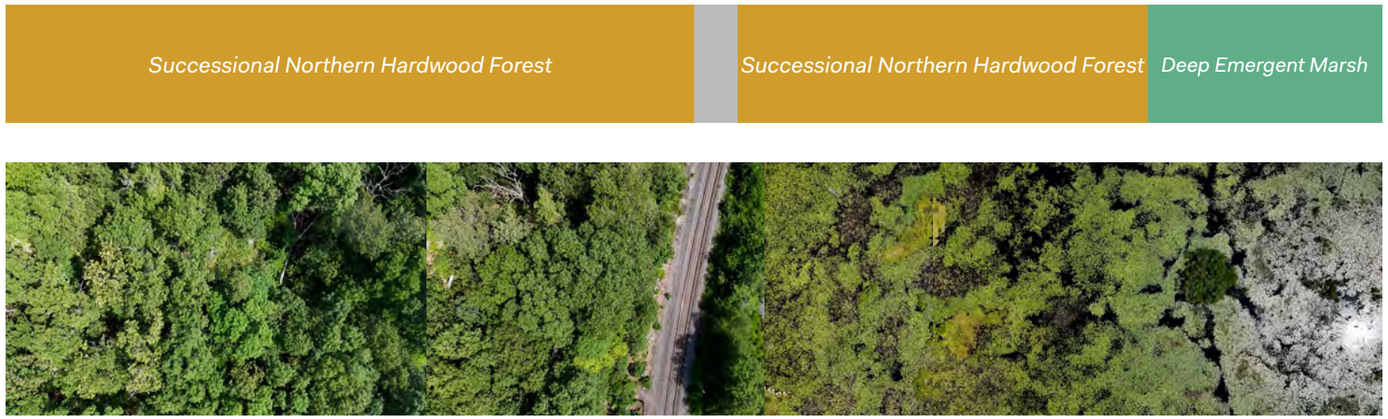
Rockport Commuter Rail

Rockport Commuter Rail
Dogtown Common
Rockport, MA 01966
USA

Rockport Commuter Rail

ECOLOGICAL INFRASTRUCTURE

Impervious Surface



Transportation
Rockport Commuter Rail

PHYSICAL INFRASTRUCTURE

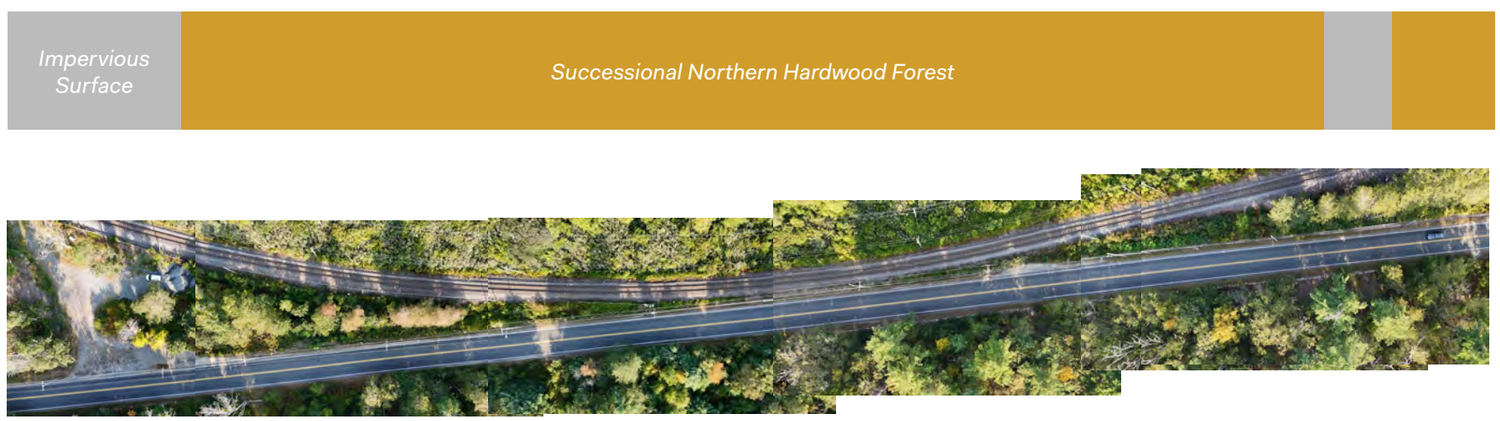
Rockport Commuter Rail
Dogtown Common
Rockport, MA 01966
USA

Rockport Commuter Rail

Rockport Commuter Rail
Dogtown Common
Rockport, MA 01966
USA

Rockport Commuter Rail

ECOLOGICAL INFRASTRUCTURE



Transportation
Rockport Commuter Rail

Transportation
Eastern Avenue

PHYSICAL INFRASTRUCTURE

Rockport Commuter Rail
Dogtown Common
Rockport, MA 01966
USA

Goose Cove Reservoir

Goose Cove Reservoir
Dogtown Common
Gloucester, MA 01930
USA

Goose Cove Reservoir

ECOLOGICAL INFRASTRUCTURE

Impervious Surface

Successional Northern Hardwood Forest

Acidic Pondshore/Lakeshore

PHYSICAL INFRASTRUCTURE

Transportation
Access Road

Water
Dam

Goose Cove Reservoir
Dogtown Common
Gloucester, MA 01930
USA

West Annisquam

West Annisquam
Gloucester, MA 01930
USA

West Annisquam

ECOLOGICAL INFRASTRUCTURE

Acidic Rocky Summit/Rock Outcrop	*Coastal Forest*	*Salt Marsh*		*Coastal Forest*	*Salt Marsh*	*Coastal Forest*	*Salt Marsh*

