

# Weir Creek Salt Marsh & Community Resilience Restoration Project

Public Meeting #3

August 20, 2025





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

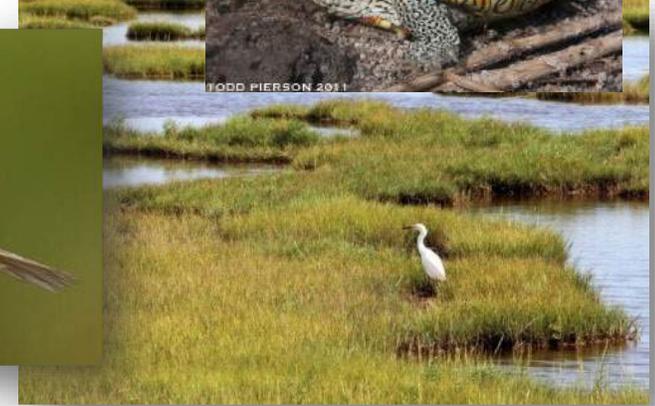


**Jordan Mora**

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



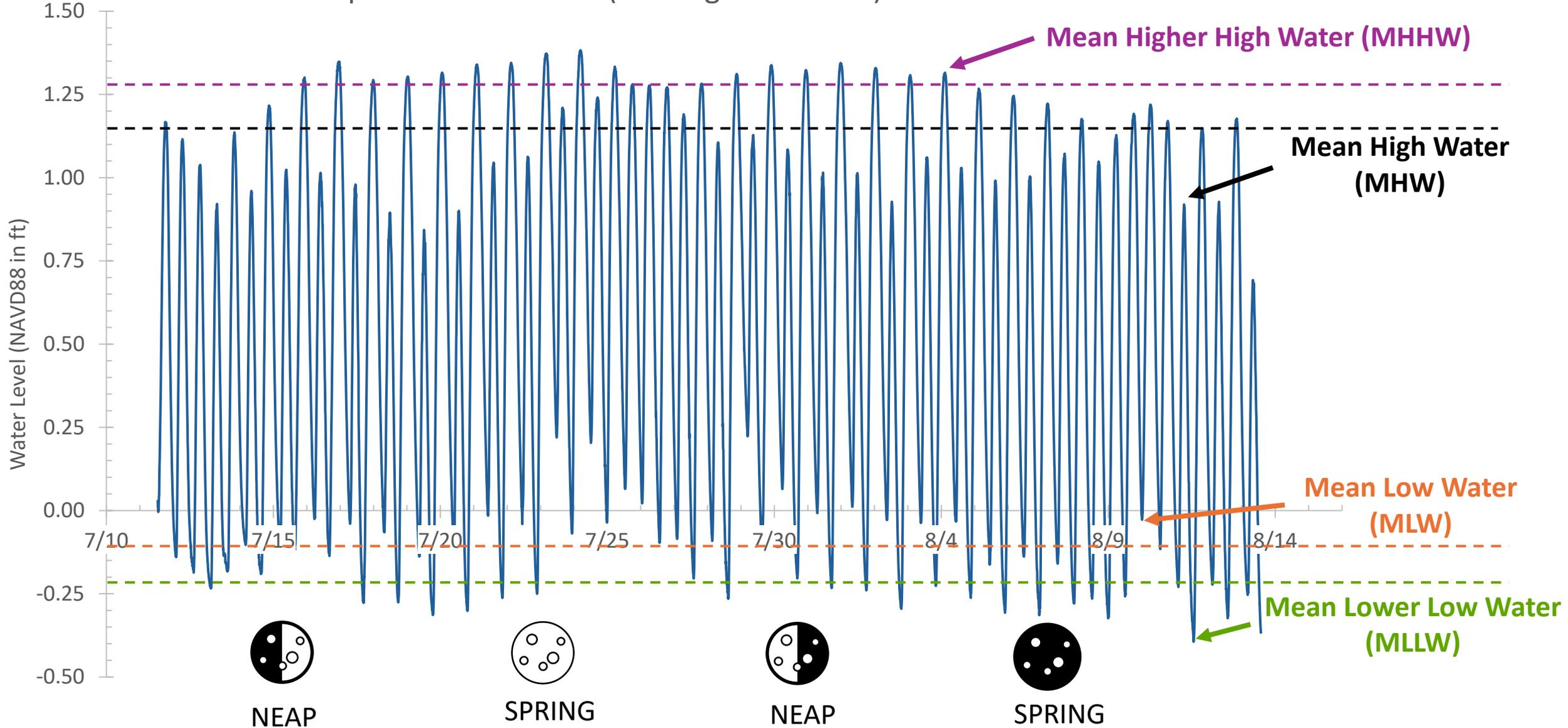


# UNDERSTANDING TIDAL HYDROLOGY



# Introduction to tidal hydrology terminology

Water Level Upstream of Culvert (Existing Conditions) at Weir Creek Salt Marsh



# Introduction to salt marsh structure

*Spartina alterniflora* (smooth cordgrass)



*Spartina patens* (salt hay)



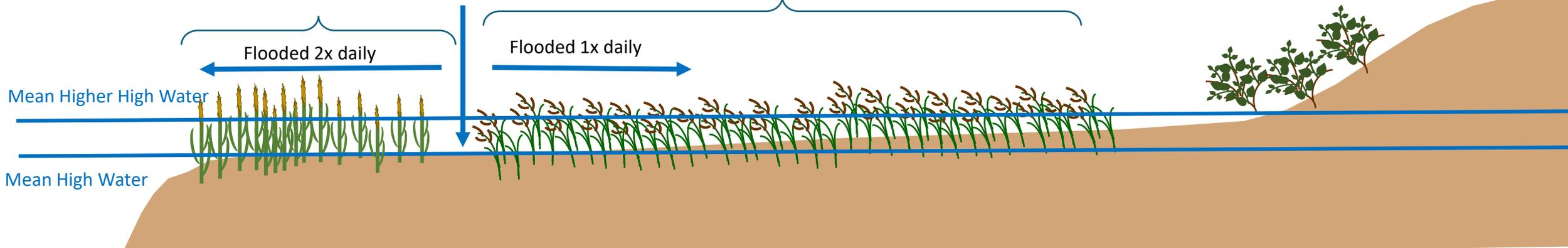
*Phragmites*



Upland transition zone

Low marsh zone

High marsh zone





*HOW* do salt marshes protect us?



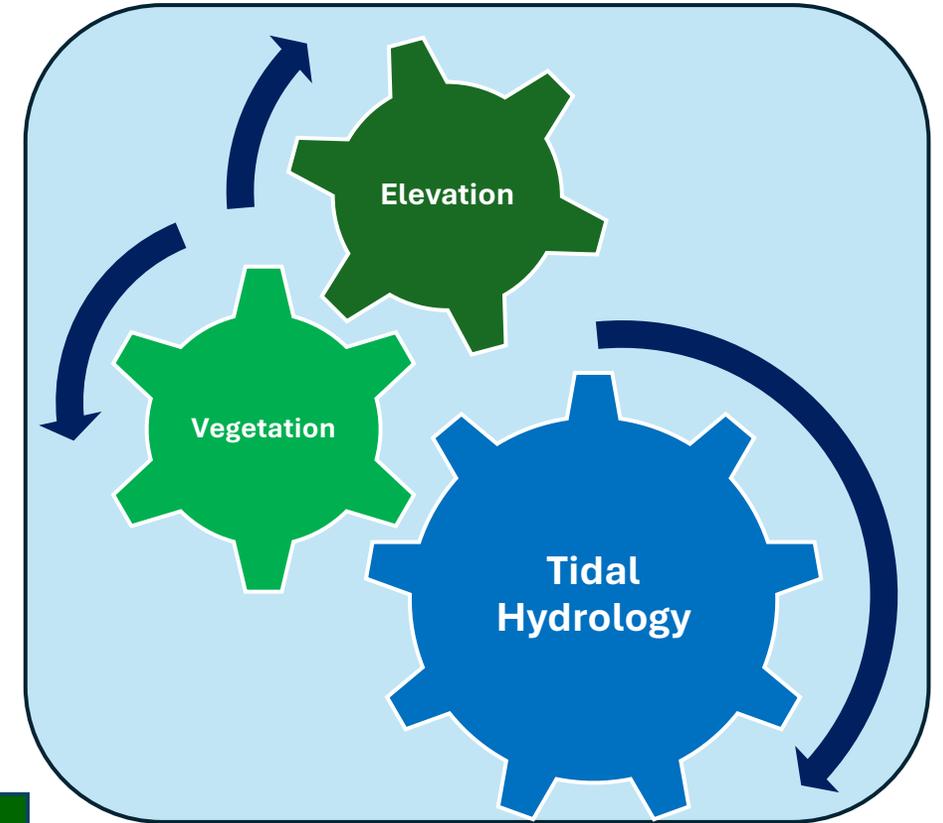
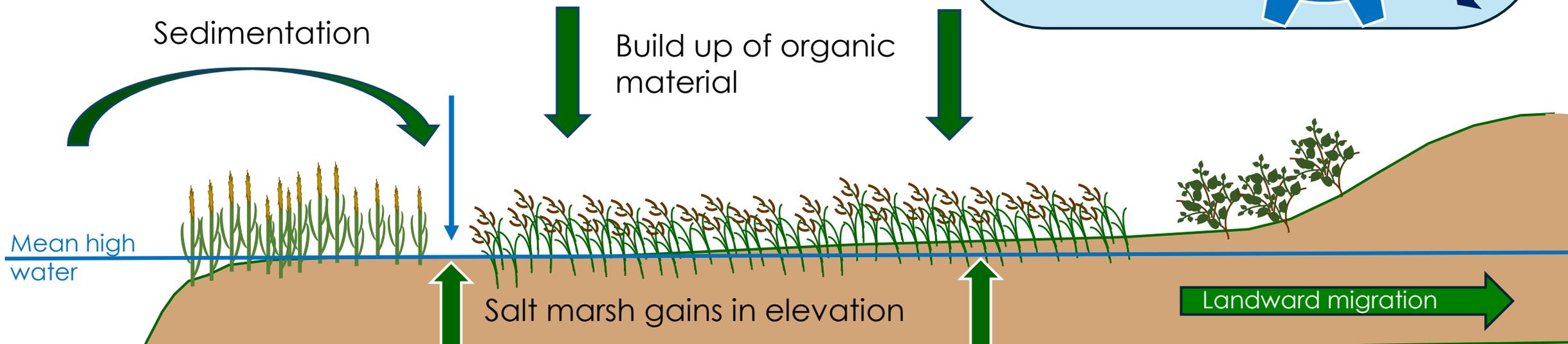
# How do salt marshes protect us?

