Weir Creek Salt Marsh & Community Resilience Restoration Project

Public Meeting #3

August 20, 2025

NOAA · APCC Association to Preserve Cape Cod · Town of Dennis Massachusetts · Tighe&Bond · Woods Hole Group A CLS Company · friends of BASS RIVER · The Dennis Conservation Land Trust · Cape Cod Commission · Cape Cod Mosquito Control Project Est. 1930 · United States Environmental Protection Agency · SNEP Watershed Implementation Grants · Restore America's Estuaries · Cape Cod Conservation District · USDA NRCS United States Department of Agriculture Natural Resources Conservation Service

Town of Dennis Massachusetts

Tom Andrade

Town Engineer
Town of Dennis

AGENDA

1. Welcome
   - Tom Andrade, Town Engineer (Dennis)
2. Understanding Salt Marsh Ecosystems & Existing Conditions at Weir Creek
   - Jordan Mora, APCC
3. Project Design & Hydrodynamic Model Overview
   - Eric Ohanian, Tighe & Bond
4. Questions & Discussion
5. TIDAL VIEWER: Breakout groups
6. Questions & Discussion

Jordan Mora

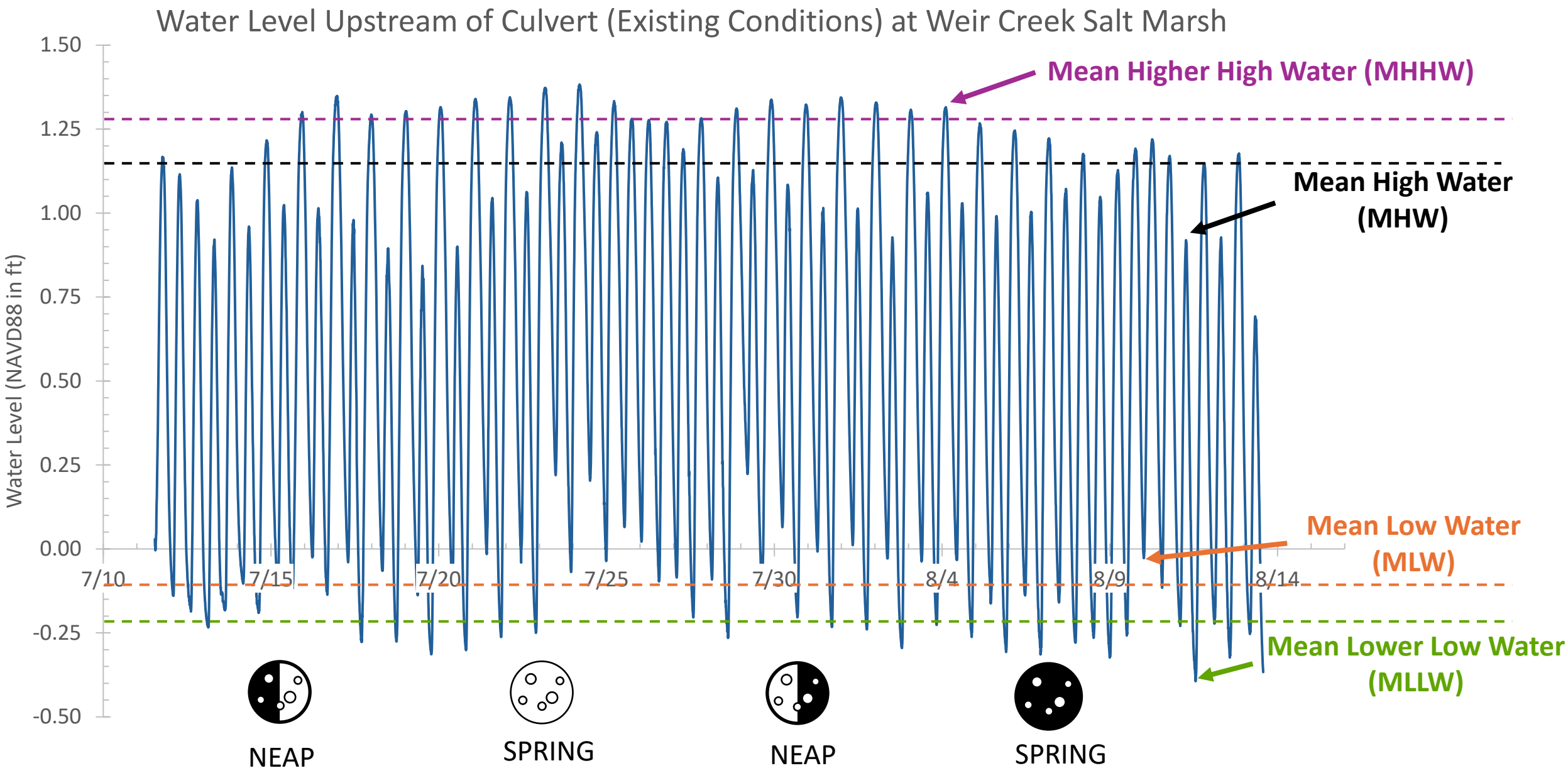
Lead Ecologist
Association to Preserve Cape Cod

Why is salt marsh habitat important?

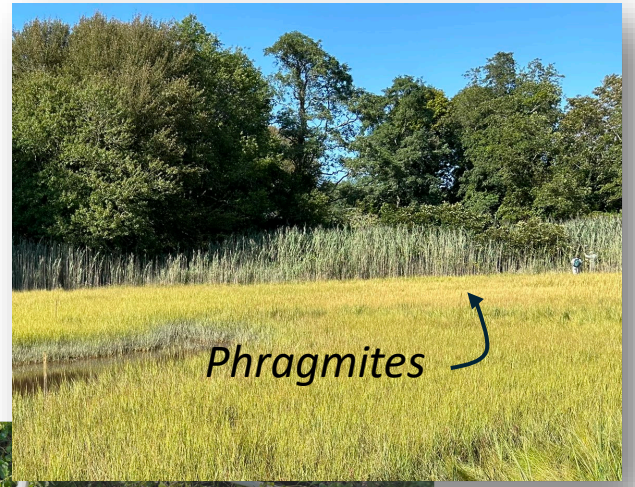
- Ecology: Protect & sustain biodiversity
- Recreation: Create sense of place & opportunity
- Economy:
    1. Employ & feed coastal communities through supporting the commercial fishing industry
    2. **Mitigate impacts from storms & sea level rise**
- Public health: Control of disease-carrying mosquitos & **improve water quality**

UNDERSTANDING TIDAL HYDROLOGY

Introduction to tidal hydrology terminology



Introduction to salt marsh structure



Spartina alterniflora (smooth cordgrass)

Spartina patens (salt hay)

Upland transition zone

Low marsh zone

High marsh zone

Flooded 1-2x per month

Flooded 2x daily

Flooded 1x daily

Mean Higher High Water

Mean High Water

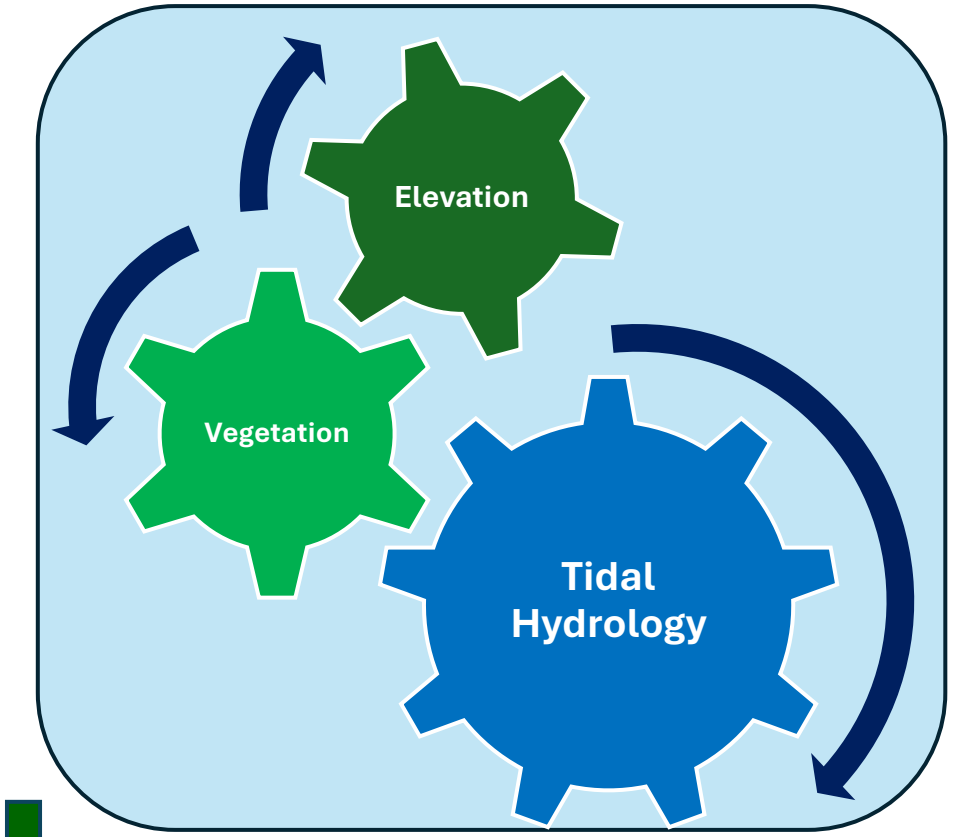
HOW do salt marshes protect us?

How do salt marshes protect us?

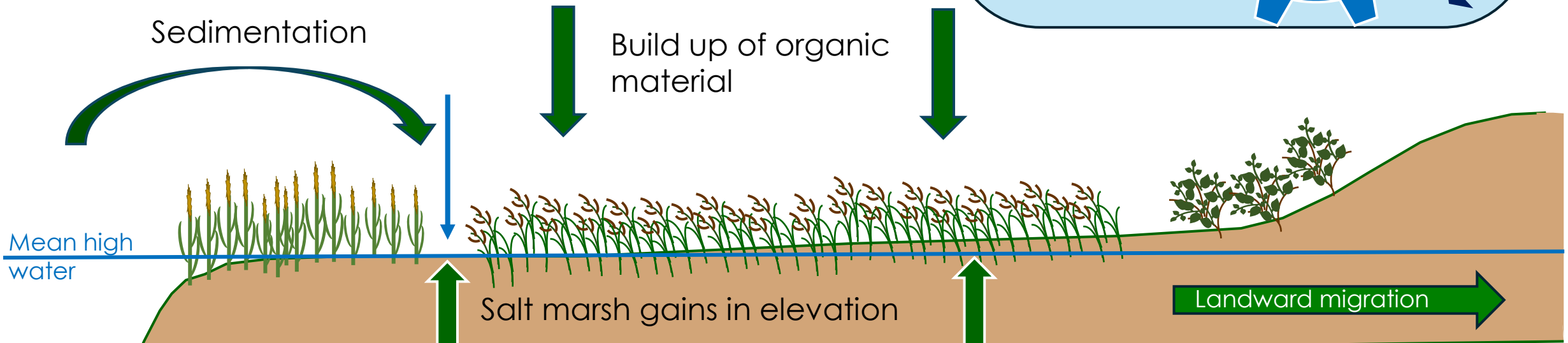
1) Salt marshes naturally adjust to sea level rise

Sea level is rising in New England at approx. 4-6mm/year (~ ½ in/yr).

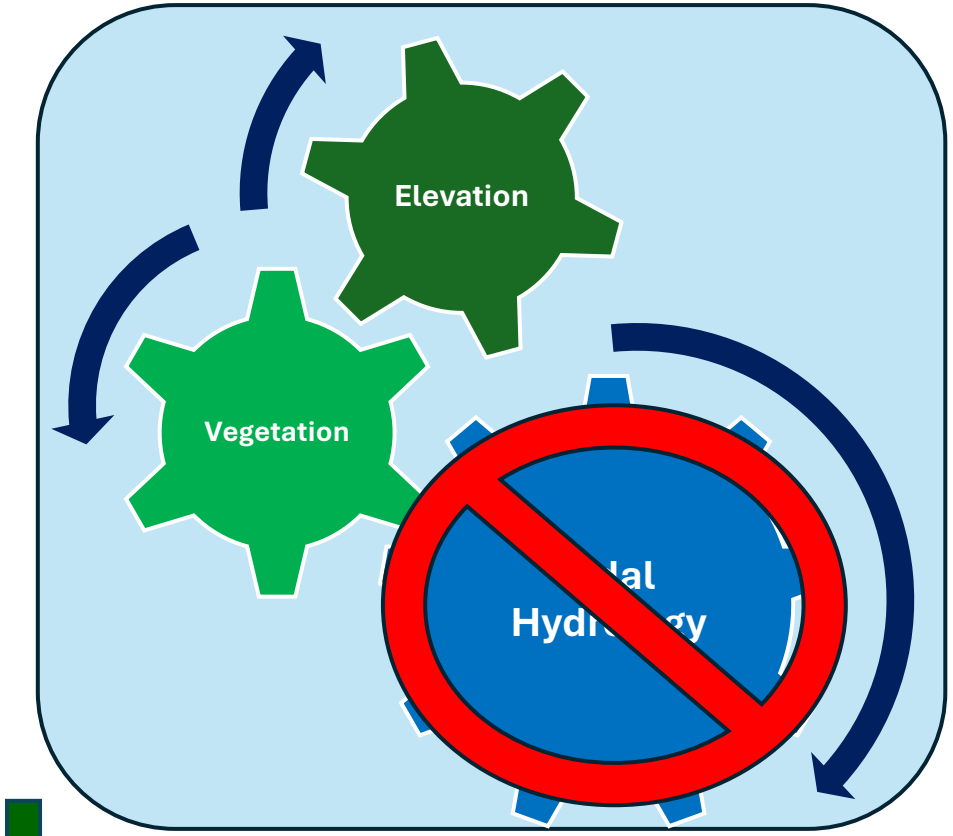
Average salt marsh elevation in Weir Creek could increase by ~ 0.5 ft in 30 years.