Coastal Resilience
Mosquito Ditch

PHYSICAL INFRASTRUCTURE

West Annisquam
Gloucester, MA 01930
USA

Route 128

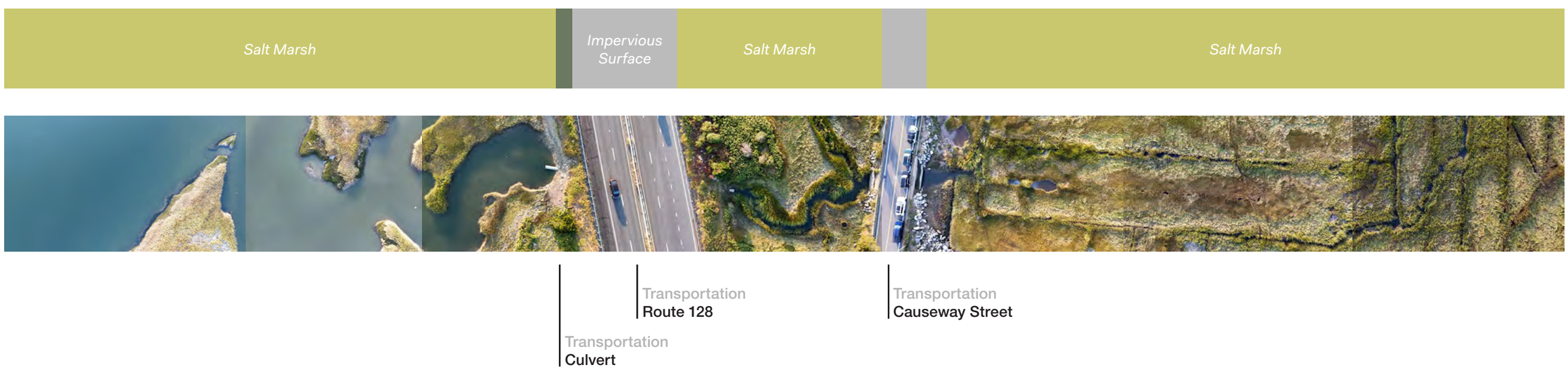
Route 128
West Annisquam
Gloucester, MA 01930
USA

Route 128

ECOLOGICAL INFRASTRUCTURE

Maritime Shrubland

Impervious Surface



Transportation
Route 128

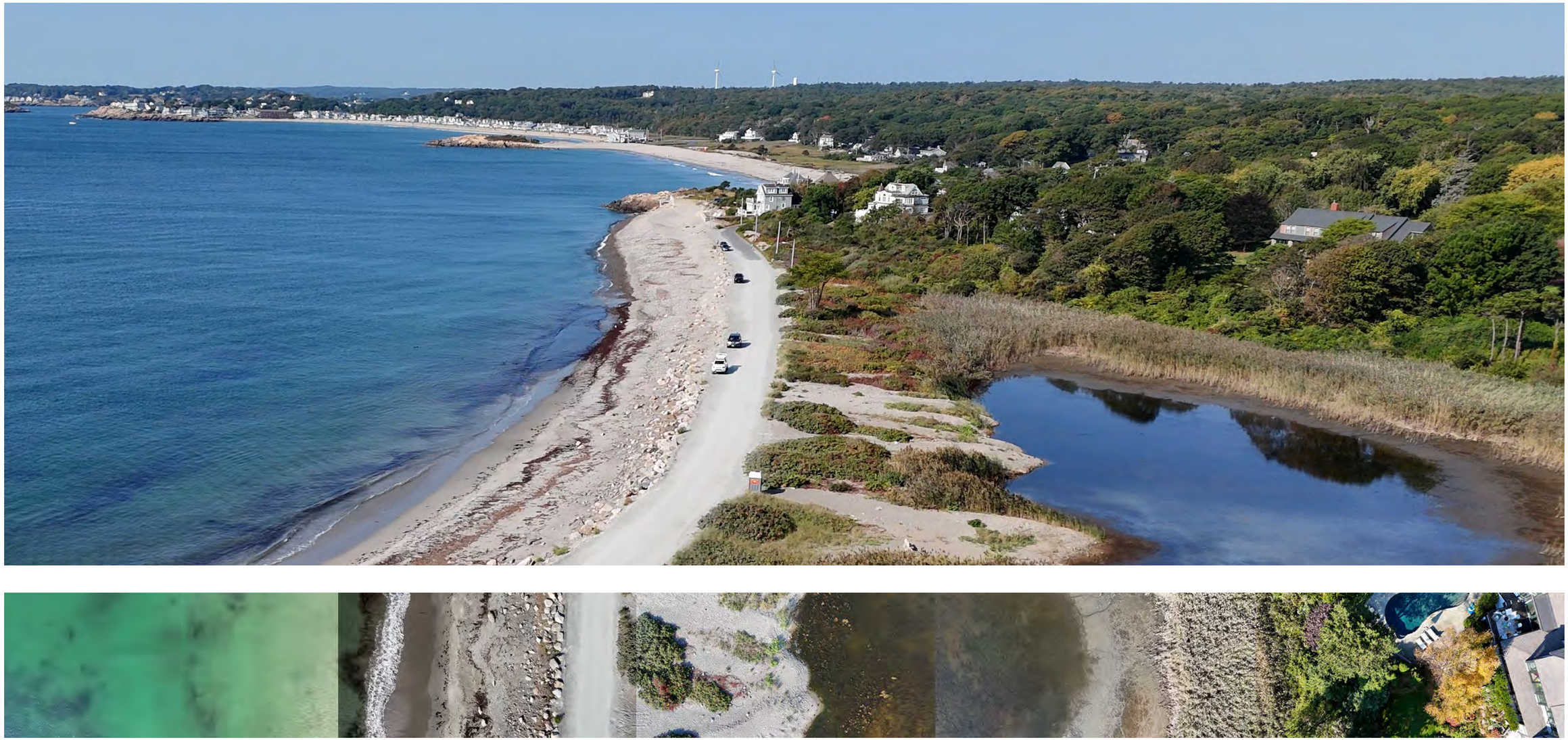
Transportation
Causeway Street

Transportation
Culvert

PHYSICAL INFRASTRUCTURE

Route 128
West Annisquam
Gloucester, MA 01930
USA

Pebble Beach



Pebble Beach
Rockport, MA 01966
USA

Pebble Beach

ECOLOGICAL INFRASTRUCTURE

Impervious Surface

Ocean	*Marine Intertidal Sand Beach*		*Maritime Beach Strand Community*	*Coastal Salt Pond*	*Coastal Plain Pondshare Community*	*Coastal Forest*	*Impervious Surface*