## 1) Salt marshes naturally adjust to sea level rise

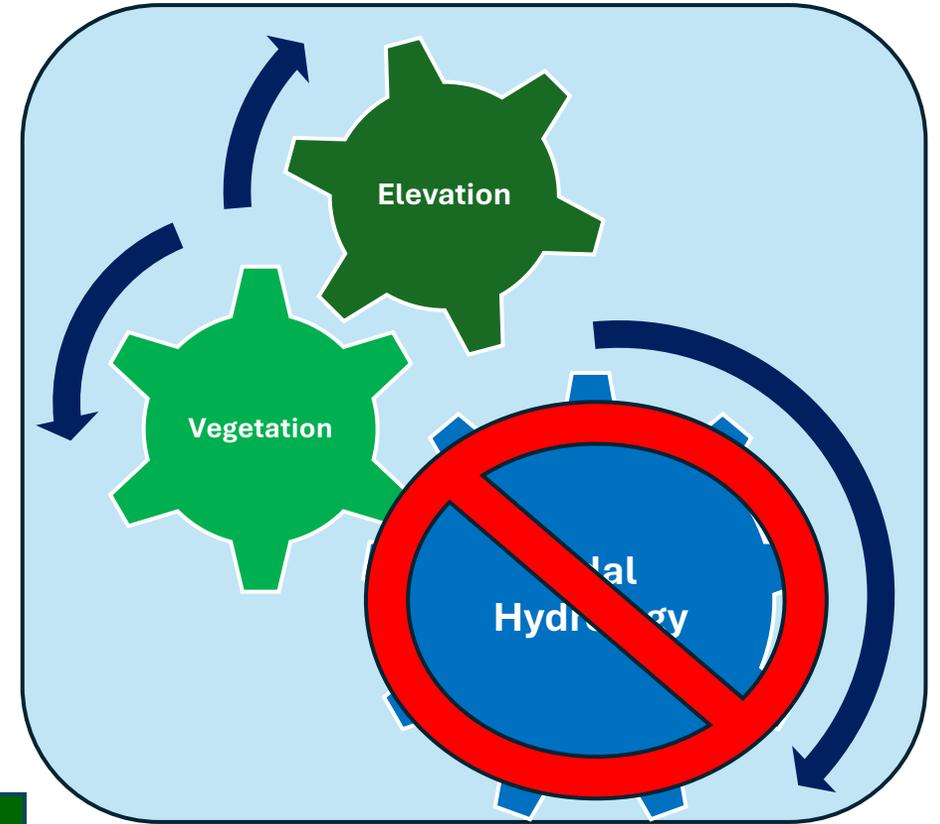
*Sea level is rising in New England at approx. 4-6mm/year (~ ½ in/yr).*

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

### Accretion



# What if tidal hydrology is restricted?



Sedimentation

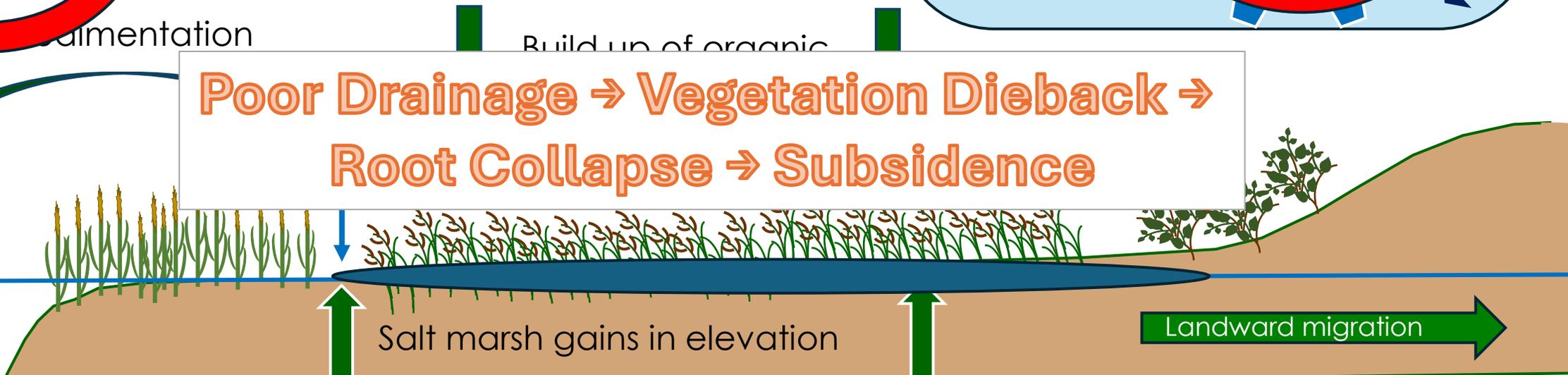
Build up of organic

Poor Drainage → Vegetation Dieback →  
Root Collapse → Subsidence

Mean high  
water

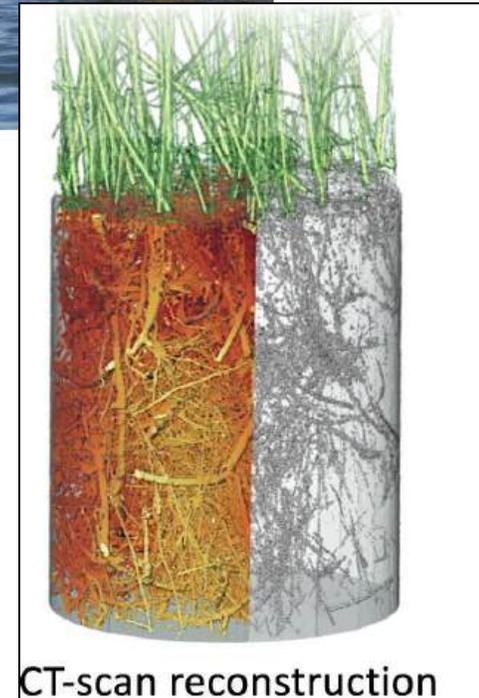
Salt marsh gains in elevation

Landward migration



# How do salt marshes protect us?

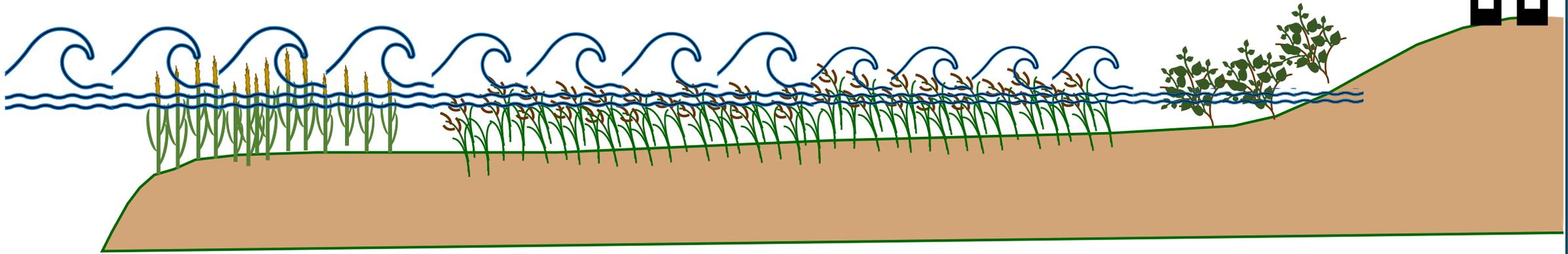
## 2) Absorption of flood tides



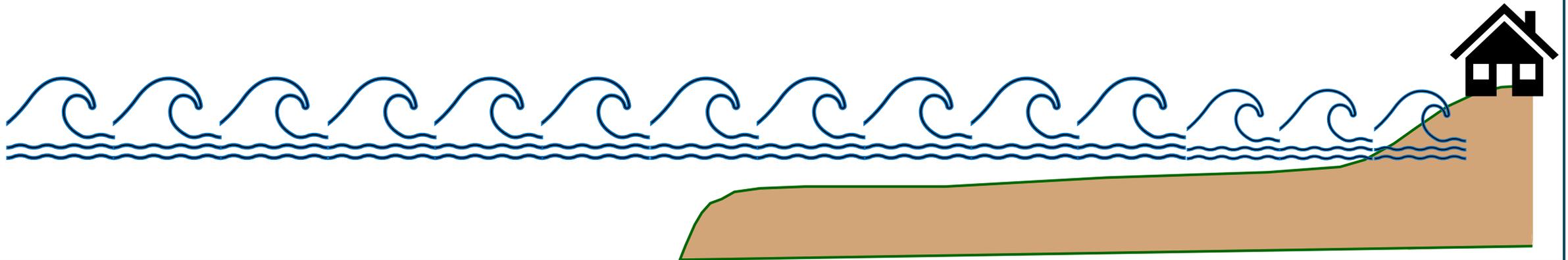
# How do salt marshes protect us?