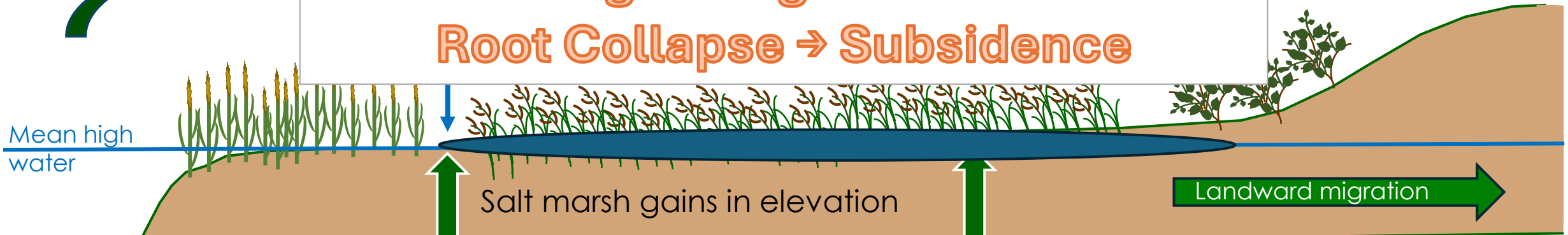
Accretion



What if tidal hydrology is restricted?

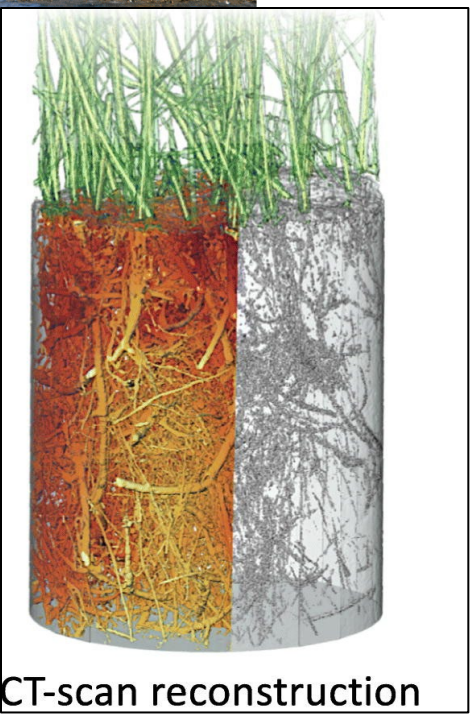


Poor Drainage → Vegetation Dieback → Root Collapse → Subsidence



How do salt marshes protect us?

2) Absorption of flood tides

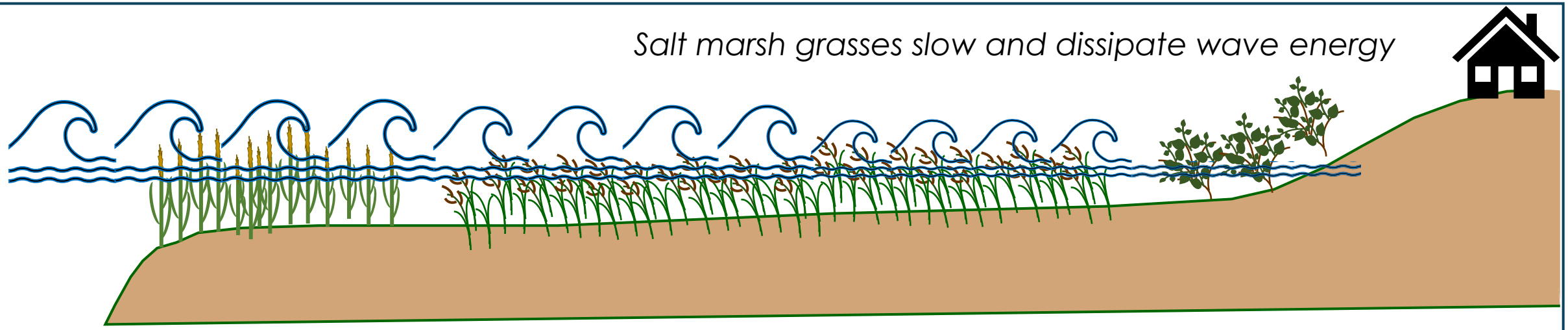


Granse et al. 2022

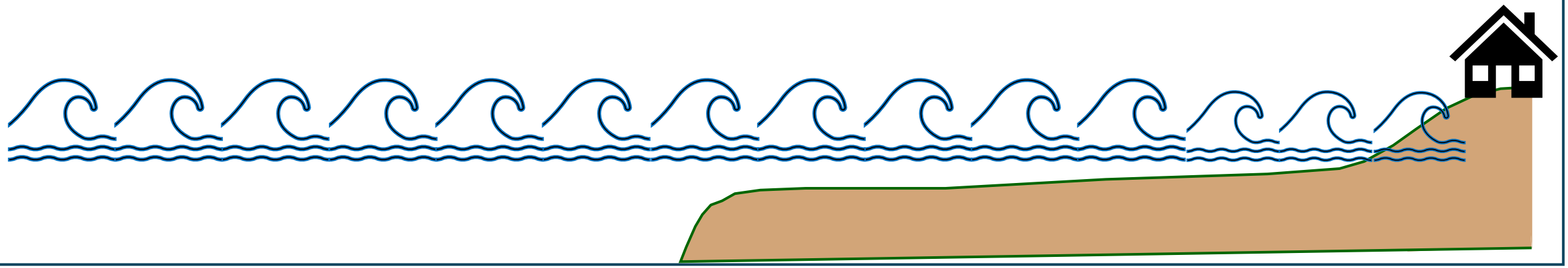
How do salt marshes protect us?

3) Wave attenuation during strong storms

Salt marsh grasses slow and dissipate wave energy



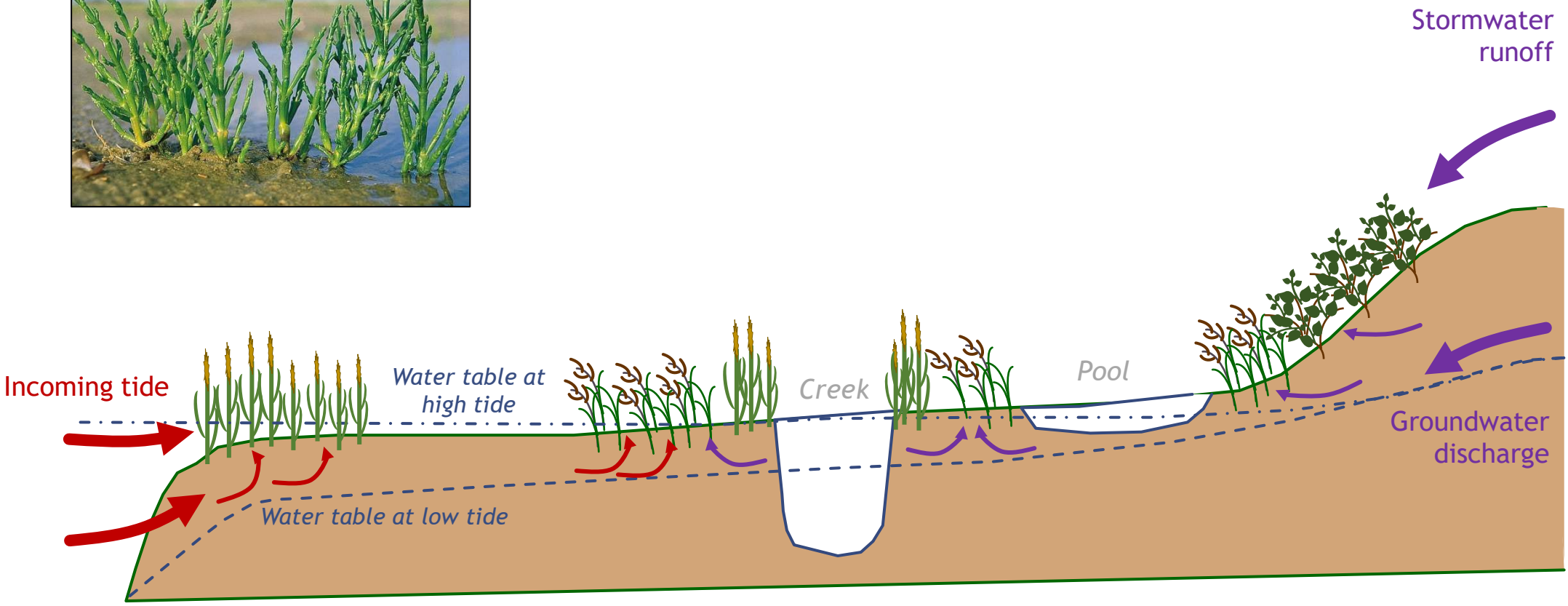
Without salt marsh, high wave energy causes coastal erosion and loss of property



How do salt marshes protect us?

4) Pollutant filtration and removal (bacteria, nutrients, heavy metals and suspended sediments)

Salicornia sp.
(glasswort or pickle weed)



Water Quality at Weir Creek

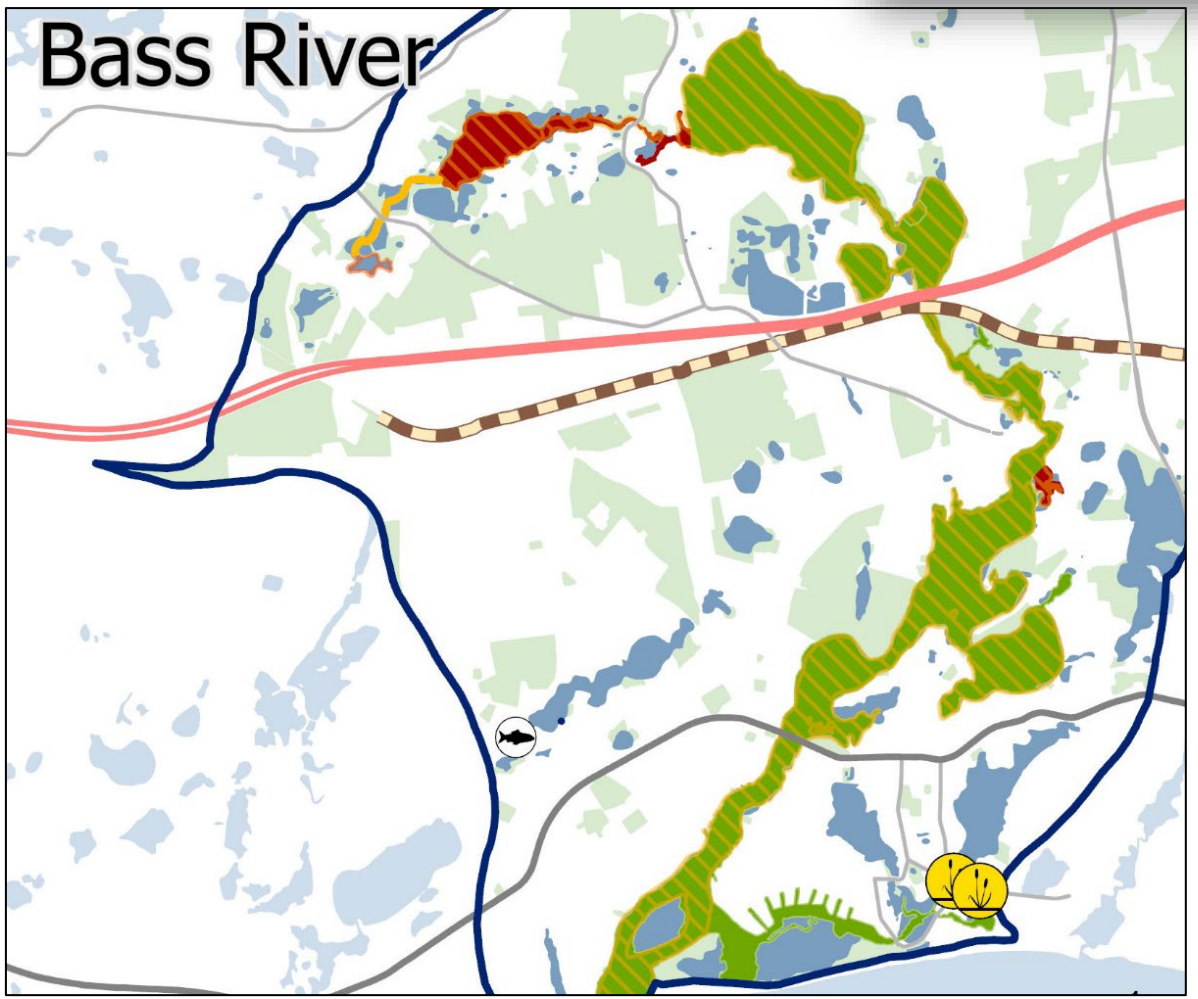
Designated Shellfish Growing Areas

- Conditionally Approved
- Restricted
- Prohibited

2018/2020 Integrated List Data (MA DEP)

Lakes & Estuaries

- Impaired - TMDL is completed
- Impairment not caused by a pollutant
- Impaired - TMDL required