Transportation
Penzance Road

Coastal Resilience
Revetment

PHYSICAL INFRASTRUCTURE

Pebble Beach
Rockport, MA 01966
USA

Goose Rocks Beach

Goose Rocks Beach
Kennebunkport, ME 04046
USA

Goose Rocks Beach

ECOLOGICAL INFRASTRUCTURE

Salt-hay Saltmarsh | *Coastal Beach* | *Salt Marsh* | *Impervious Surface*

PHYSICAL INFRASTRUCTURE

Transportation
Road

Electrical
Power Line

Building
Residential

Goose Rocks Beach
Kennebunkport, ME 04046
USA

Goose Rocks Beach

Goose Rocks Beach
Kennebunkport, ME 04046
USA

Goose Rocks Beach

ECOLOGICAL INFRASTRUCTURE

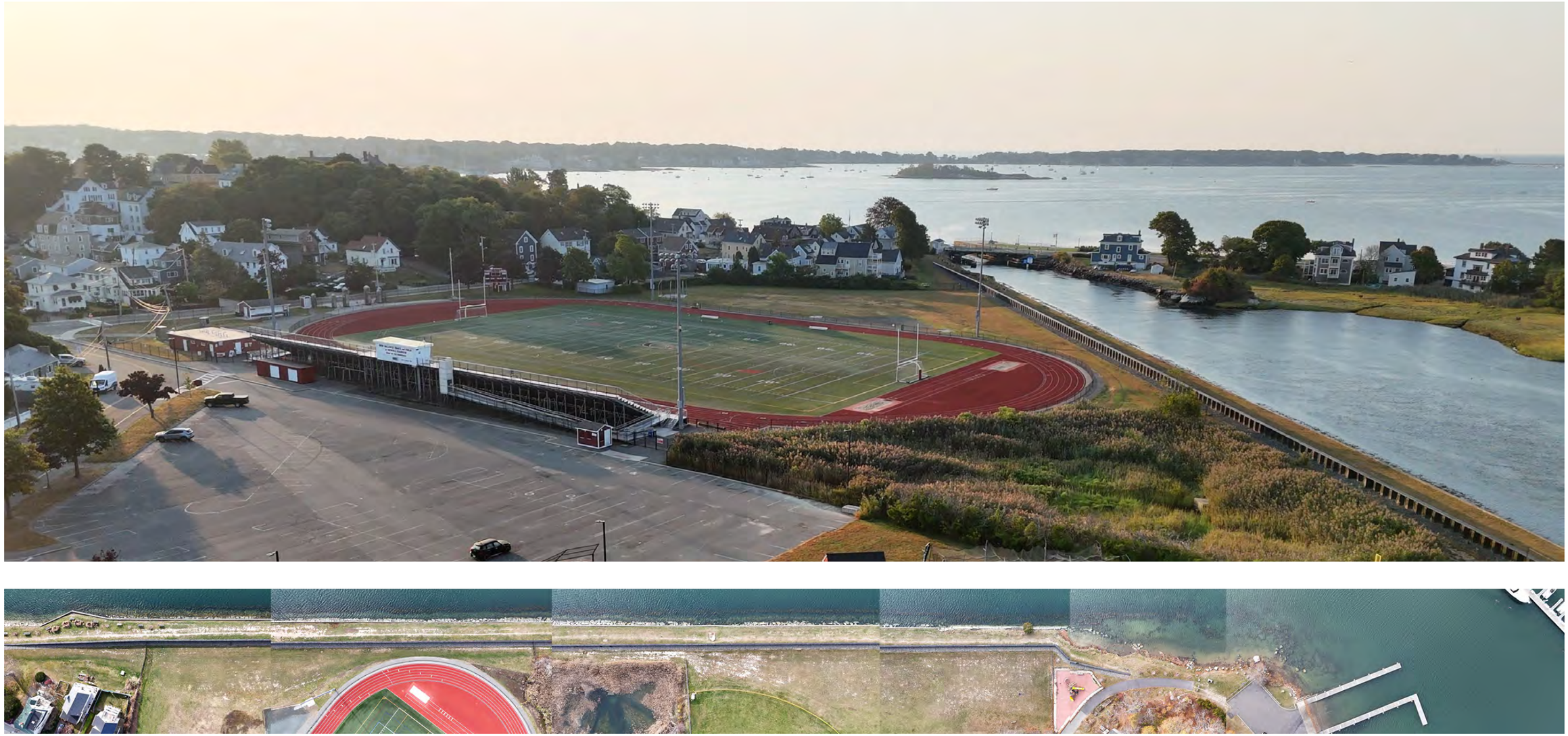
Salt-hay Saltmarsh	*Mixed Saltmarsh*	*Salt-hay Saltmarsh*