## 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*

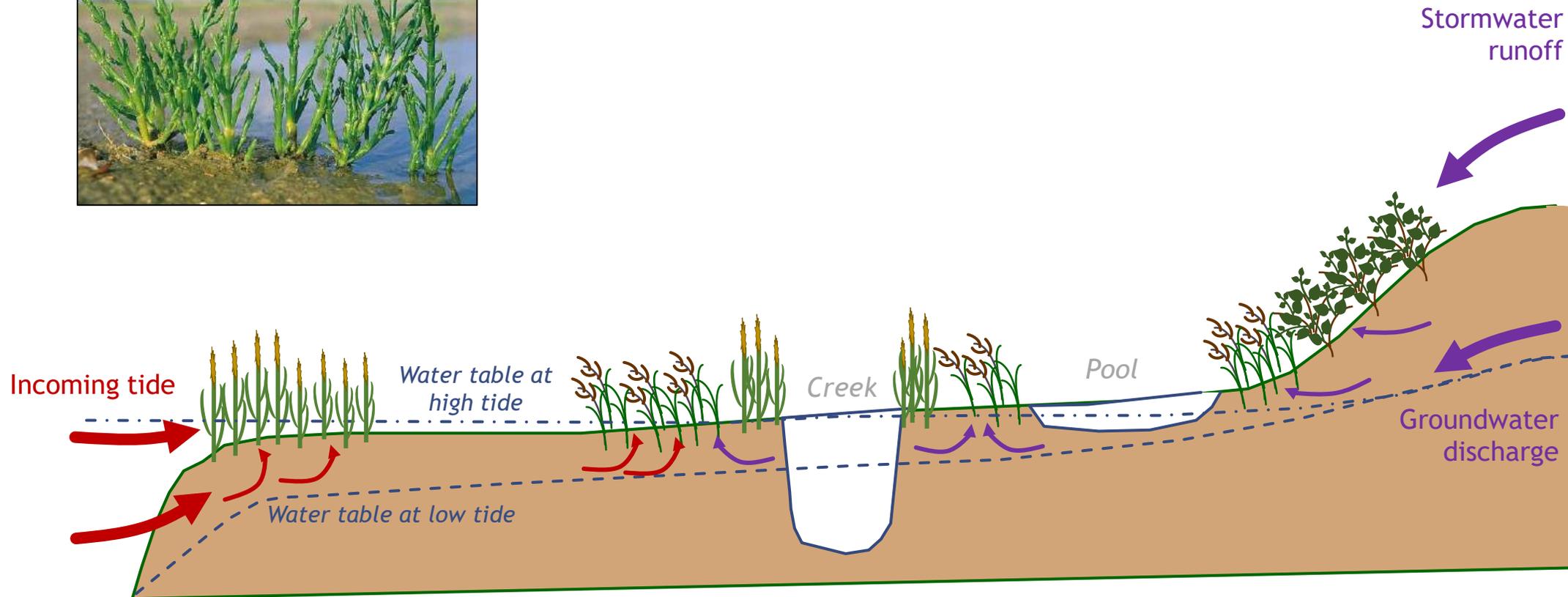


# How do salt marshes protect us?

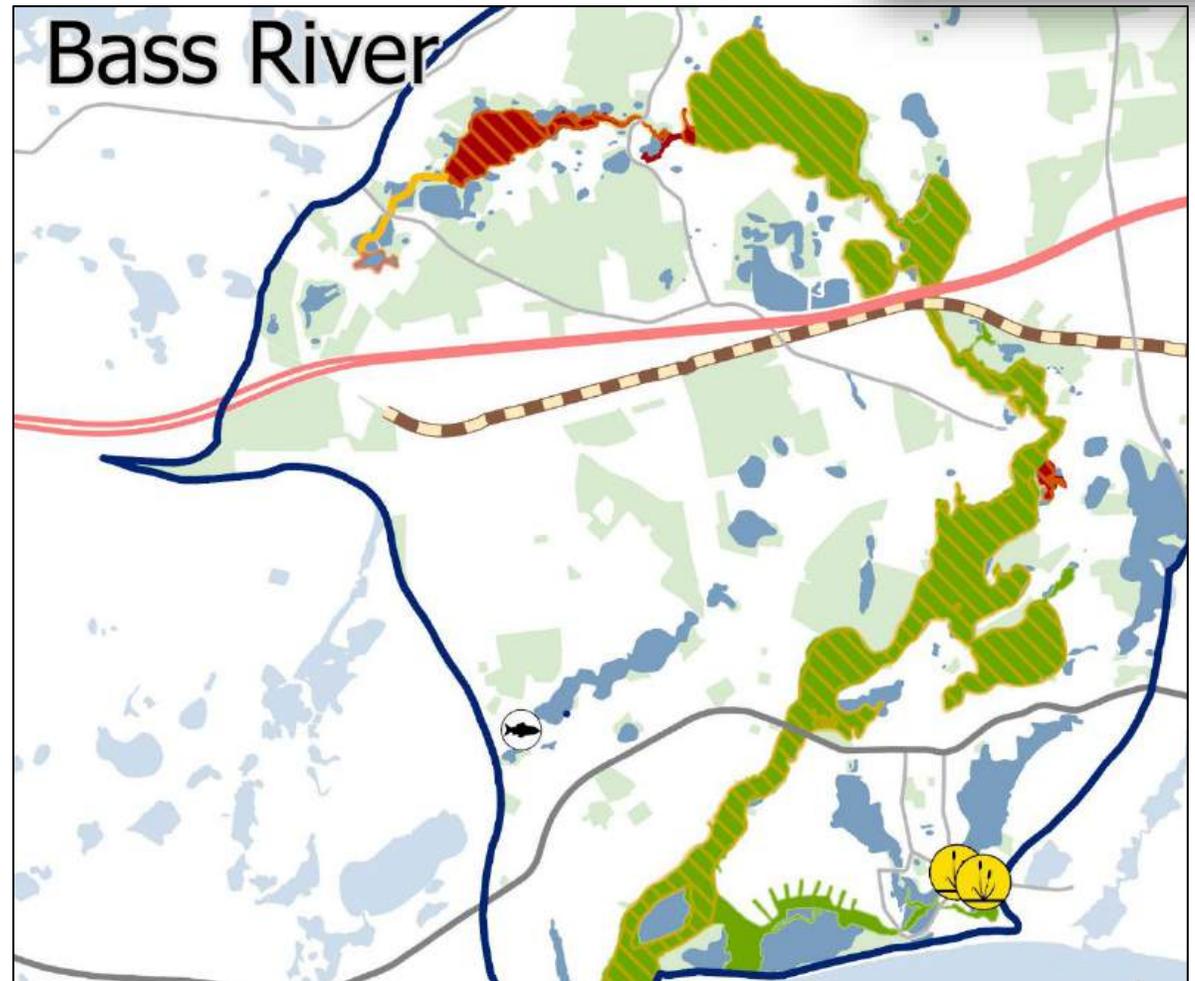
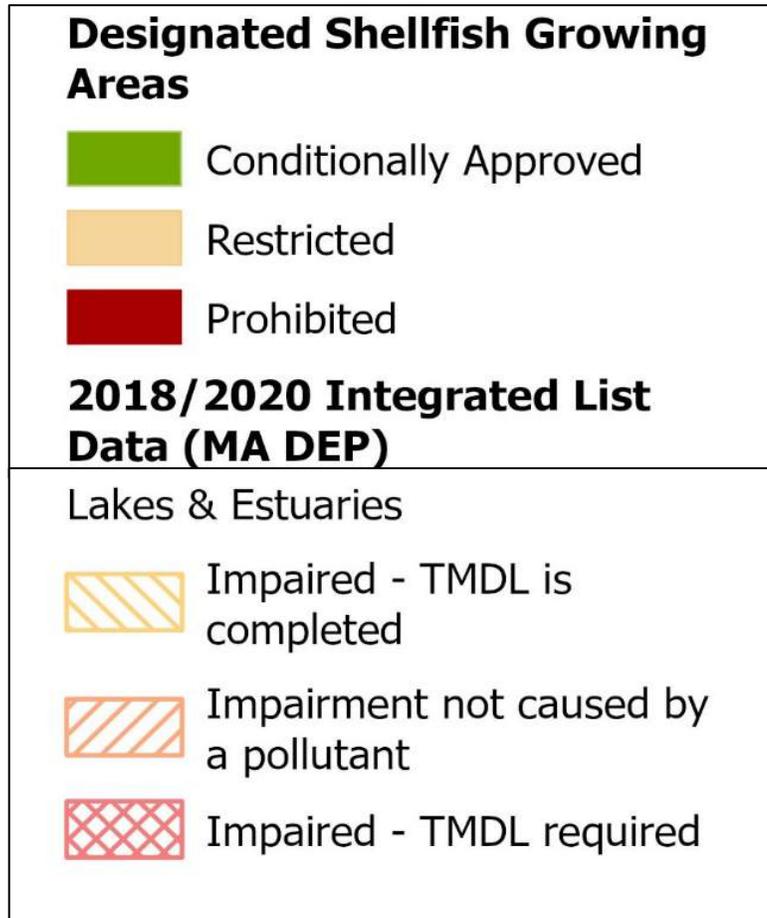
4) Pollutant filtration and removal (bacteria, nutrients, heavy metals and suspended sediments)



*Salicornia sp.*  
(glasswort or pickle weed)



# Water Quality at Weir Creek





**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/](http://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/](http://www.capecodcommission.org/our-work/cape-cod-chronology-viewer/)