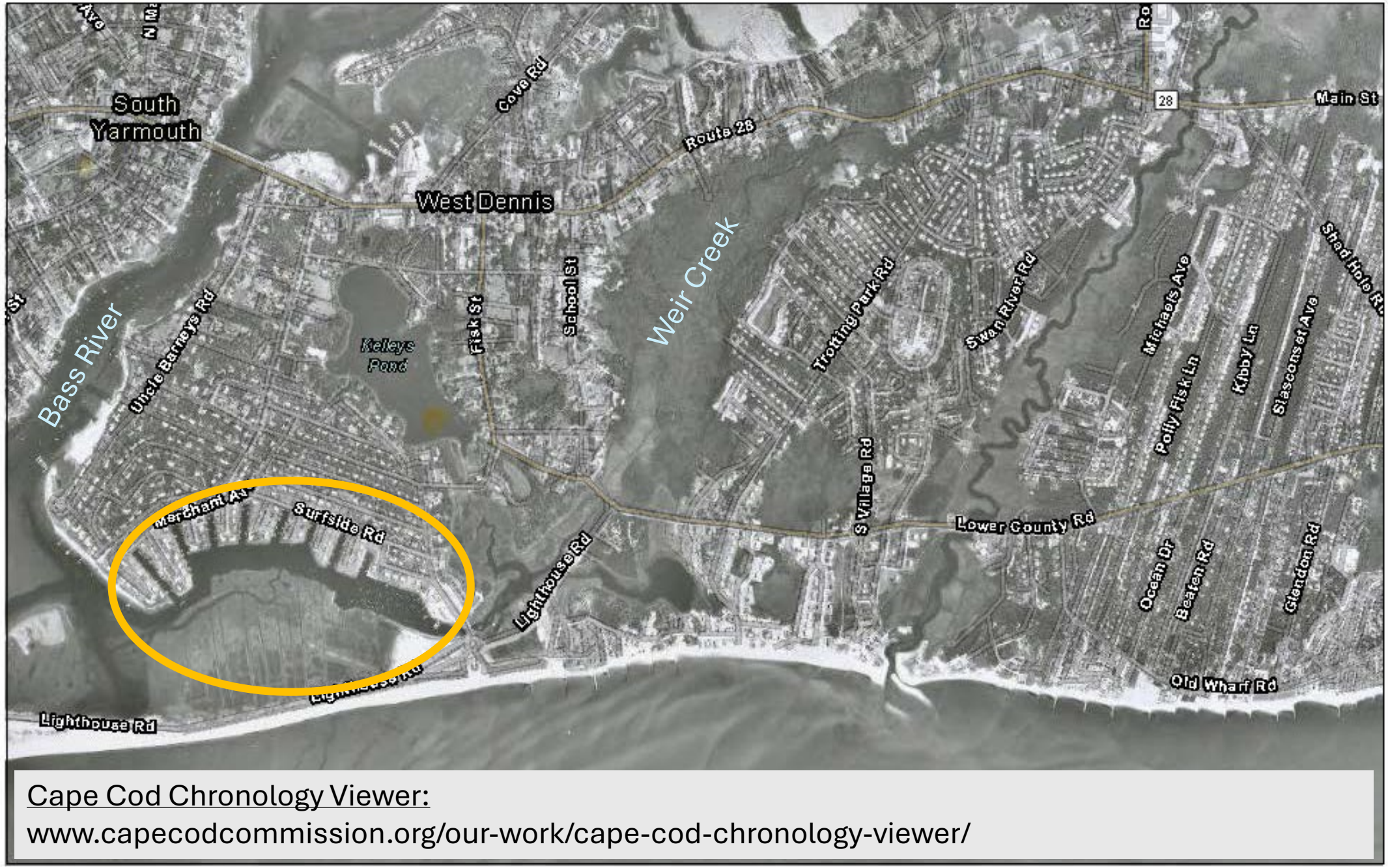


Weir Creek -
A long history of tidal hydrology manipulation

West Dennis -1952

Cape Cod Chronology Viewer:
www.capecodcommission.org/our-work/cape-cod-chronology-viewer/

West Dennis -1971



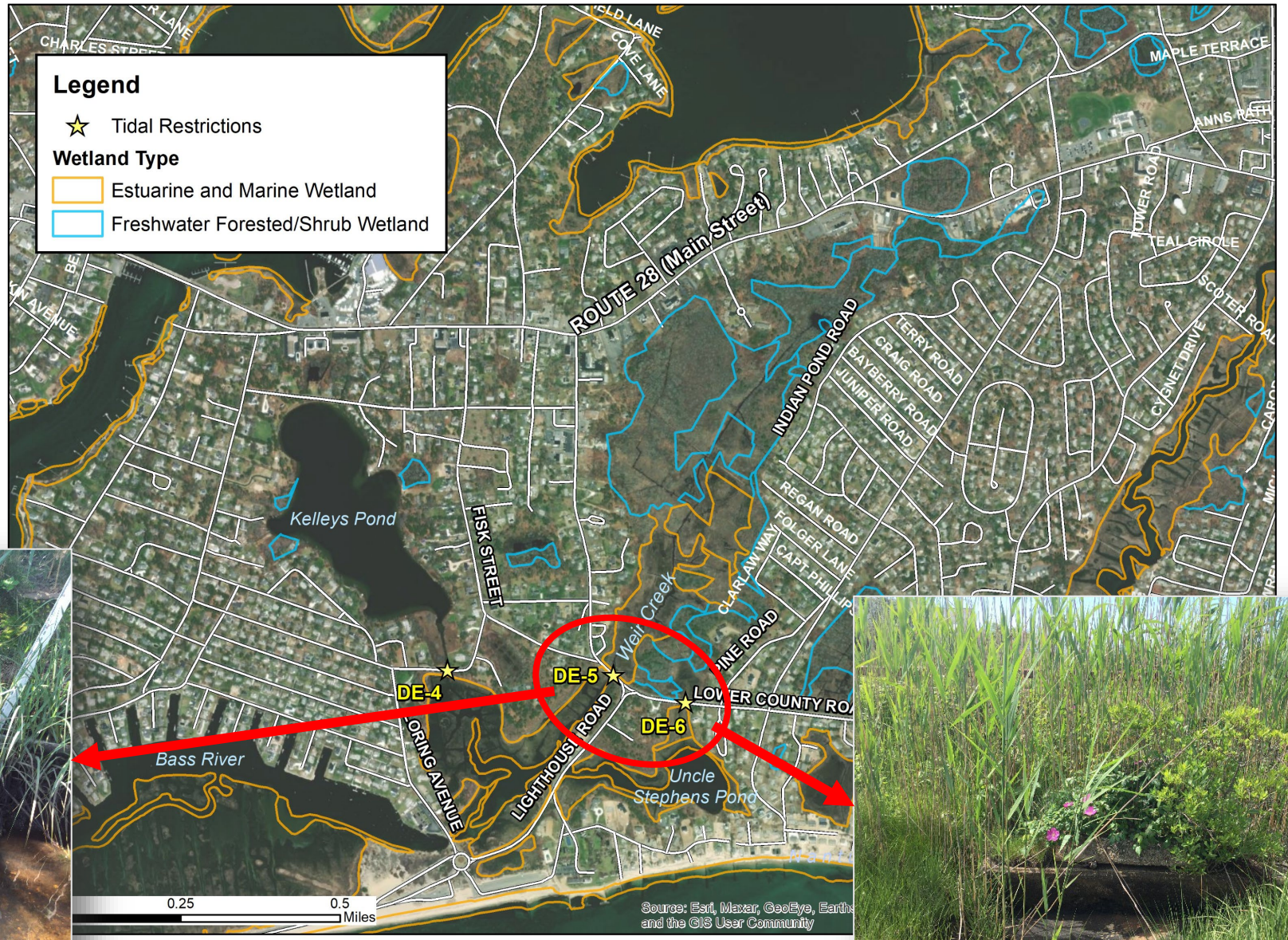
Cape Cod Chronology Viewer:
www.capecodcommission.org/our-work/cape-cod-chronology-viewer/

Weir Creek: Existing Conditions

Results from pre-restoration monitoring

Existing Conditions:
Impairments to ecosystem function

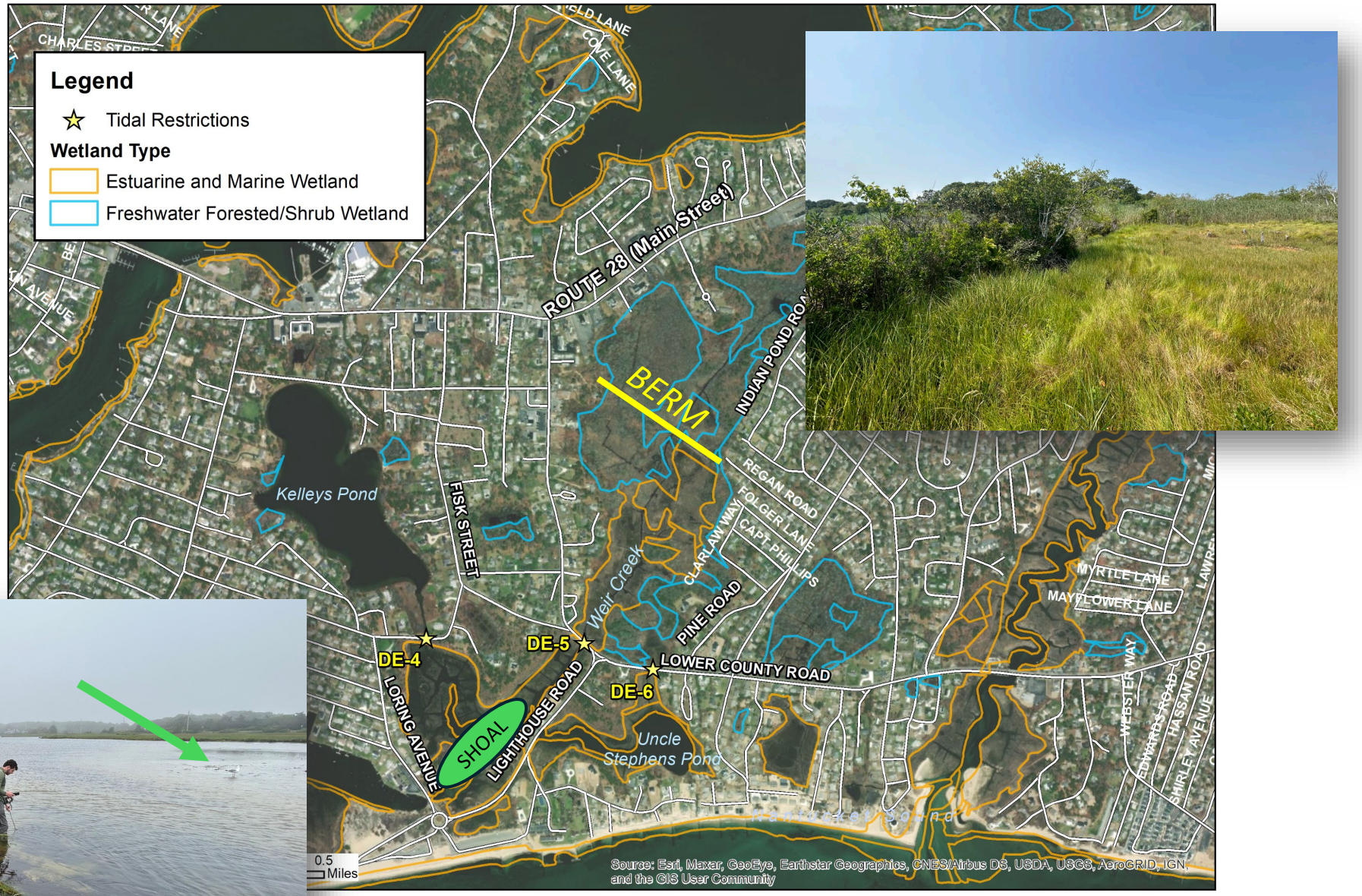
Weir Creek Restoration Site Map



Existing Conditions:

<u>Additional</u> impairments to ecosystem function

Weir Creek Restoration Site Map



Permanent vegetation plots & RTK-based mapping of upland border

LEGEND

- Woods Hole Group Loggers
- WQ Sampling Stations
- Salinity Loggers

Vegetation Monitoring

- Fresh/Brackish Upstream
- Reference
- Restricted

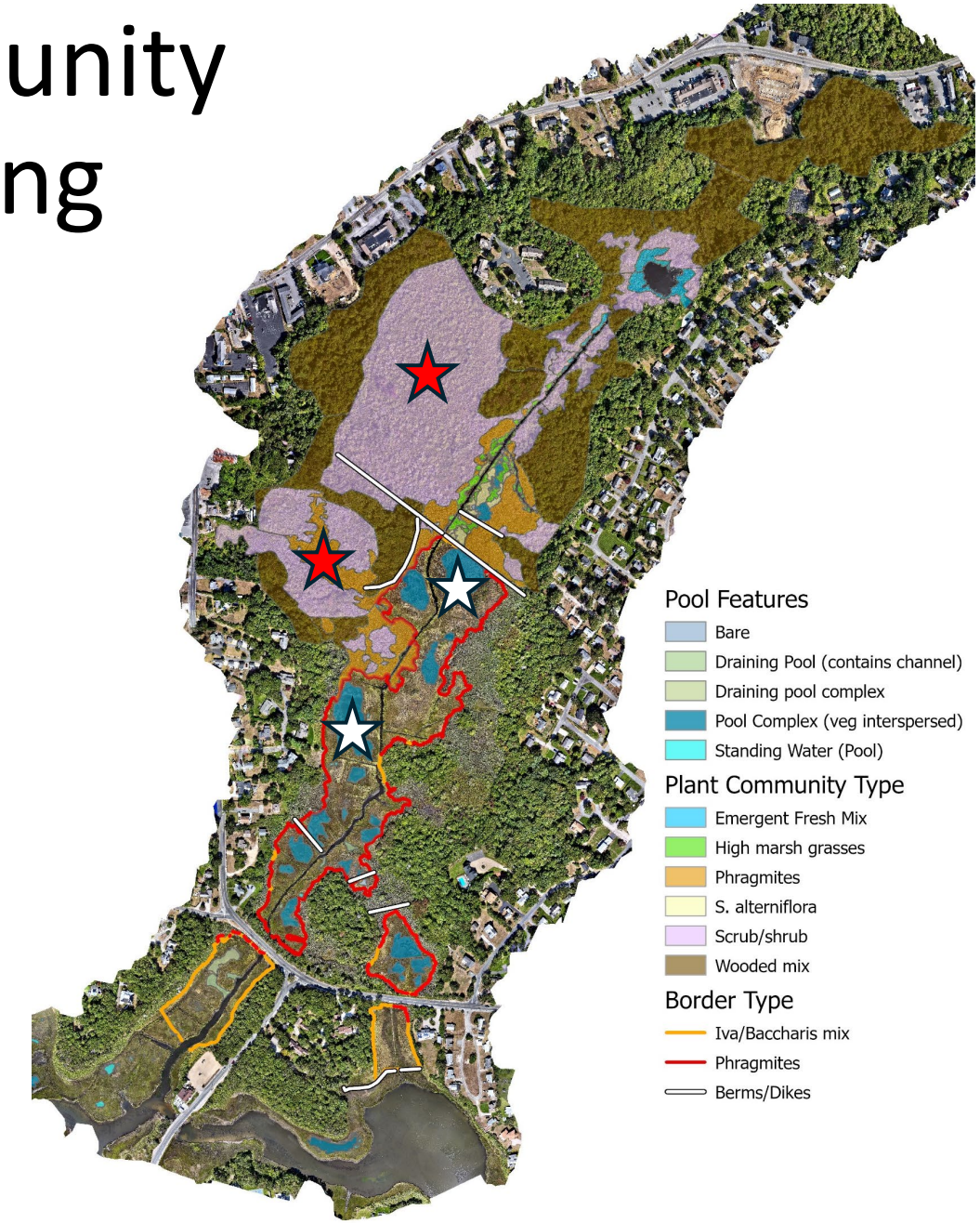
N

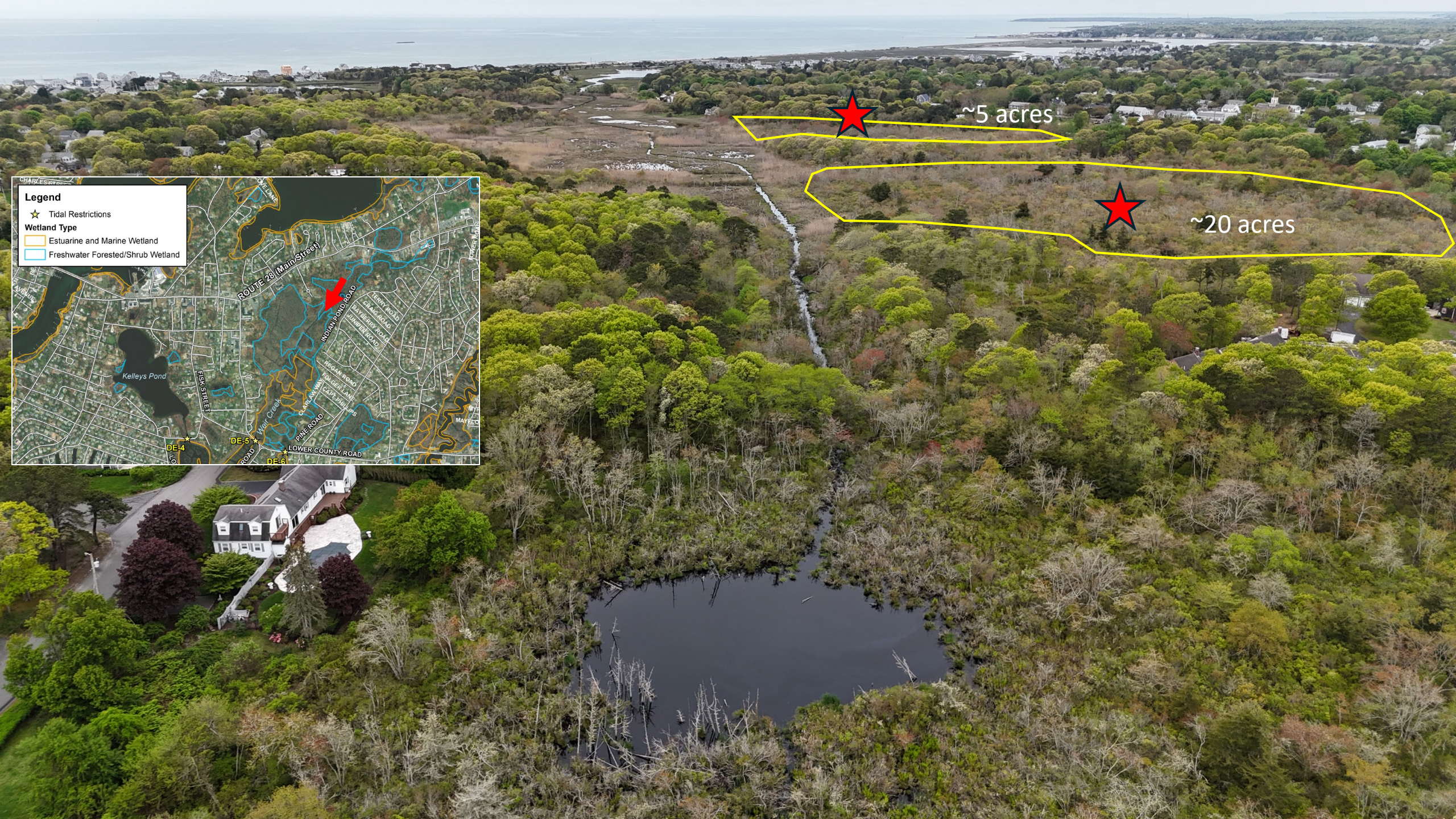
Maxar

0 500 1,000 2,000 Feet

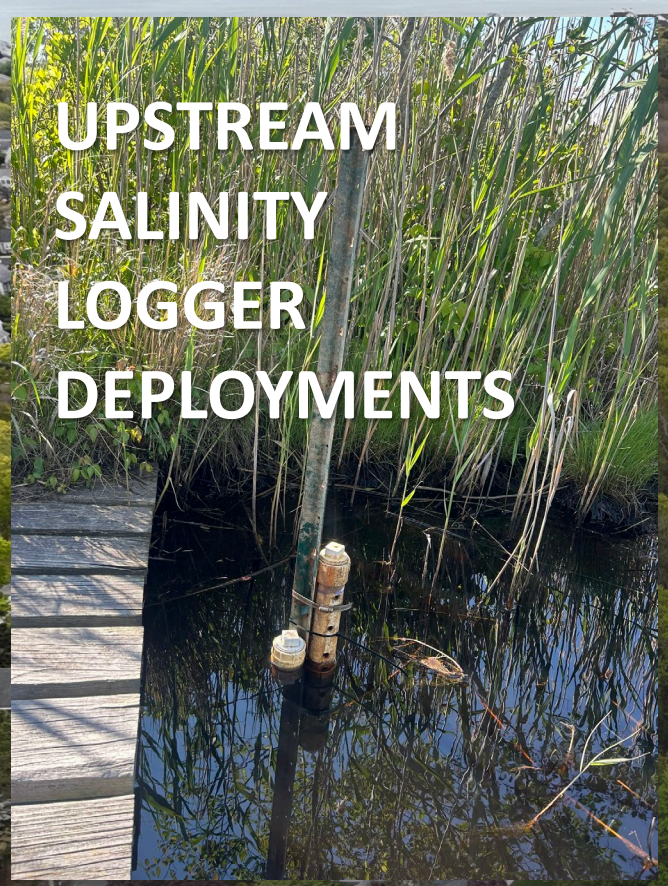
Drone imagery & GIS-based plant community delineations

Community Mapping




~5 acres
~20 acres
Legend
Tidal Restrictions
Wetland Type
Estuarine and Marine Wetland
Freshwater Forested/Shrub Wetland
ROUTE 28 (Main Street)
INDIAN POND ROAD
Kelleys Pond
FISK STREET
Weir Creek
PINE ROAD
LOWER COUNTY ROAD
DE-4
DE-5
DE-6


Legend
Tidal Restrictions
Wetland Type
Estuarine and Marine Wetland
Freshwater Forested/Shrub Wetland
ROUTE 28 (Main Street)
COVE LANE
INDIAN POND ROAD
TERRY ROAD
CRAIG ROAD
BAYBERRY ROAD
JUNIPER ROAD
REGAN ROAD
FOLGER LANE
CAPT PHILLIPS
CLARLAW WAY
PINE ROAD
Kelleys Pond
FISK STREET
Weir Creek
LOWER COUNTY ROAD
DE-4
DE-5
DE-6



UPSTREAM SALINITY LOGGER DEPLOYMENTS

CULVERT

BERM

UPPER

POND

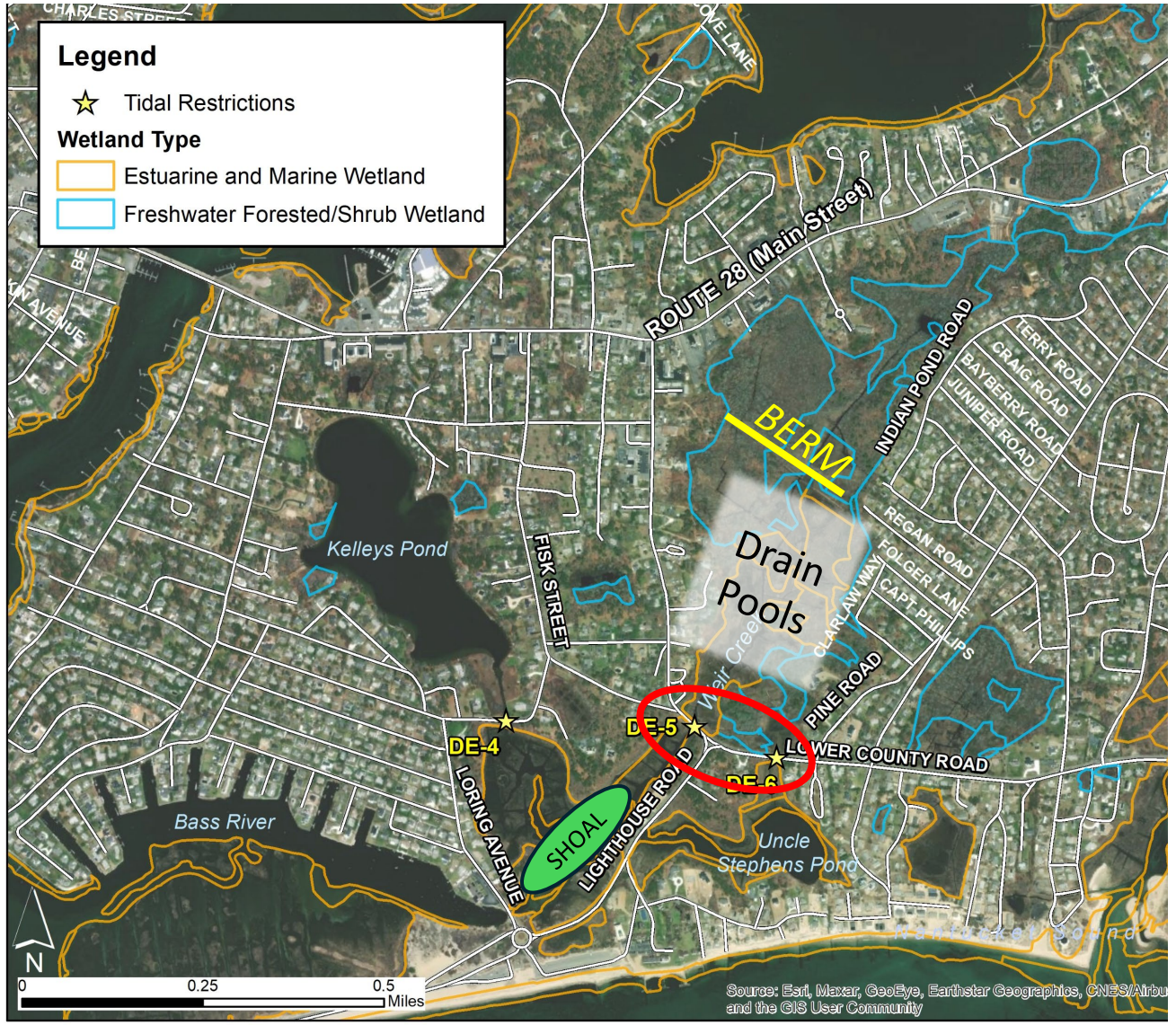
	Tidal Range	Salinity Range	Salinity Average
CULVERT	1.8 ft	25 ppt	22 ppt
BERM	7 inches	25 ppt	14 ppt
UPPER	6 inches	26 ppt	8 ppt
POND - Surface	5 inches	5 ppt	1 ppt
POND - Bottom		9 ppt	2 ppt

Weir Creek: Restoration Plans

Adaptive Management

Restoration Plans

1. Clear/maintain drainage ditches (Cape Cod Mosquito Control Project)
2. Remove berms
3. Replace undersized culverts with 6 ft (H) x 8 ft (W) box culverts
4. Remove sandbar/shoal upstream of Loring Ave Bridge
5. Monitor & adapt