Coastal Resilience
Mosquito Ditch

PHYSICAL INFRASTRUCTURE

Goose Rocks Beach
Kennebunkport, ME 04046
USA

Gloucester High School



Gloucester High School
Gloucester, MA 01930
USA

Gloucester High School

ECOLOGICAL INFRASTRUCTURE

Building
Residential

Education
Gloucester High School

Coastal Resilience
Revetment

PHYSICAL INFRASTRUCTURE

Gloucester High School
Gloucester, MA 01930
USA

Penzance Road

Penzance Road
Rockport, MA 01966
USA

Penzance Road

ECOLOGICAL INFRASTRUCTURE

PHYSICAL INFRASTRUCTURE

Transportation
Penzance Road

Penzance Road
Rockport, MA 01966
USA

Main Street

Main Street
US Route 1
Machias, ME 04654
USA

ECOLOGICAL INFRASTRUCTURE

PHYSICAL INFRASTRUCTURE

Main Street
US Route 1
Machias, ME 04654
USA

Main Street

Mixed Saltmarsh | *Impervious Surface*

Coastal Resilience
Revetment

Transportation
US Route 1 Main Street

Masconomo Point

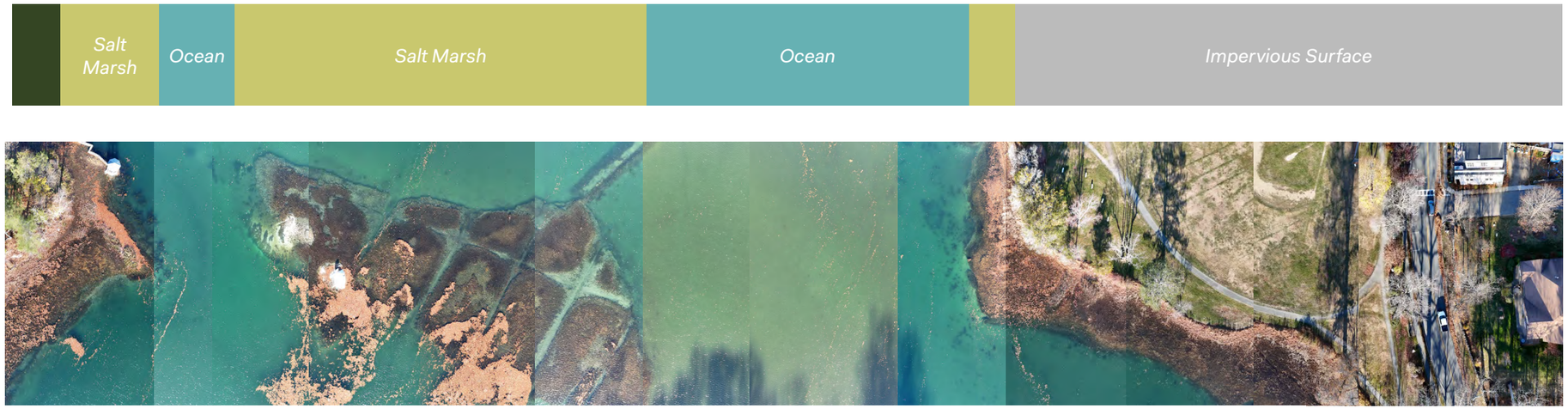
Masconomo Point
Manchester-by-the-Sea, MA 01944
USA

Masconomo Point

ECOLOGICAL INFRASTRUCTURE

Coastal Forest

Salt Marsh



PHYSICAL INFRASTRUCTURE

Transportation
Beach Street

Coastal Resilience
Bulkhead

Masconomo Point
Manchester-by-the-Sea, MA 01944
USA

Saco Heath Preserve

Saco Heath Preserve
Buxton Road
Saco, ME 04072
USA

Saco Heath Preserve

ECOLOGICAL INFRASTRUCTURE

Atlantic White Cedar Bog

PHYSICAL INFRASTRUCTURE

Saco Heath Preserve
Buxton Road
Saco, ME 04072
USA

Sunrise Trail

Sunrise Trail
Machias, ME 04654
USA

Sunrise Trail

ECOLOGICAL INFRASTRUCTURE

Salt-hay Saltmarsh

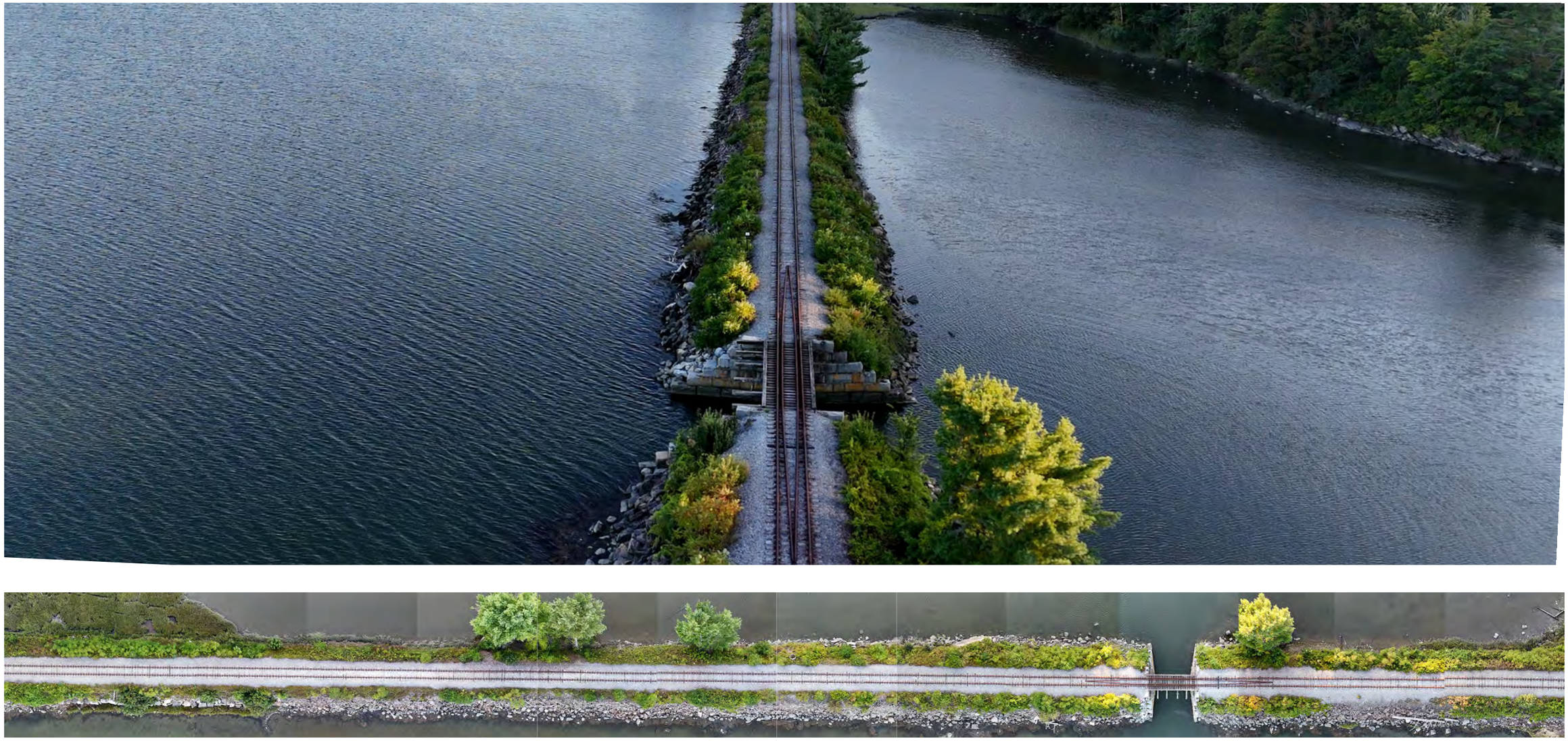
Transportation
Sunrise Snowmobile/ ATV trail