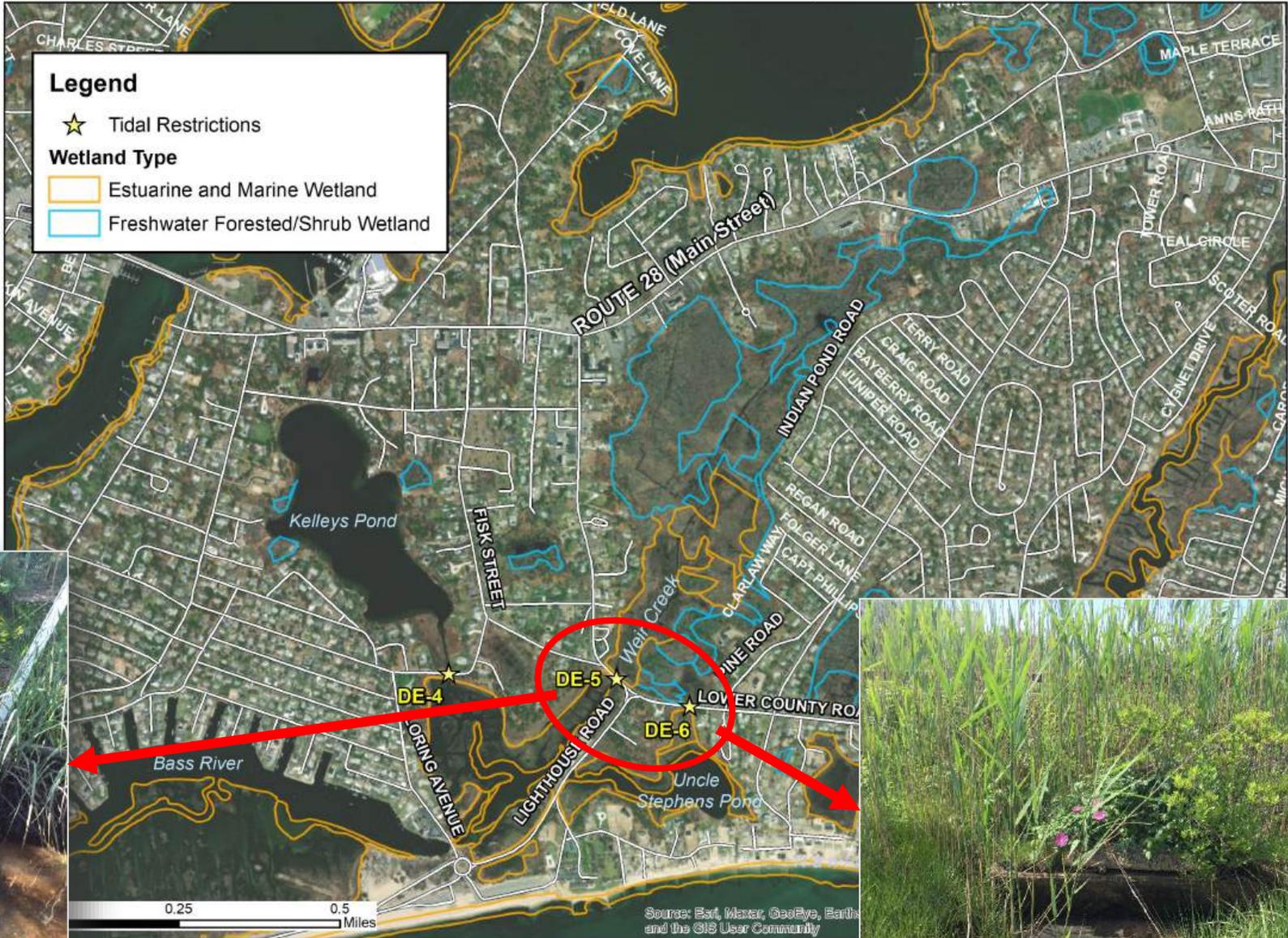
# Weir Creek: Existing Conditions

*Results from pre-restoration monitoring*



**Existing Conditions:**  
*Impairments to ecosystem function*

Weir Creek Restoration Site Map



Source: Esri, Maxar, GeoEye, Earthstar and the GIS User Community

**Existing Conditions:**  
**Additional**  
**impairments to**  
**ecosystem function**

Weir Creek Restoration Site Map



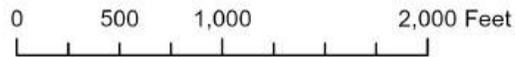


**LEGEND**

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

**Vegetation Monitoring**

- Fresh/Brackish Upstream
- Reference
- Restricted



Permanent vegetation plots & RTK-based mapping of upland border



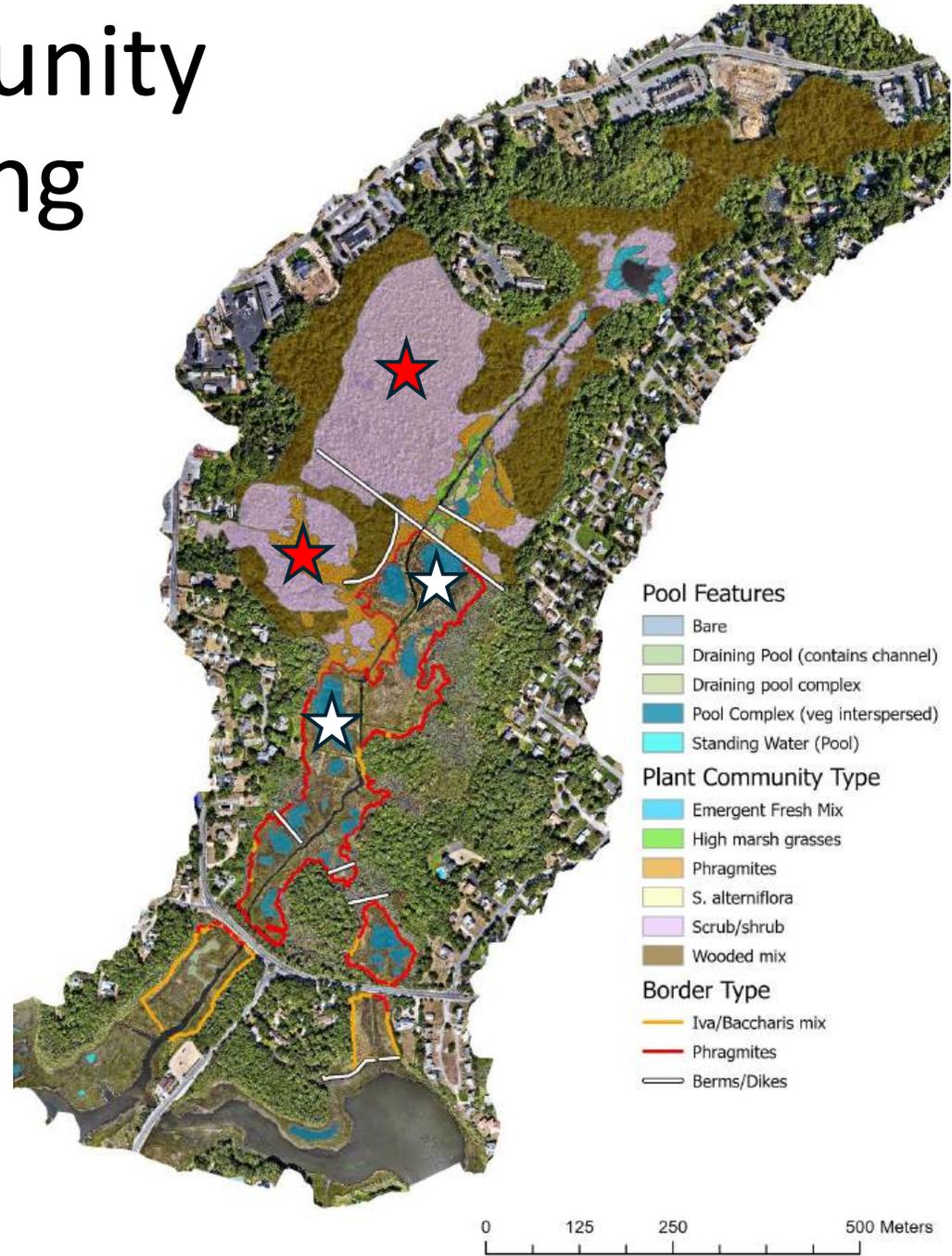


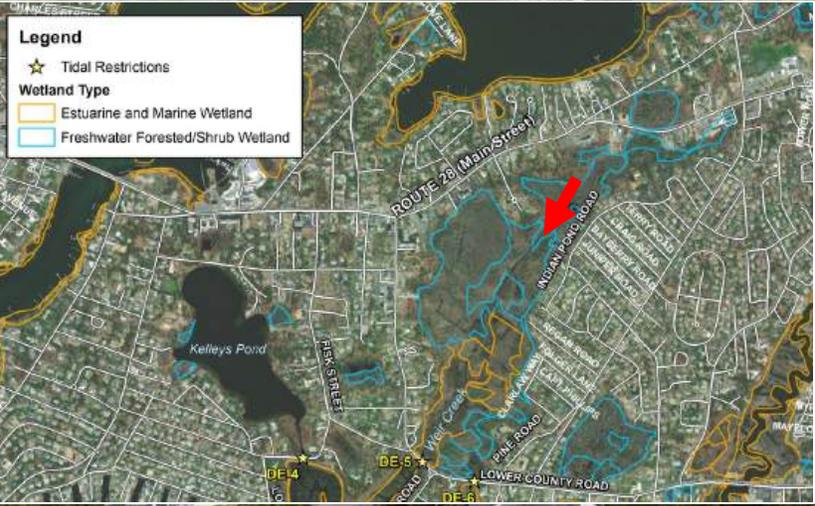
Drone imagery & GIS-based plant community delineations