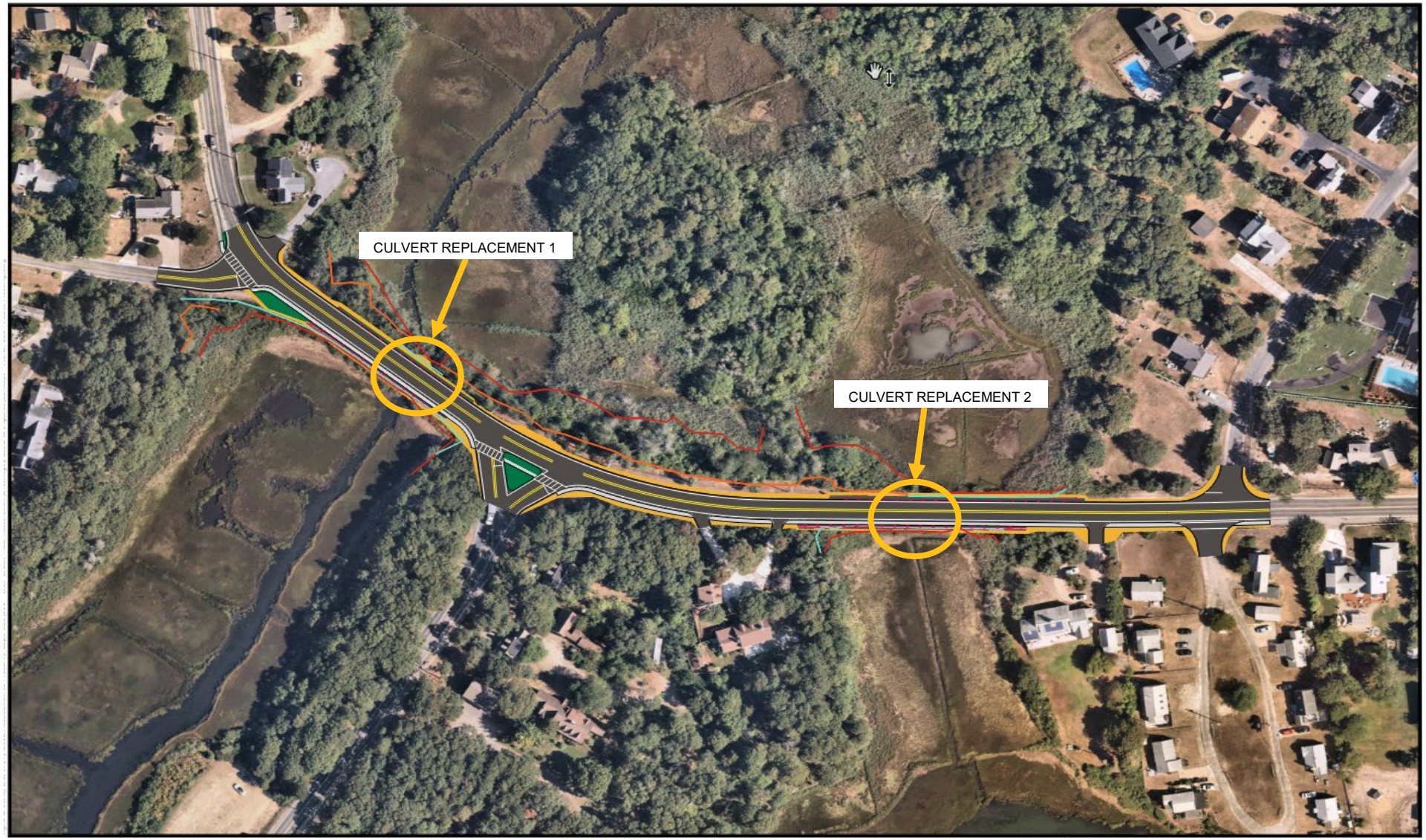
Acknowledgements

Funding for this project has been provided by the National Fish and Wildlife Foundation National Coastal Resilience Fund, the NOAA Restoration Center under U.S. Department of Commerce award NA24NMFX463C0065-T1-01, the Southeast New England Program (SNEP) Watershed Implementation Grants funded by the U.S. Environmental Protection Agency through collaboration with Restore America's Estuaries, the USDA Natural Resources Conservation Service in collaboration with the Cape Cod Conservation District, and a private foundation.

Eric Ohanian

Project Manager
Tighe & Bond

PROJECT AREA OVERVIEW

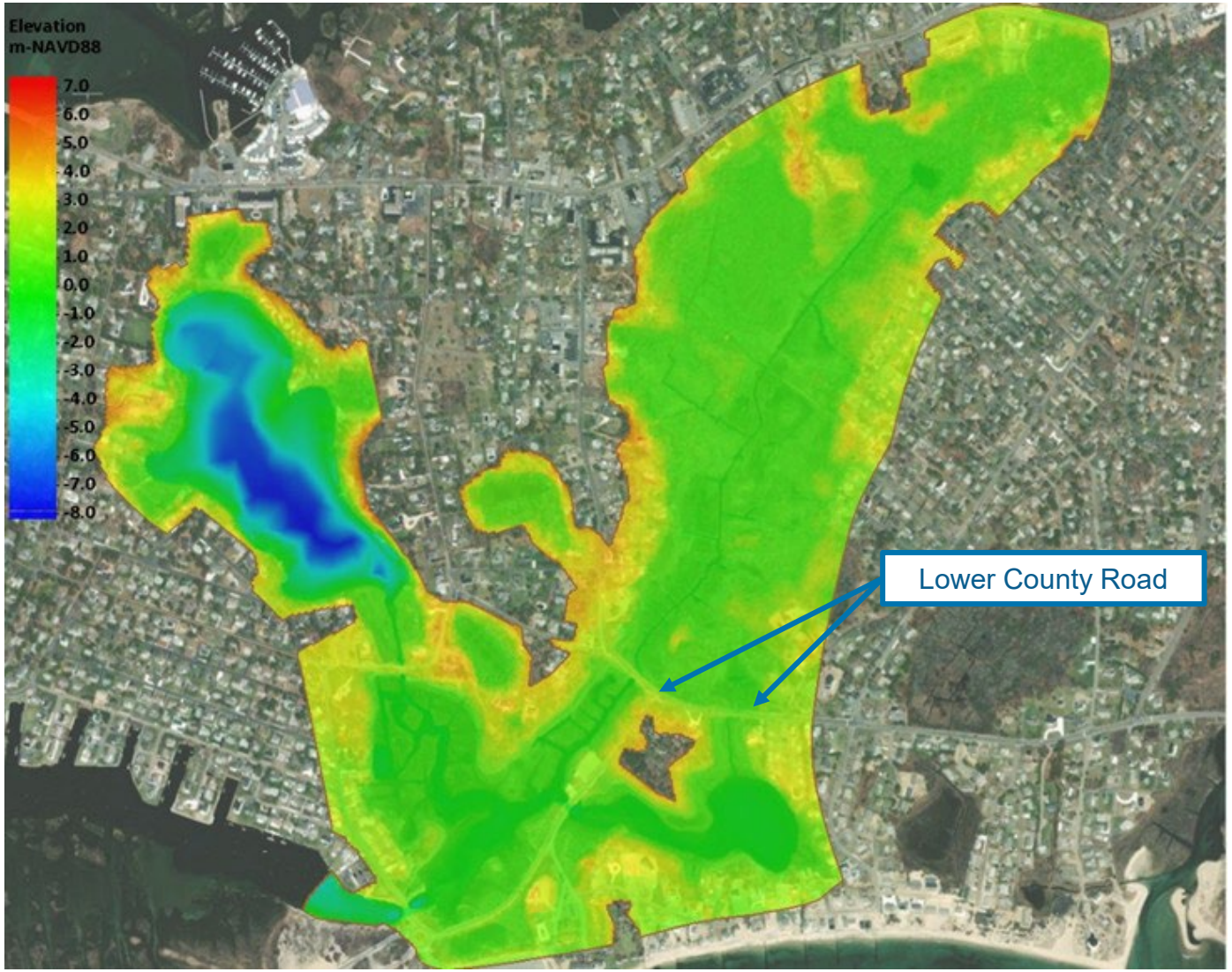

CULVERT REPLACEMENT 1
CULVERT REPLACEMENT 2

MODEL DEVELOPMENT

WOODS HOLE GROUP
A CLS COMPANY

Tighe&Bond

MODEL DEVELOPMENT



WOODS HOLE GROUP
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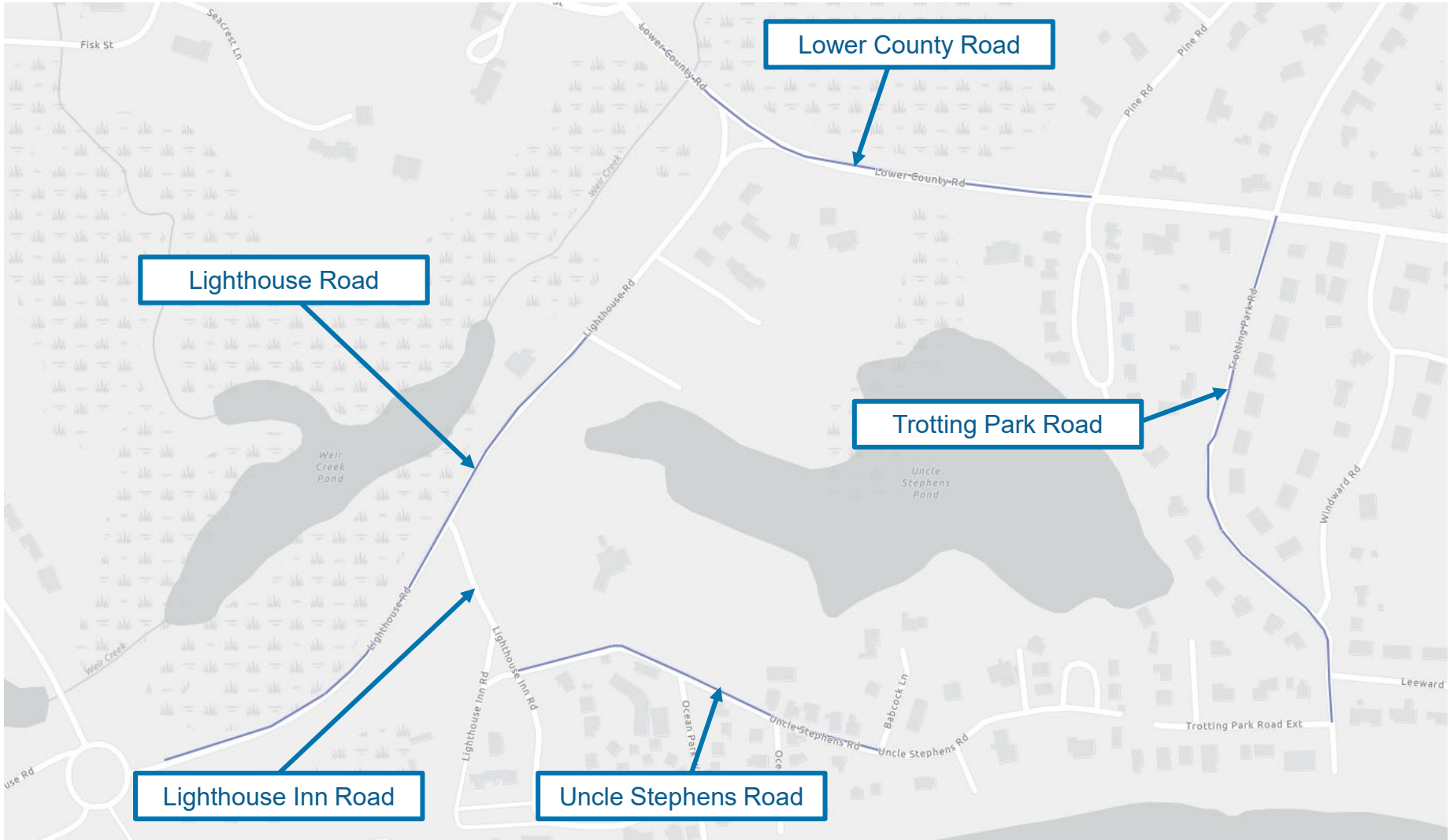
LOW LYING ROADS IDENTIFIED BY THE CAPE COD COMMISSION