Transportation
Culvert

PHYSICAL INFRASTRUCTURE

Sunrise Trail
Machias, ME 04654
USA

Damariscotta Mills Causeway



Damariscotta Mills Causeway
Newcastle, ME 04553
USA

Damariscotta Mills Causeway

ECOLOGICAL INFRASTRUCTURE

Salt-hay Saltmarsh

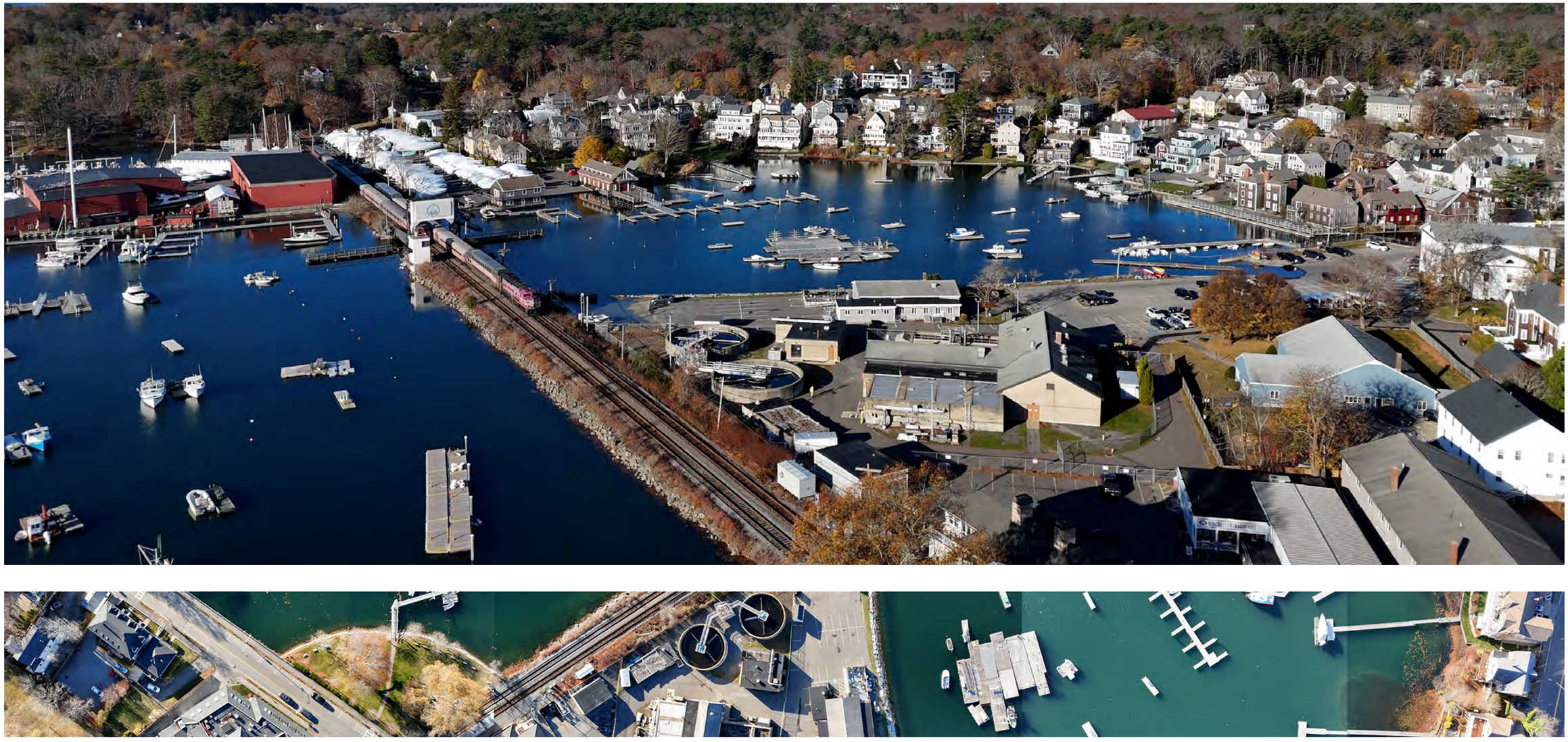
PHYSICAL INFRASTRUCTURE

Coastal Resilience
Revetment

Transportation
Culvert

Damariscotta Mills Causeway
Newcastle, ME 04553
USA

Manchester-by-the-Sea Wastewater Treatment Plant



Manchester-by-the-Sea Wastewater Treatment Plant
Manchester-by-the-Sea Inner Harbor
Manchester-by-the-Sea, MA 01944
USA