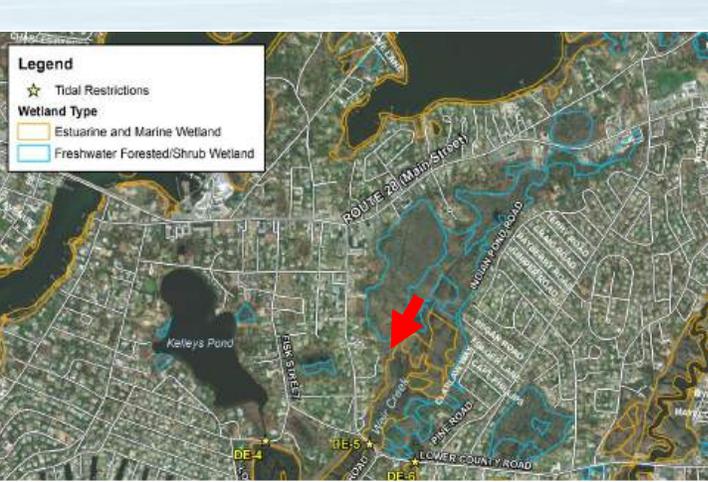


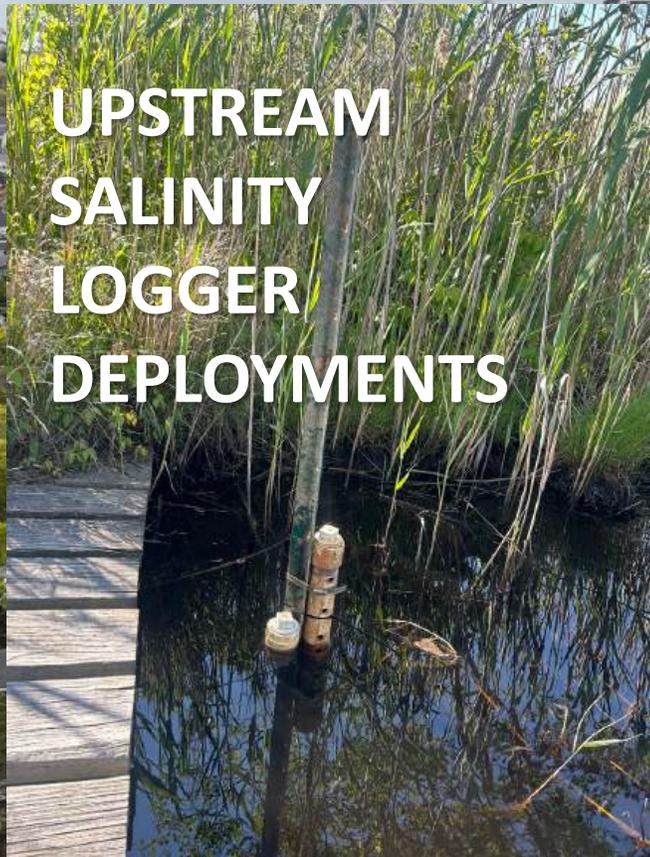
0 500 1,000 2,000 Feet

# Community Mapping









**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

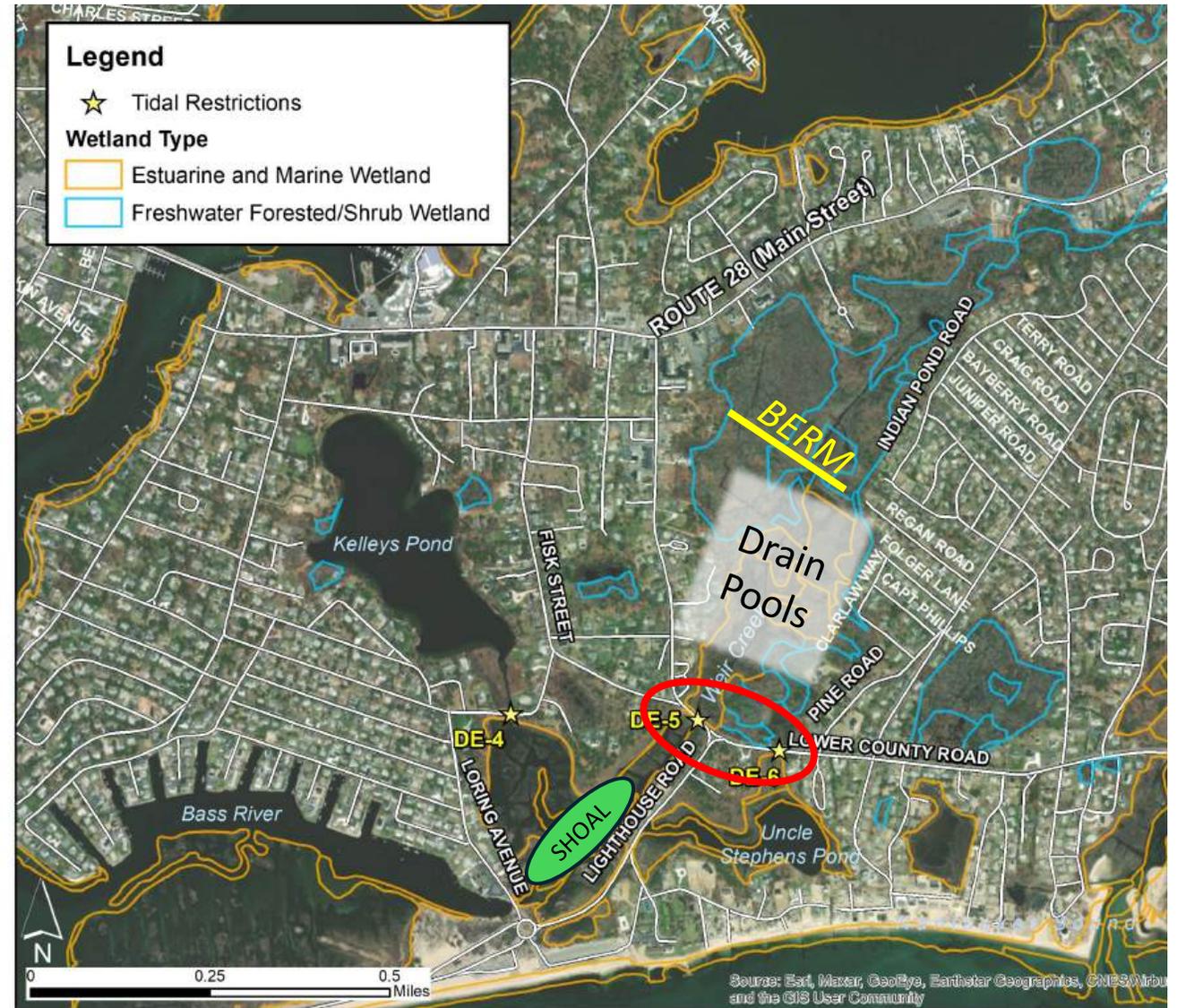


# Adaptive Management



# 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 NA24NMF463C0065-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.