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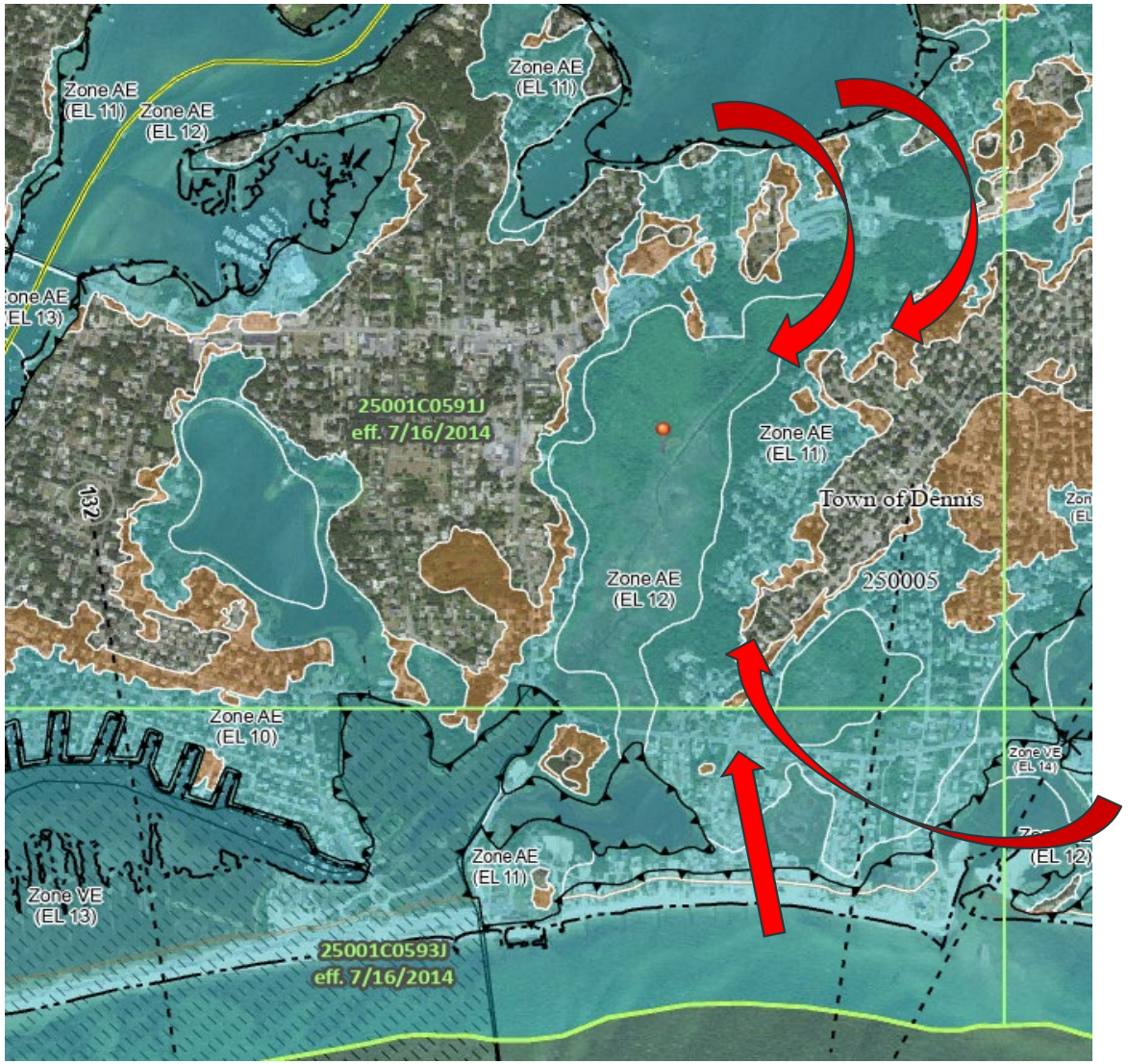
FEMA FLOOD MAP

- Based on the 1% AEP Event
- Upper Weir Creek located in Zone AE 12
- Adjacent Neighborhoods to the east are Zone AE 11
- Multiple Potential flood paths other than Lower County Road (LCR)
- LCR currently has a low elevation of 4.2 ft-NAVD88



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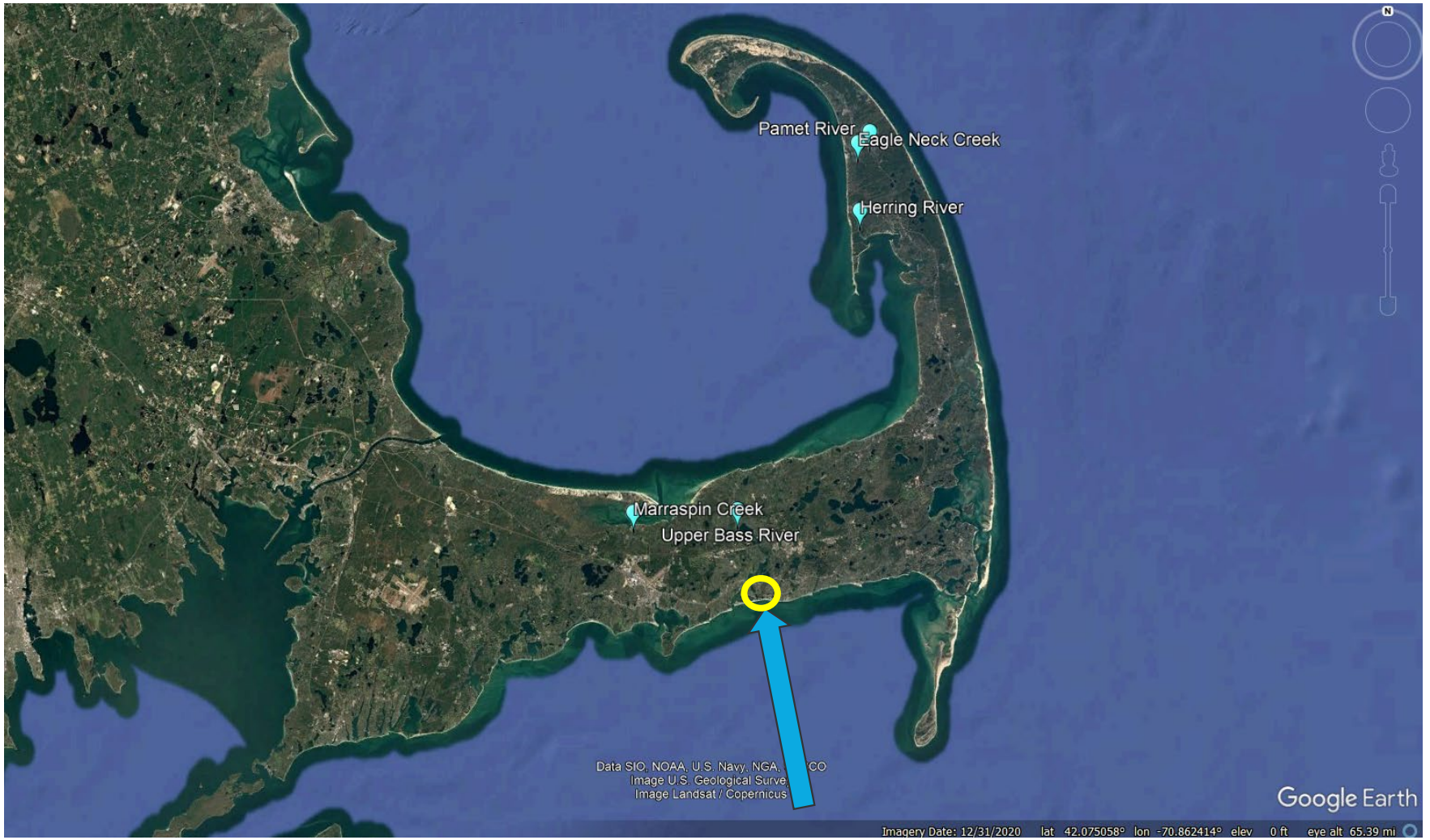
STORM EVENTS

Exceedance Probability	Water Surface Elevation	Common Name
10.5%	6.8 ft-NAVD88	Hurricane Carol
10%	7.0 ft-NAVD88	10-Year Storm
2%	9.0 ft-NAVD88	50-Year Storm
1%	9.8 ft-NAVD88	100-Year Storm

LOCAL EFDC MODELING PROJECTS



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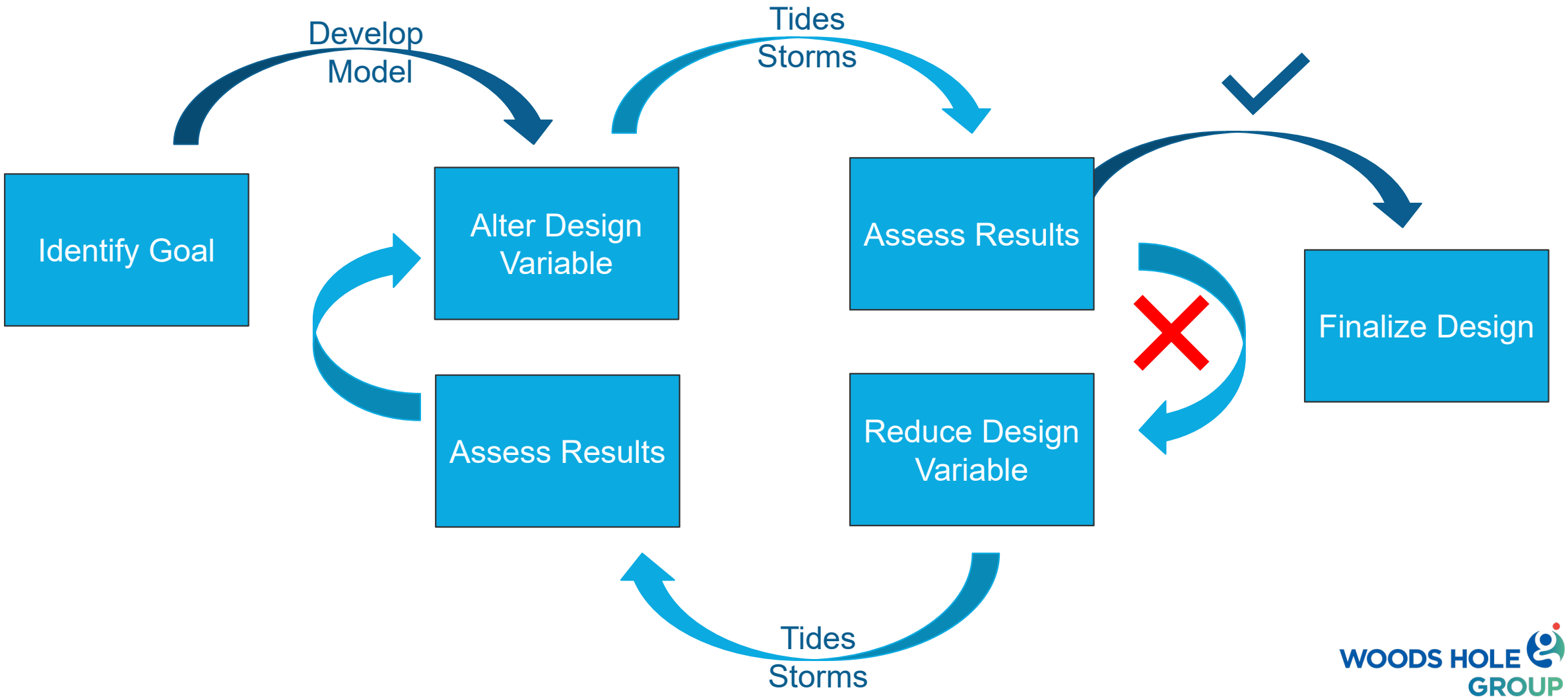
THE ITERATIVE HYDRAULIC MODEL DESIGN PROCESS



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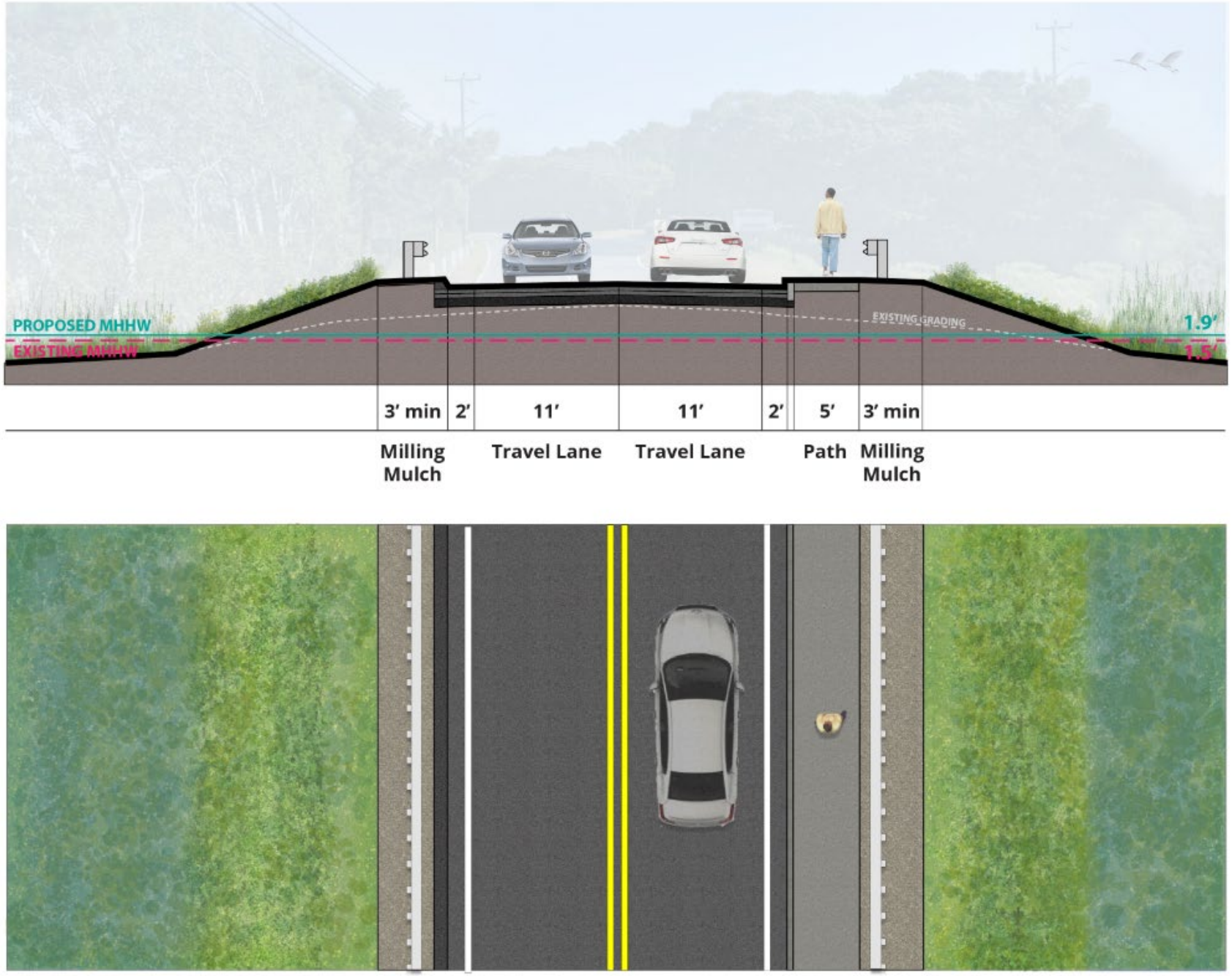
Tighe&Bond