Manchester-by-the-Sea Wastewater Treatment Plant

ECOLOGICAL INFRASTRUCTURE

Impervious Surface	*Ocean*	*Impervious Surface*	*Ocean*	*Impervious Surface*

Transportation
Road

Transportation
Rockport Commuter Rail

Transportation
Beach Street

Wastewater
Wastewater Treatment Plant

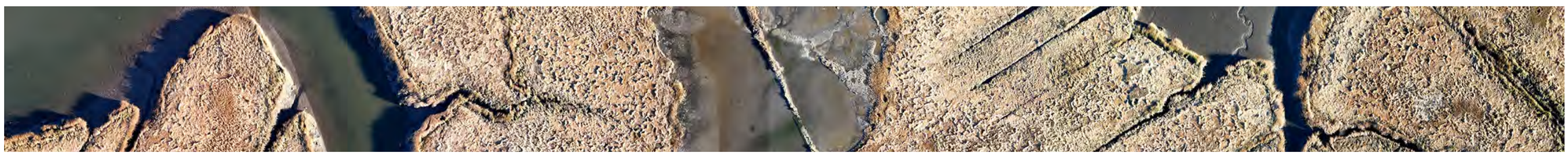
Coastal Resilience
Revetment

Coastal Resilience
Bulkhead

PHYSICAL INFRASTRUCTURE

Manchester-by-the-Sea Wastewater Treatment Plant
Manchester-by-the-Sea Inner Harbor
Manchester-by-the-Sea, MA 01944
USA