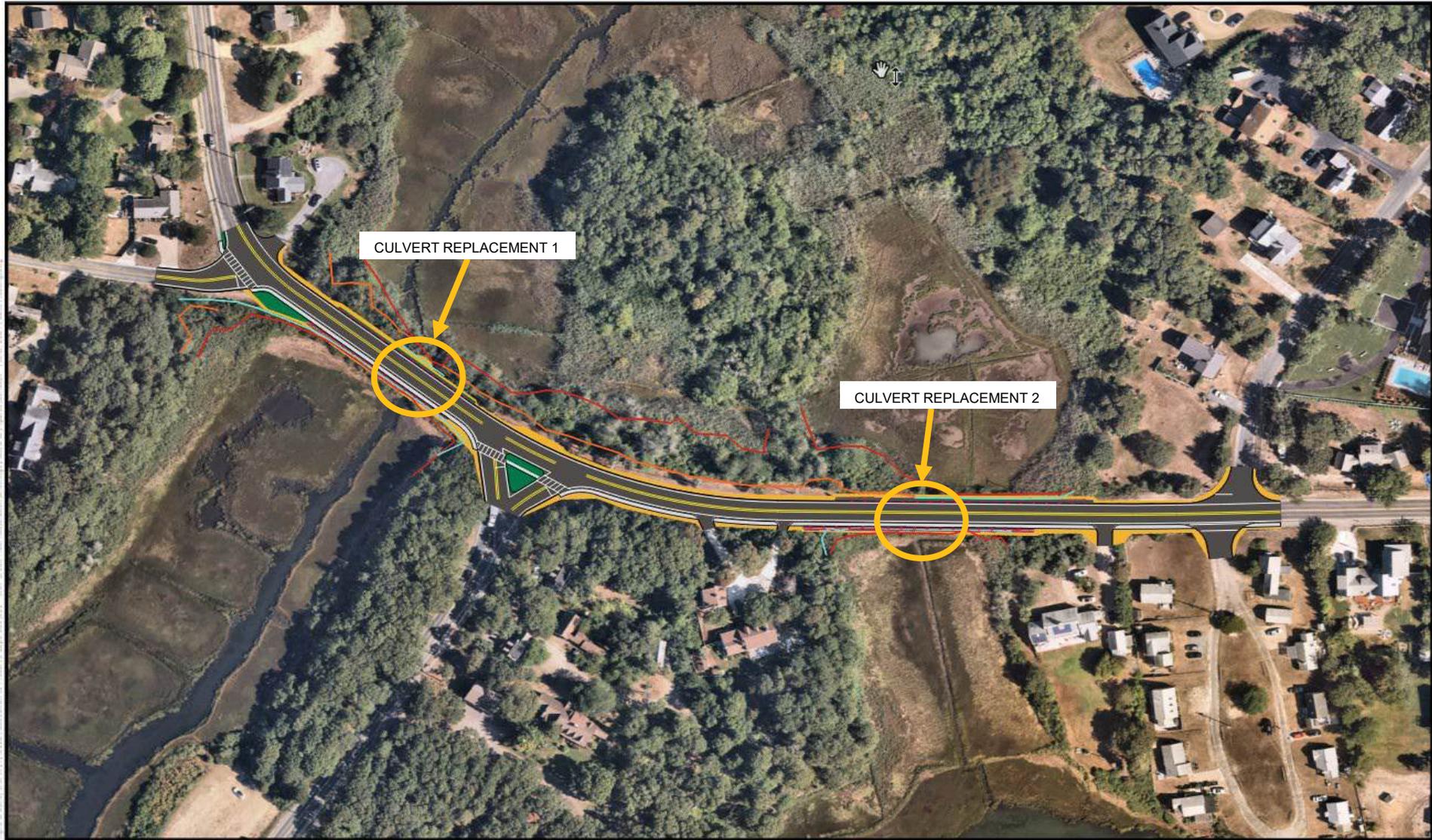


**Eric Ohanian**

Project Manager  
Tighe & Bond

# PROJECT AREA OVERVIEW





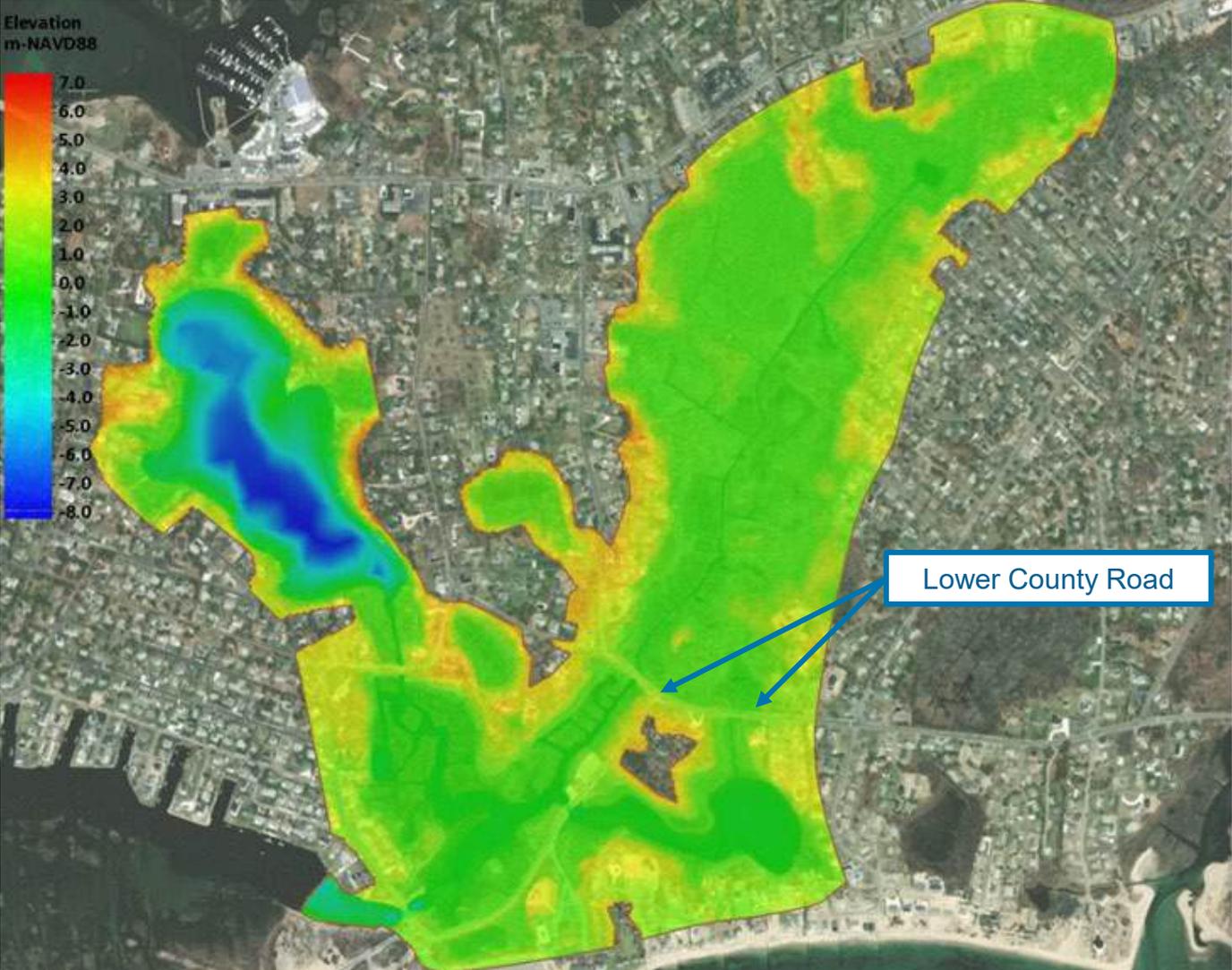
CULVERT REPLACEMENT 1

CULVERT REPLACEMENT 2

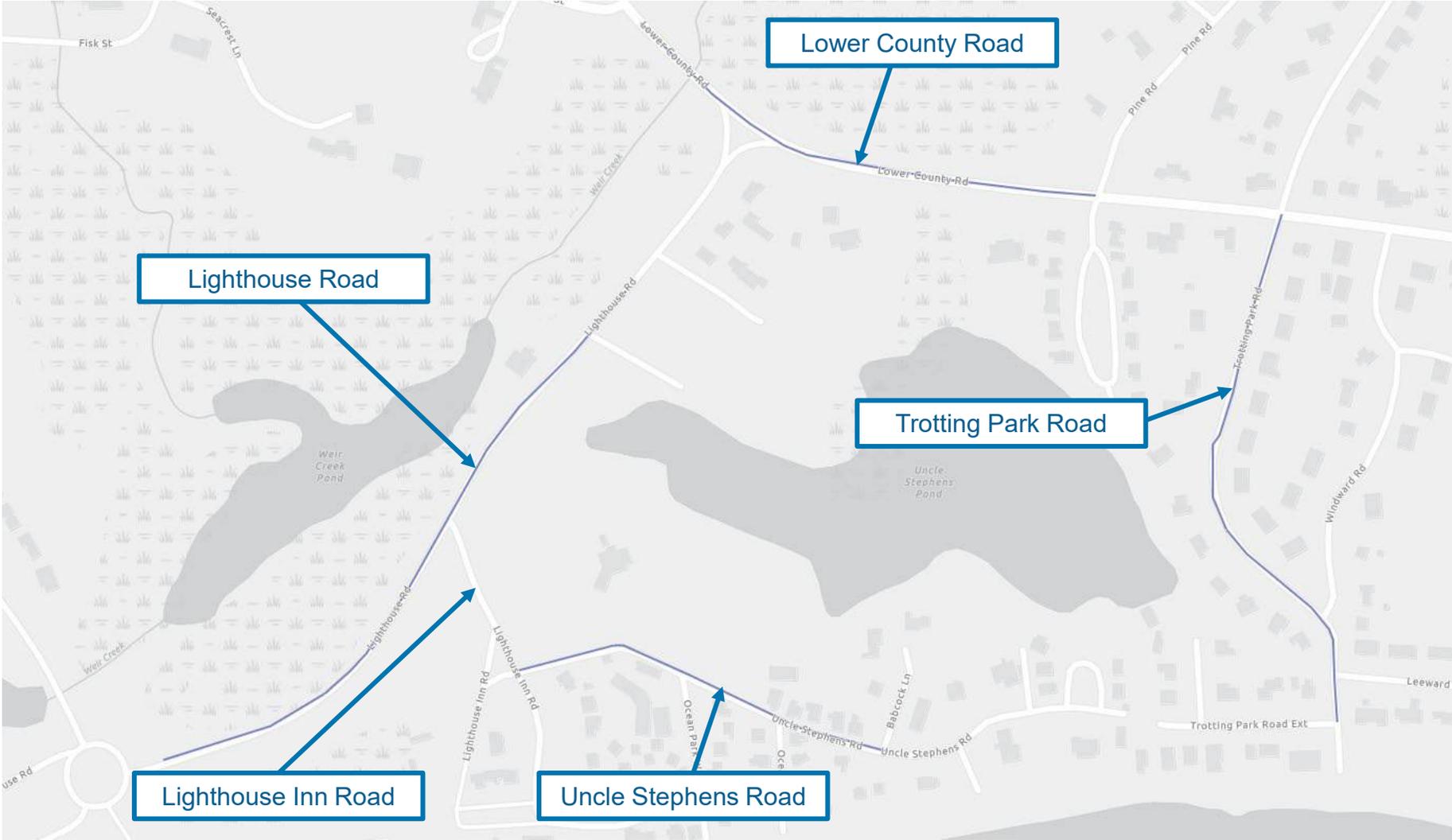
# MODEL DEVELOPMENT



# MODEL DEVELOPMENT

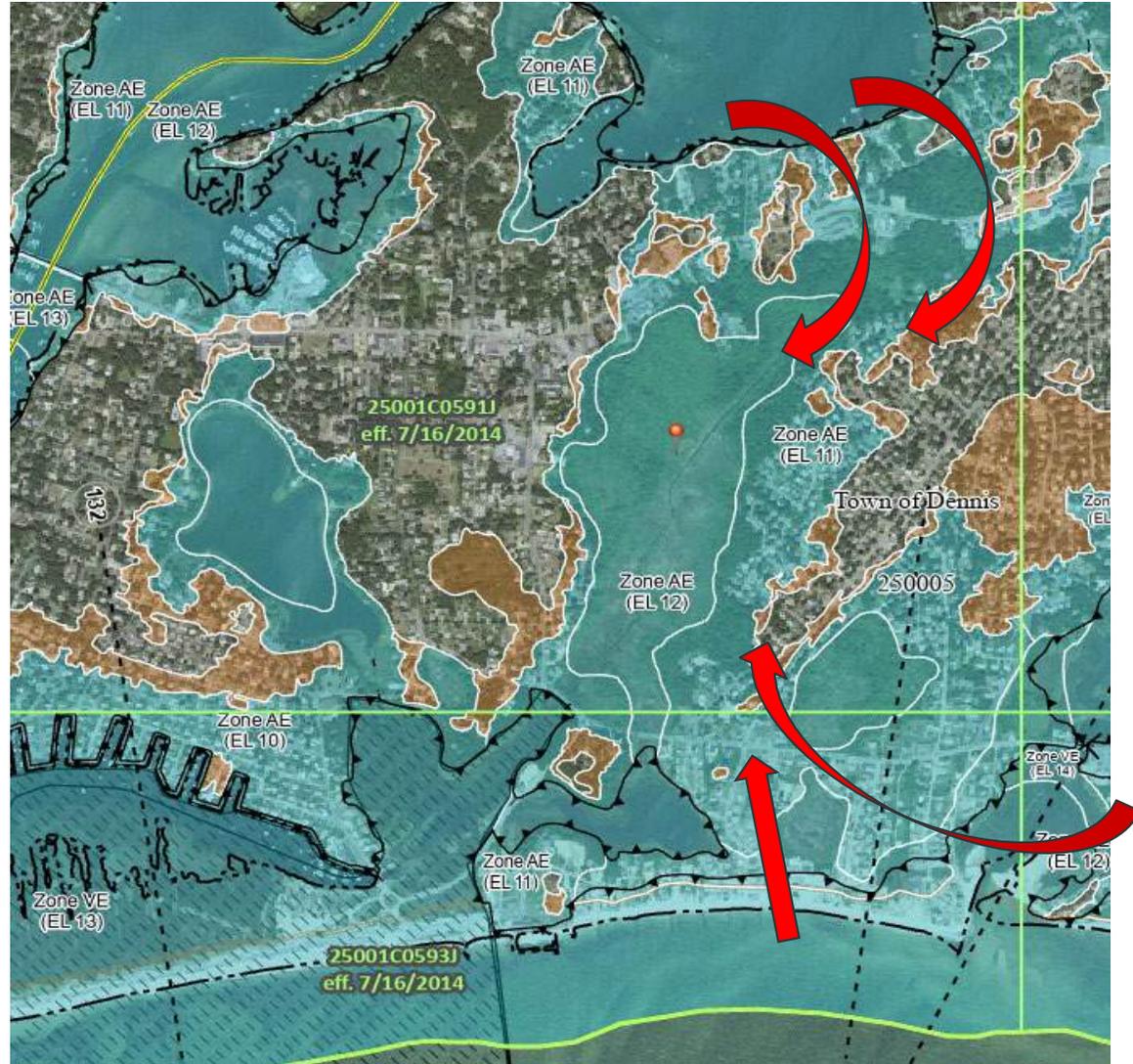


# LOW LYING ROADS IDENTIFIED BY THE CAPE COD COMMISSION



# FEMA FLOOD MAP

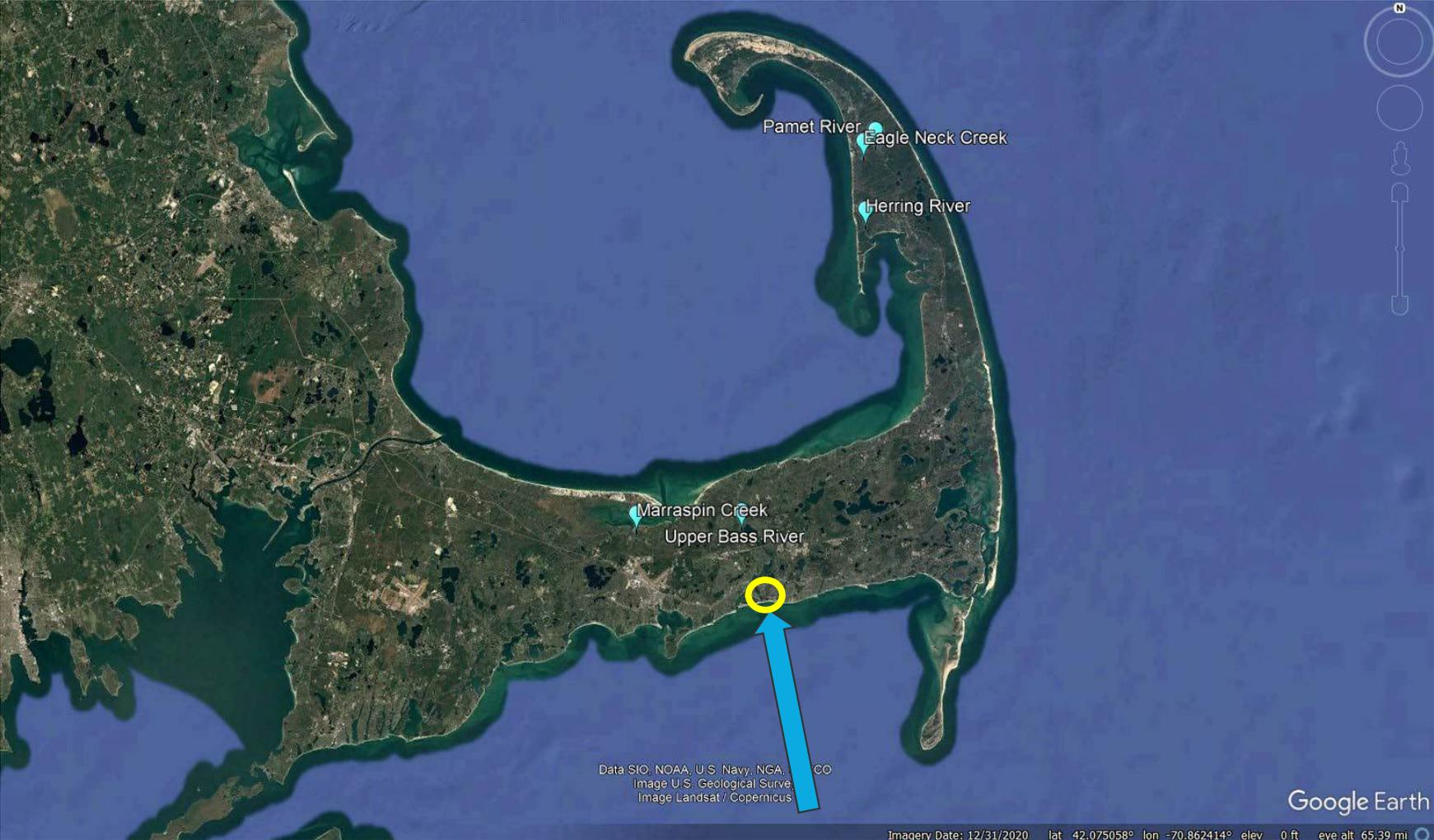
- Based on the 1% AEP Event