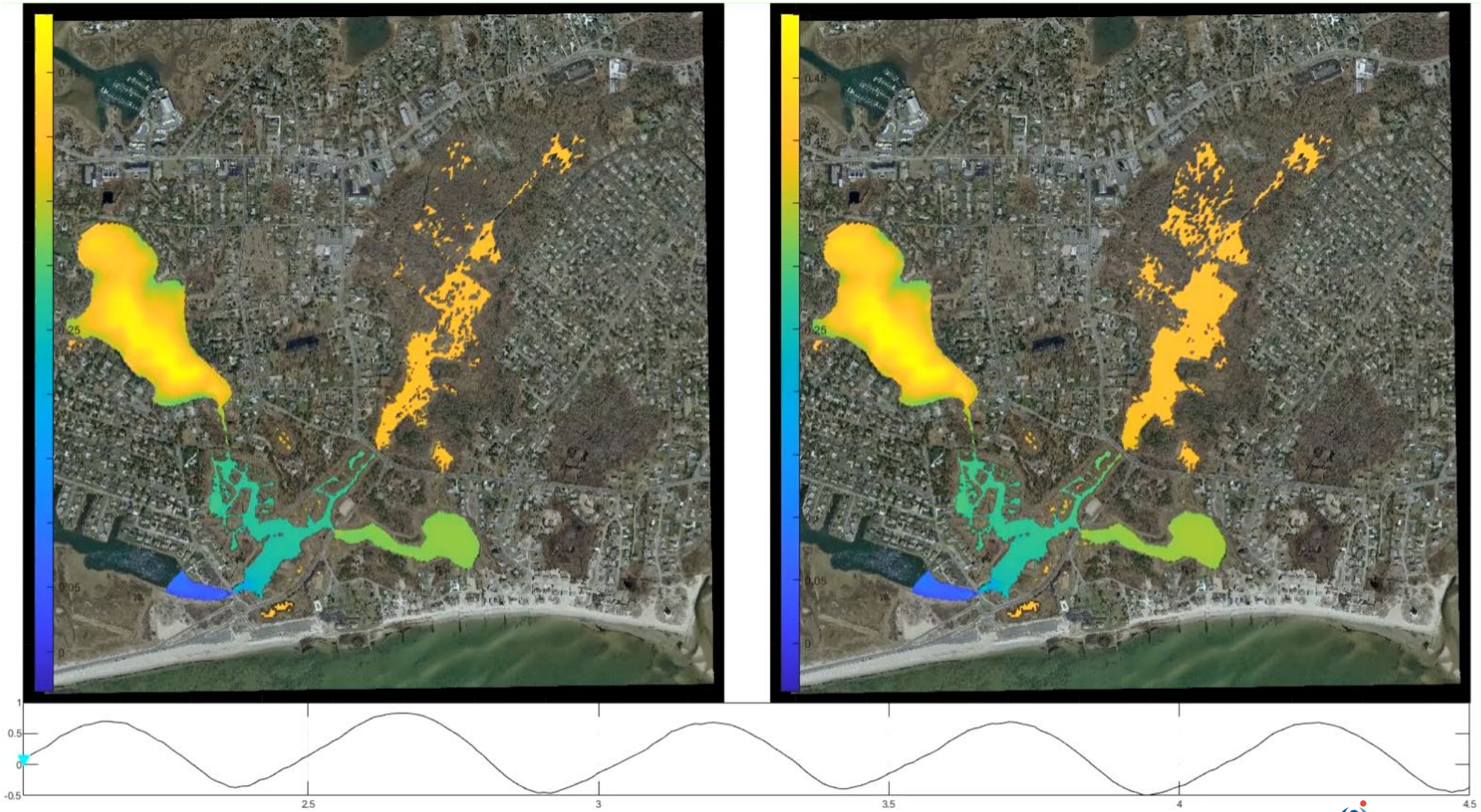

Improved
Upstream
Salt Marsh
Weir Creek
Lower County Road
Lighthouse Road
8’ Box Culvert
Raised Roadway
with Sidewalk and
Guardrails
Weir Creek
N


PROPOSED MHHW
EXISTING MHHW
EXISTING GRADING
1.9'
1.5'
3' min
2'
11'
11'
2'
5'
3' min
Milling Mulch
Travel Lane
Travel Lane
Path
Milling Mulch

Tighe&Bond

TIDAL CYCLE COMPARISON

EXISTING



DESIGN

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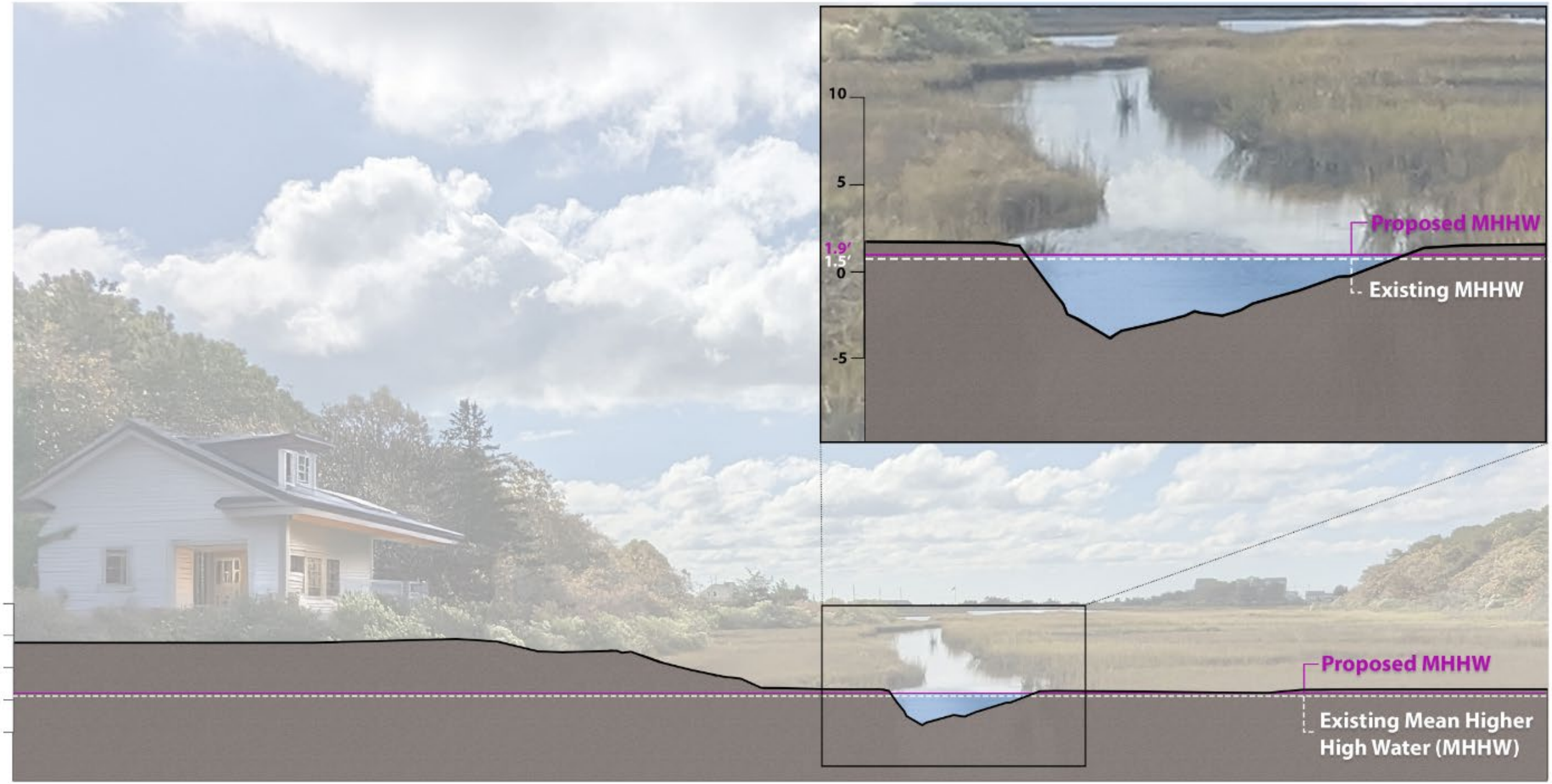
10
5
1.9'
1.5'
0
-5
Proposed MHHW
Existing MHHW
15
10
5
0
-5
Proposed MHHW
Existing Mean Higher
High Water (MHHW)

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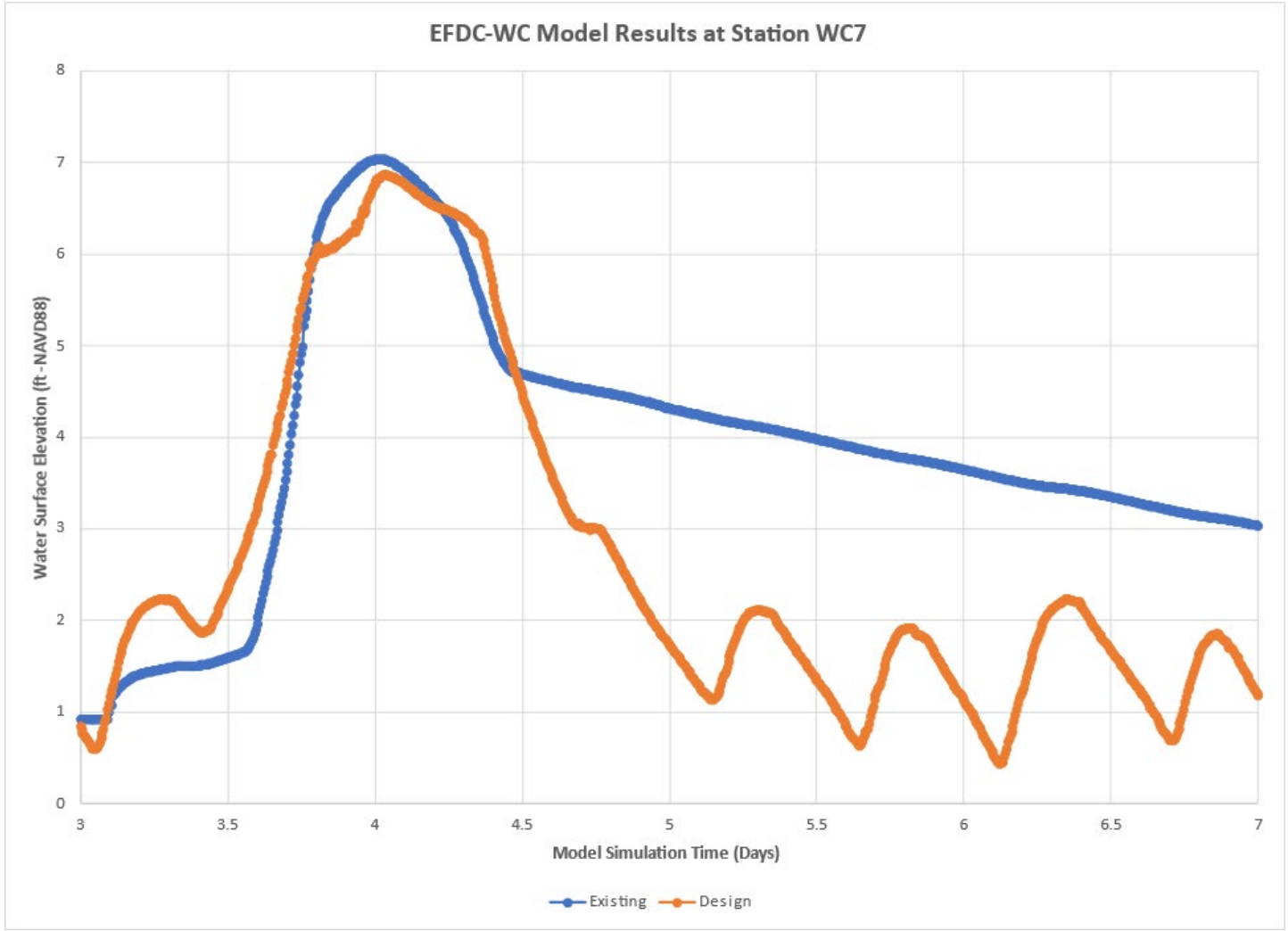
10% STORM COMPARISON