Great Marsh

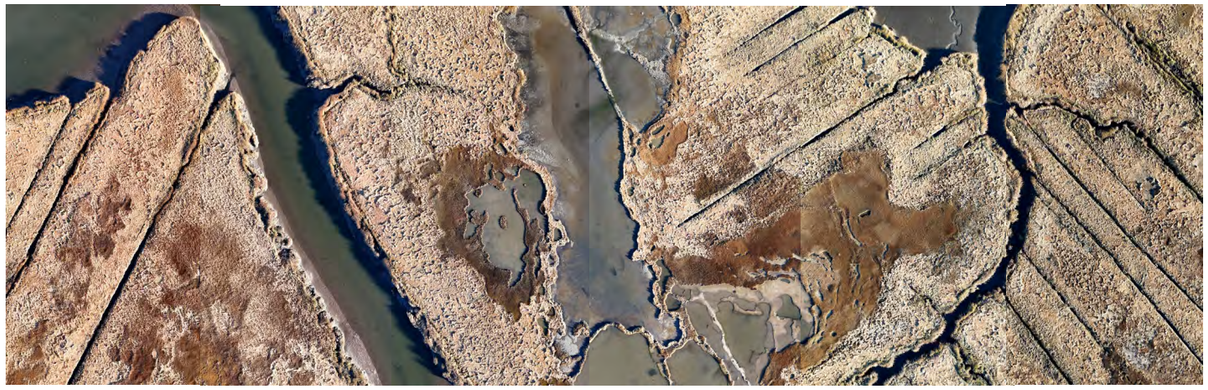


Great Marsh
Essex Causeway
Essex, MA 01929
USA

Great Marsh

ECOLOGICAL INFRASTRUCTURE

Salt Marsh

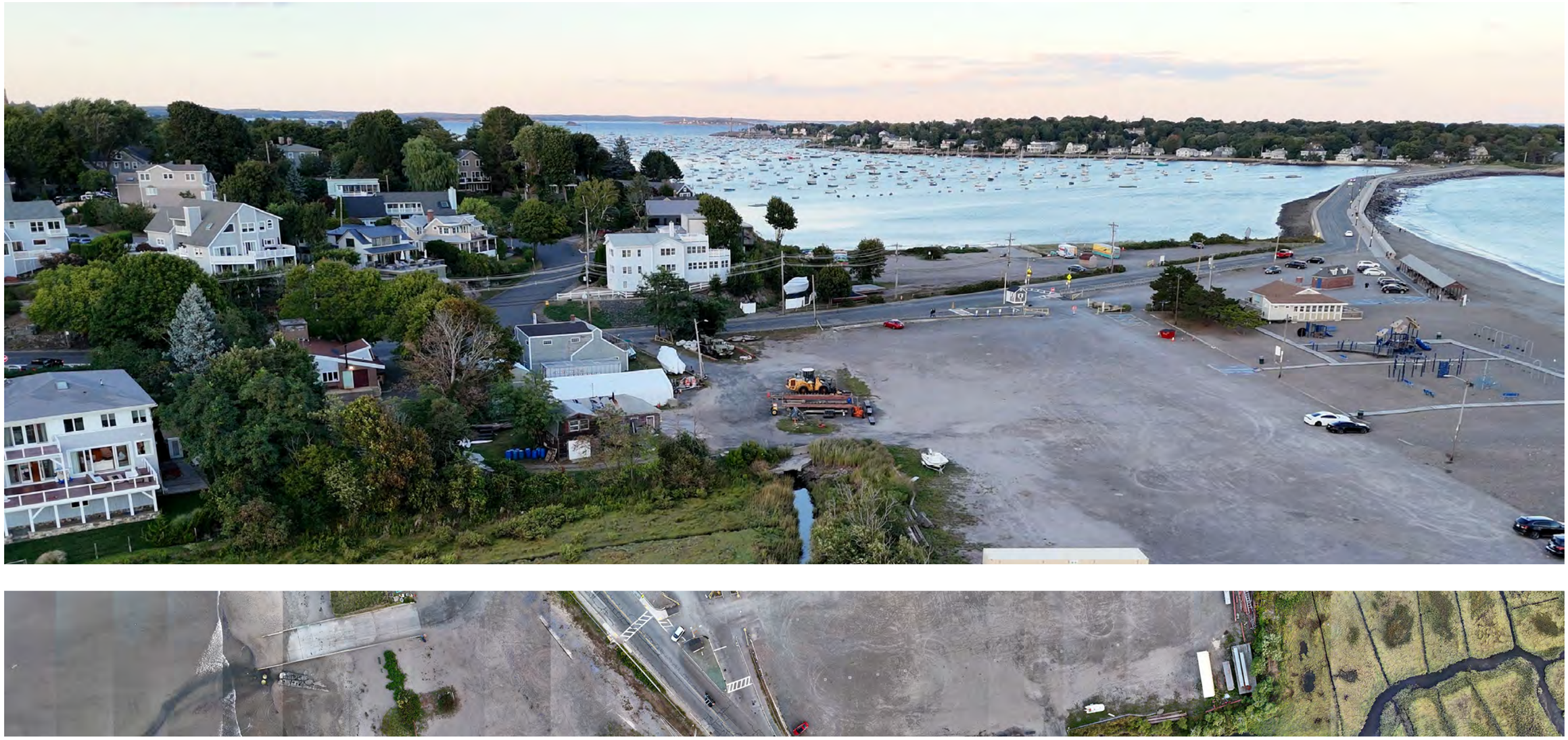


PHYSICAL INFRASTRUCTURE

Coastal Resilience
Mosquito Ditch

Great Marsh
Essex Causeway
Essex, MA 01929
USA

Riverhead Beach

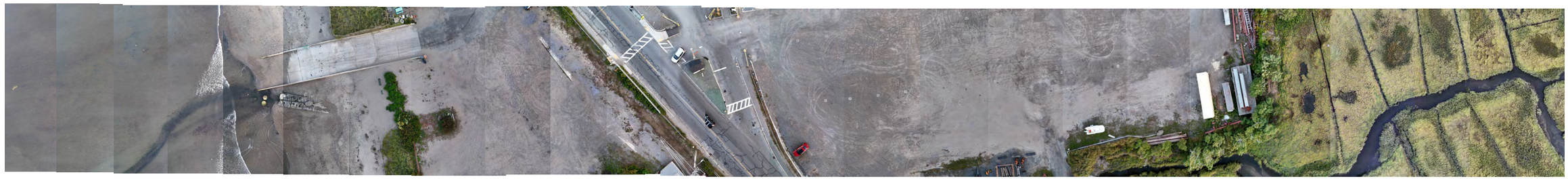


Riverhead Beach
Marblehead, MA 01945
USA

Riverhead Beach

ECOLOGICAL INFRASTRUCTURE

Marine Intertidal Sand Beach	*Maritime Beach*	*Impervious Surface*	*Maritime Shrubland*	*Salt Marsh*



Transportation
Riverhead Beach Parking Lot

Wastewater Treatment
Marine Outflow

Transportation
Ocean Avenue

Transportation
Devereux Beach Parking Lot

Coastal Resilience
Mosquito Ditch

PHYSICAL INFRASTRUCTURE

Riverhead Beach
Marblehead, MA 01945
USA

Gerry Island

Gerry Island
Marblehead, MA 01945
USA

Marine Intertidal Rocky Shore

Marine Intertidal Sand Beach

ECOLOGICAL INFRASTRUCTURE

Water
Water Main

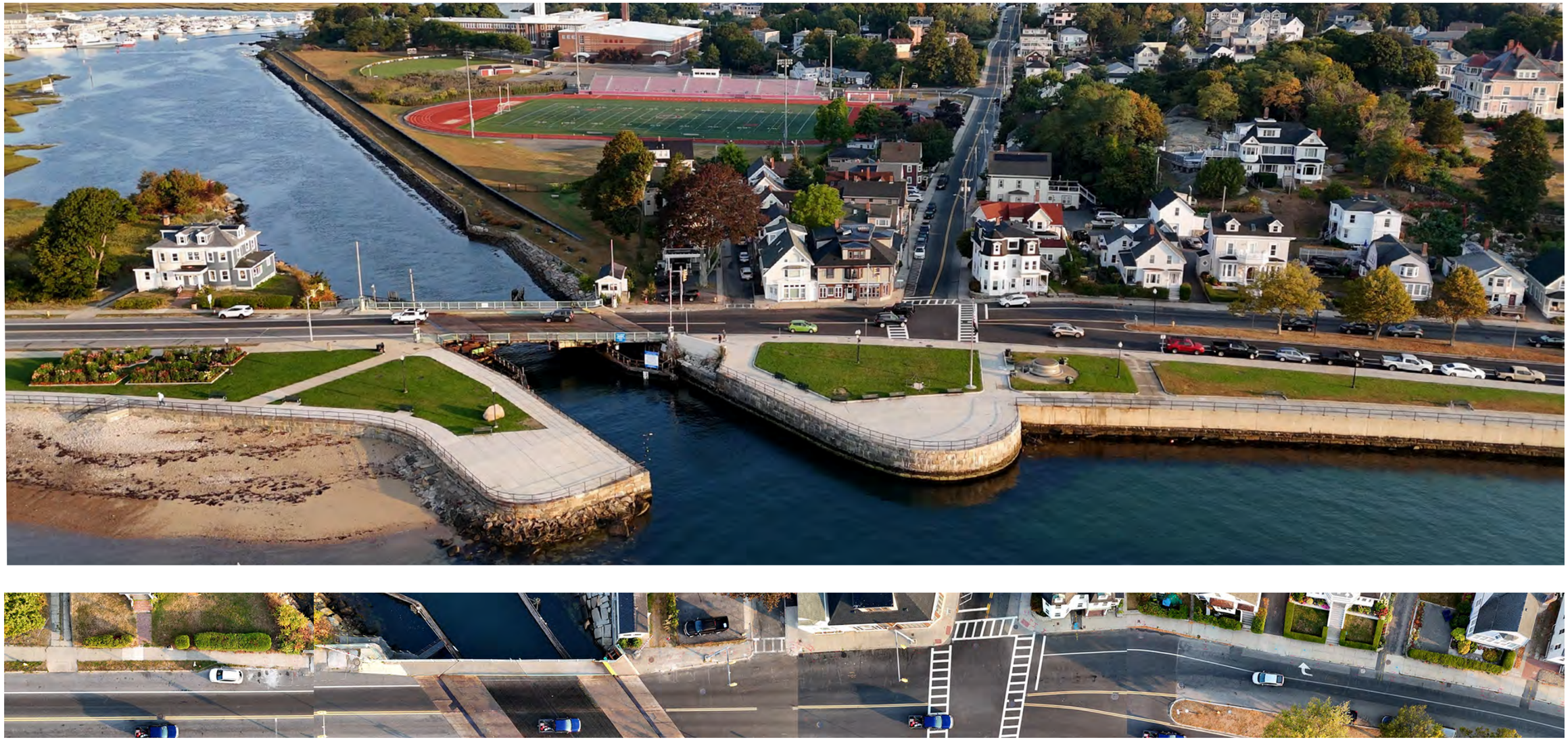
Coastal Resilience
Seawall

PHYSICAL INFRASTRUCTURE

Coastal Resilience
Seawall

Gerry Island
Marblehead, MA 01945
USA

The “Cut Bridge”