- Upper Weir Creek located in Zone AE 12
- Adjacent Neighborhoods to the east are Zone AE 11
- Multiple Potential flood paths other than Lower County Road (LCR)
- LCR currently has a low elevation of 4.2 ft-NAVD88



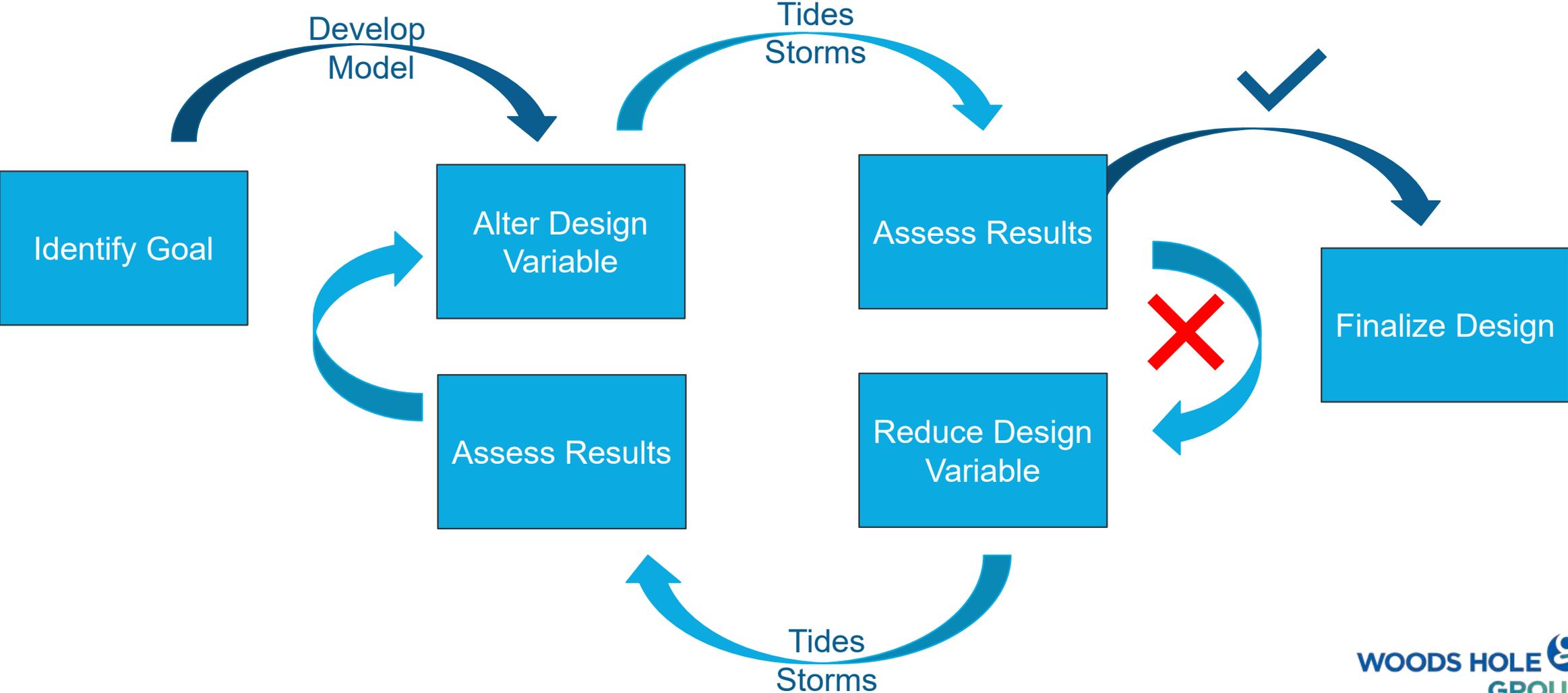
# STORM EVENTS

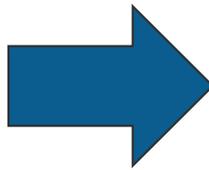
Exceedance Probability	Water Surface Elevation	Common Name
10.5%	6.8 ft-NAVD88	Hurricane Carol
10%	7.0 ft-NAVD88	10-Year Storm
2%	9.0 ft-NAVD88	50-Year Storm
1%	9.8 ft-NAVD88	100-Year Storm