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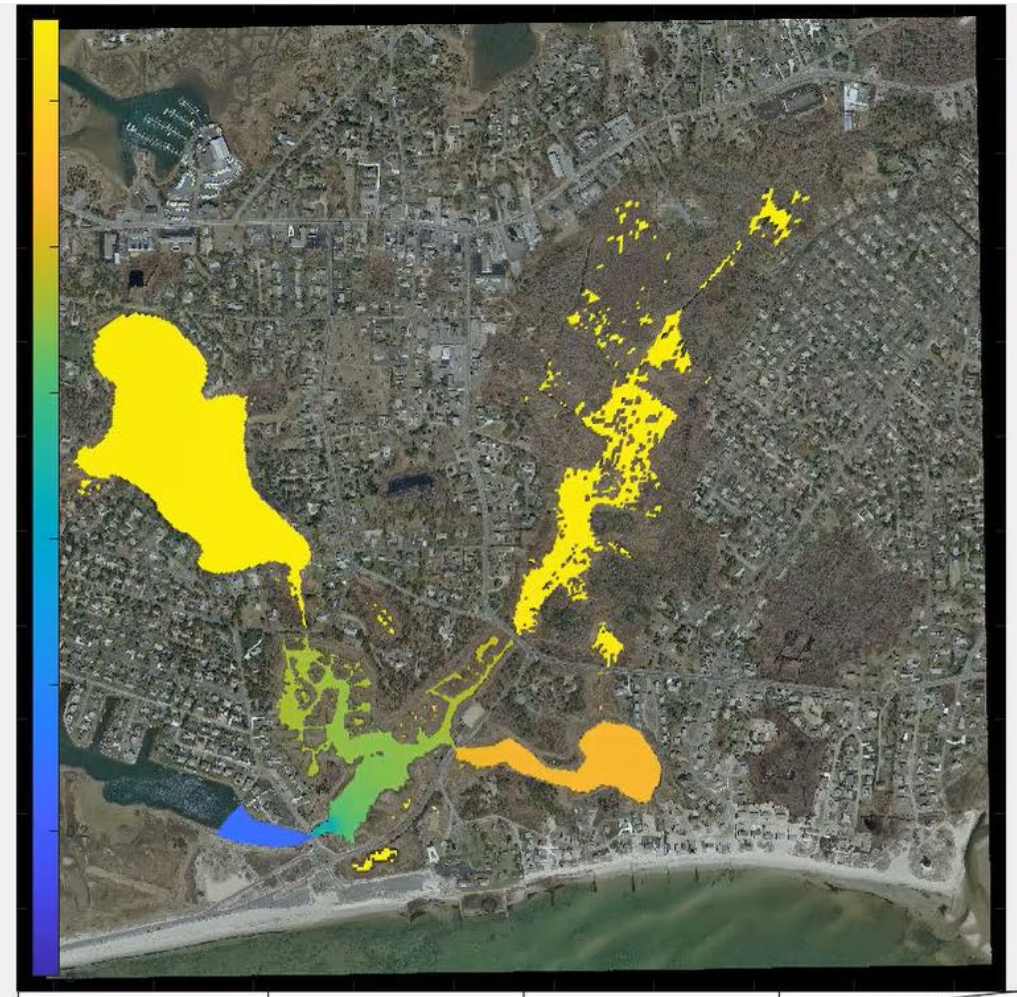
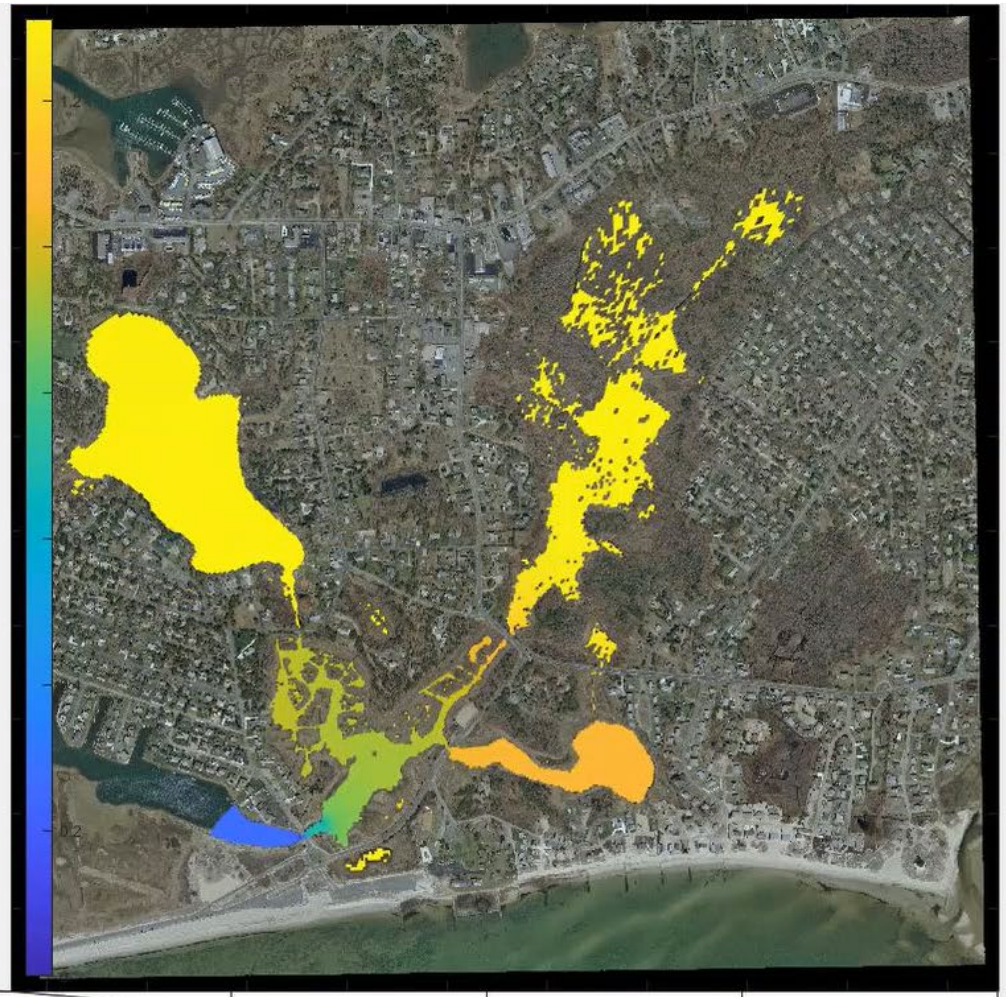
10% STORM COMPARISON

WOODS HOLE GROUP
A CLS COMPANY

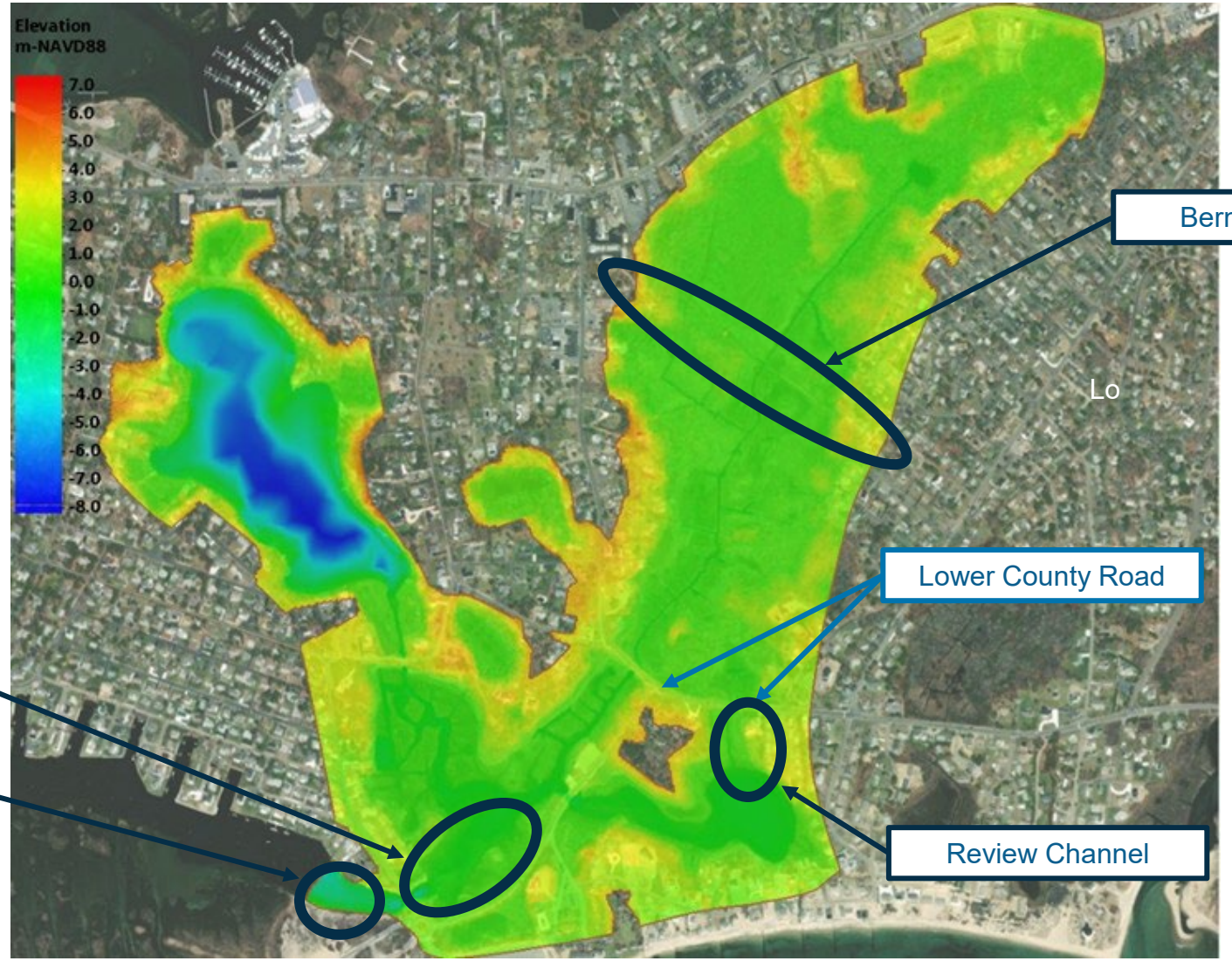
EXISTING





DESIGN

NEXT STEPS



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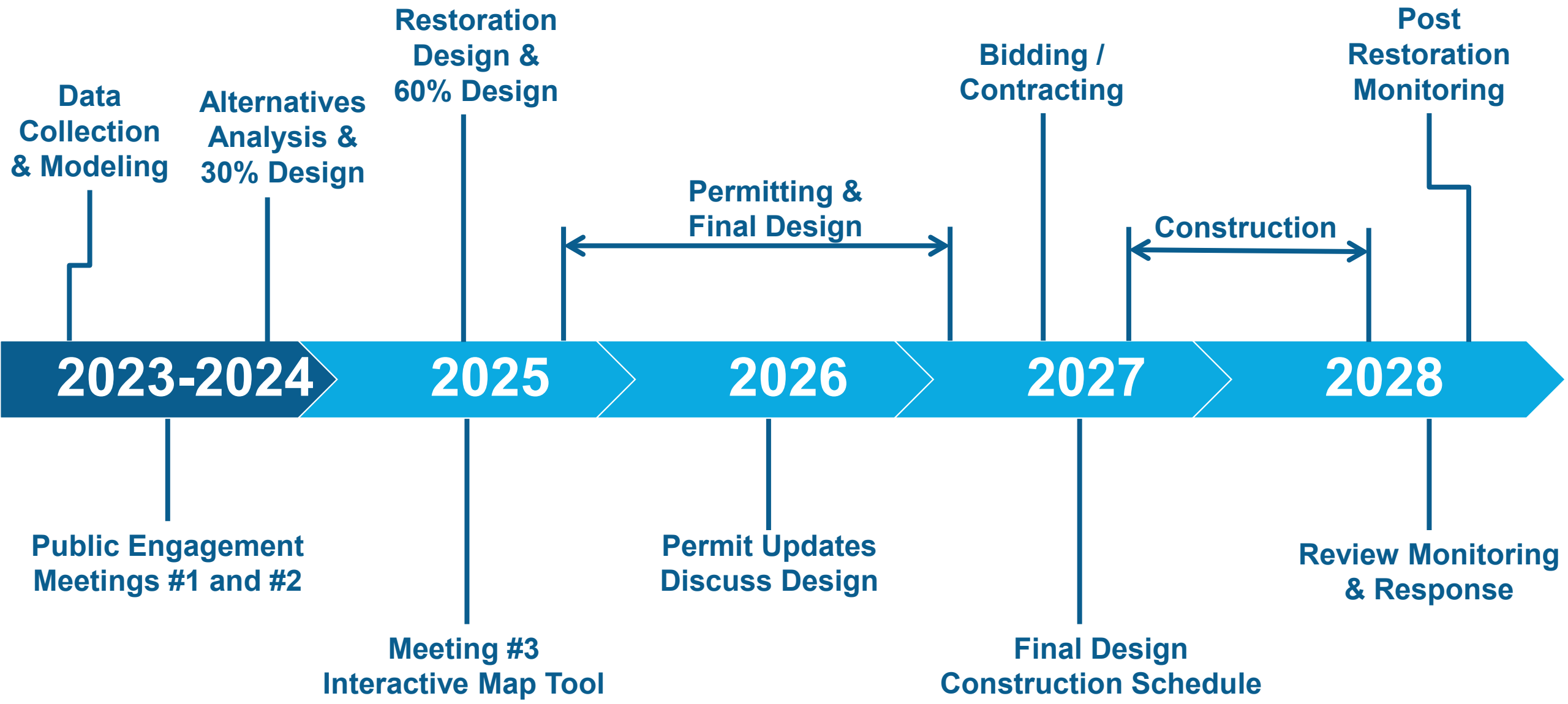
SCHEDULE



Tighe&Bond

Resources will be made available on the website

http://www.apcc.org/weir-creek

Please sign-up via the website to receive email updates.

Discussion & Questions

For additional questions and comments:
Jordan Mora
Lead Ecologist
Association to Preserve Cape Cod
jmora@apcc.org

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Introducing the online Weir Creek Tidal Viewer

https://arcg.is/yqLiy0