The “Cut Bridge”
Blynman Canal
Gloucester, MA 01930
USA

The “Cut Bridge”

ECOLOGICAL INFRASTRUCTURE

Impervious Surface | *Ocean* | *Impervious Surface*

PHYSICAL INFRASTRUCTURE

Transportation
Western Avenue

Electrical
Telephone Pole

Transportation
“The Cut” Bridge

Wastewater
Combined Sewer Overflow

Coastal Resilience
Bulkhead

Electrical
Telephone Pole

Wastewater
Manhole Cover

The “Cut Bridge”
Blynman Canal
Gloucester, MA 01930
USA

Gloucester High School

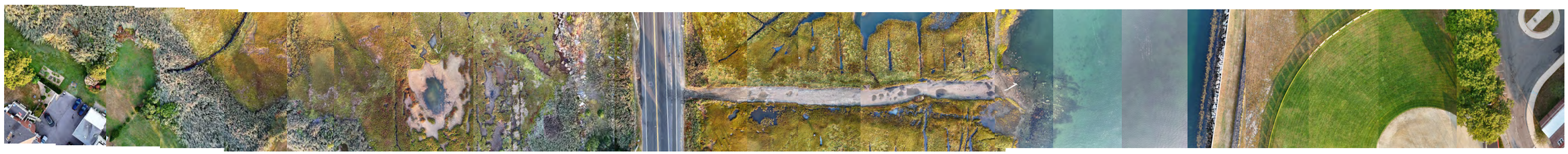
Annisquam River
Gloucester, MA 01930
USA

Gloucester High School

ECOLOGICAL INFRASTRUCTURE

Impervious Surface

Salt Marsh | *Salt Marsh* | *Ocean* | *Impervious Surface*



Building
Residential

Transportation
Boat Ramp

Transportation
Essex Avenue

Coastal Resilience
Mosquito Ditch

Coastal Resilience
Bulkhead

Coastal Resilience
Revetment

Education
Gloucester High School

PHYSICAL INFRASTRUCTURE

Annisquam River
Gloucester, MA 01930
USA

Wingaersheek Beach

Wingaersheek Beach
Gloucester, MA 01930
USA

Wingaersheek Beach

ECOLOGICAL INFRASTRUCTURE

Ocean	*Marine Intertidal Sand Beach*	*Maritime Dune*	*Interdunal Marsh/Swale*	*Coastal Forest*	*Interdunal Marsh/Swale*	*Salt Marsh*

PHYSICAL INFRASTRUCTURE

Wingaersheek Beach
Gloucester, MA 01930
USA

Wingaersheek Beach

Wingaersheek Beach
Gloucester, MA 01930
USA

Wingaersheek Beach

ECOLOGICAL INFRASTRUCTURE

PHYSICAL INFRASTRUCTURE

Wingaersheek Beach
Gloucester, MA 01930
USA

Marblehead Causeway

Marblehead Causeway
Marblehead, MA 01945
USA

Marblehead Causeway

PHYSICAL INFRASTRUCTURE

ECOLOGICAL INFRASTRUCTURE

Transportation
Marblehead Causeway

Marine Intertidal Sand Beach

Impervious Surface

Marine Intertidal Sand Beach

Ocean

Marblehead Causeway
Marblehead, MA 01945
USA

Bailey Island Bridge

Bailey Island Bridge
Harpswell, ME 04003
USA

Bailey Island Bridge

ECOLOGICAL INFRASTRUCTURE

Impervious Surface

PHYSICAL INFRASTRUCTURE

Transportation
Bailey Island Bridge

Electrical
Telephone Pole

Electrical
Telephone Pole

Bailey Island Bridge
Harpswell, ME 04003
USA

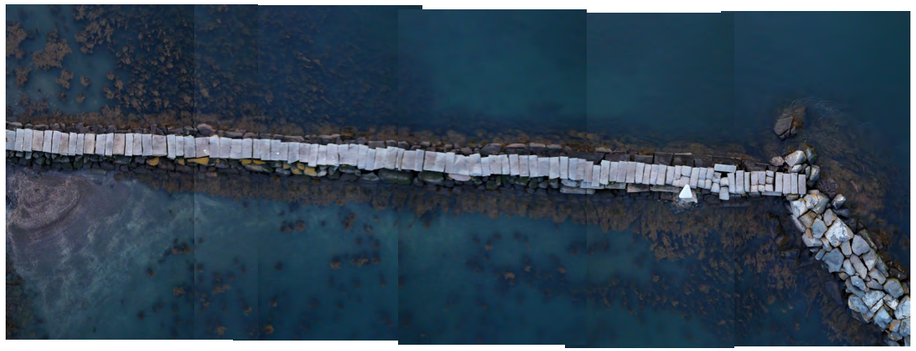
Lubec Breakwater

Lubec Breakwater
Lubec, ME 04652
USA

Lubec Breakwater

ECOLOGICAL INFRASTRUCTURE

Ocean



PHYSICAL INFRASTRUCTURE

Coastal Resilience
Breakwater

Coastal Resilience
Revetment

Lubec Breakwater
Lubec, ME 04652
USA

OFFICE
FOR
URBANIZATION