# LOCAL EFDC MODELING PROJECTS

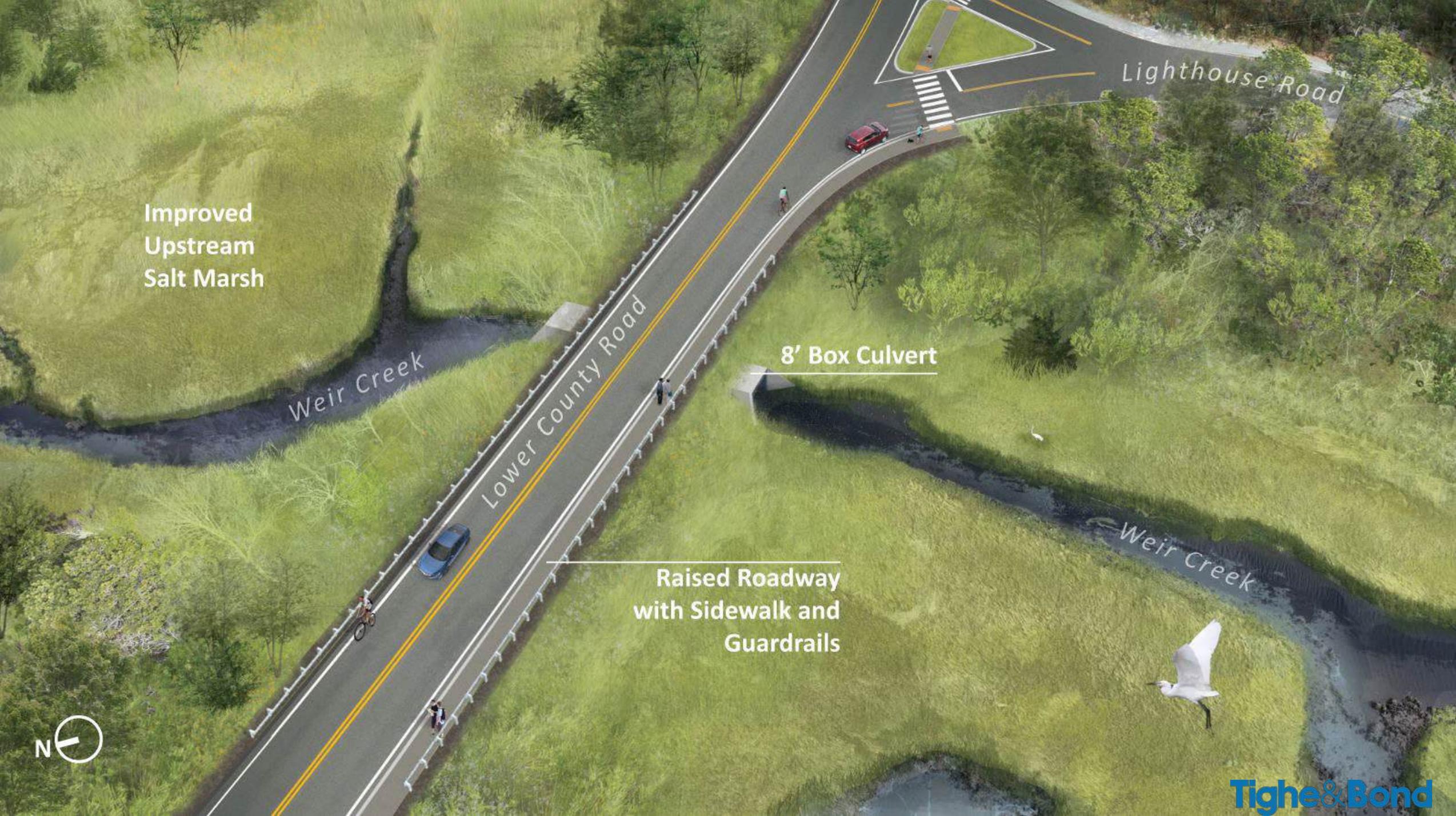


# THE ITERATIVE HYDRAULIC MODEL DESIGN PROCESS









Improved  
Upstream  
Salt Marsh

Weir Creek

Lower County Road

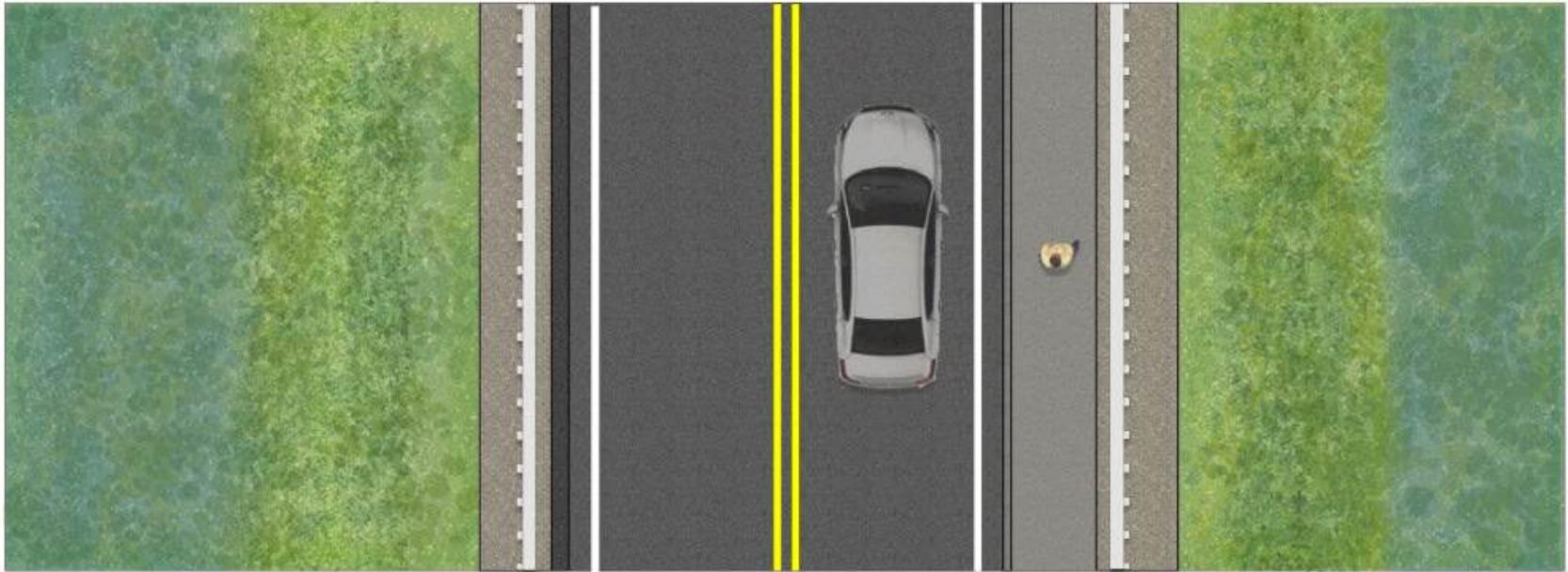
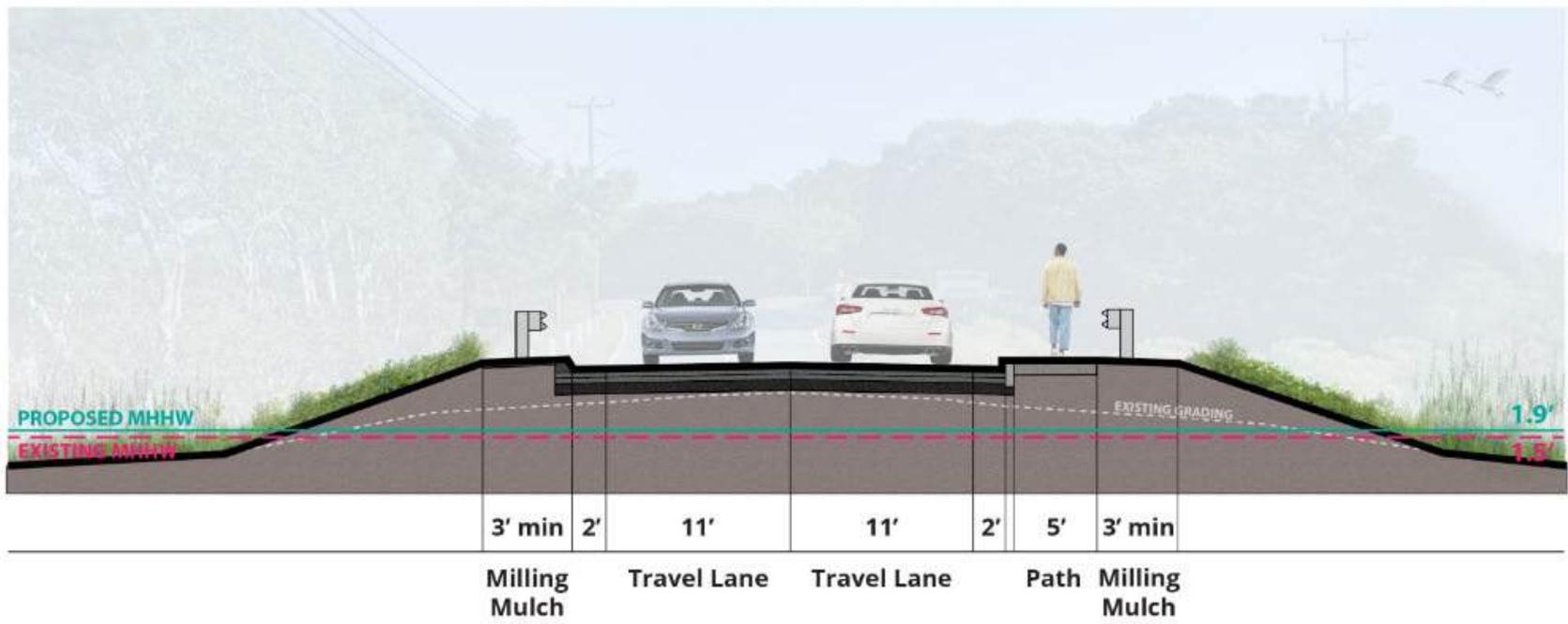
Lighthouse Road

8' Box Culvert

Raised Roadway  
with Sidewalk and  
Guardrails

Weir Creek

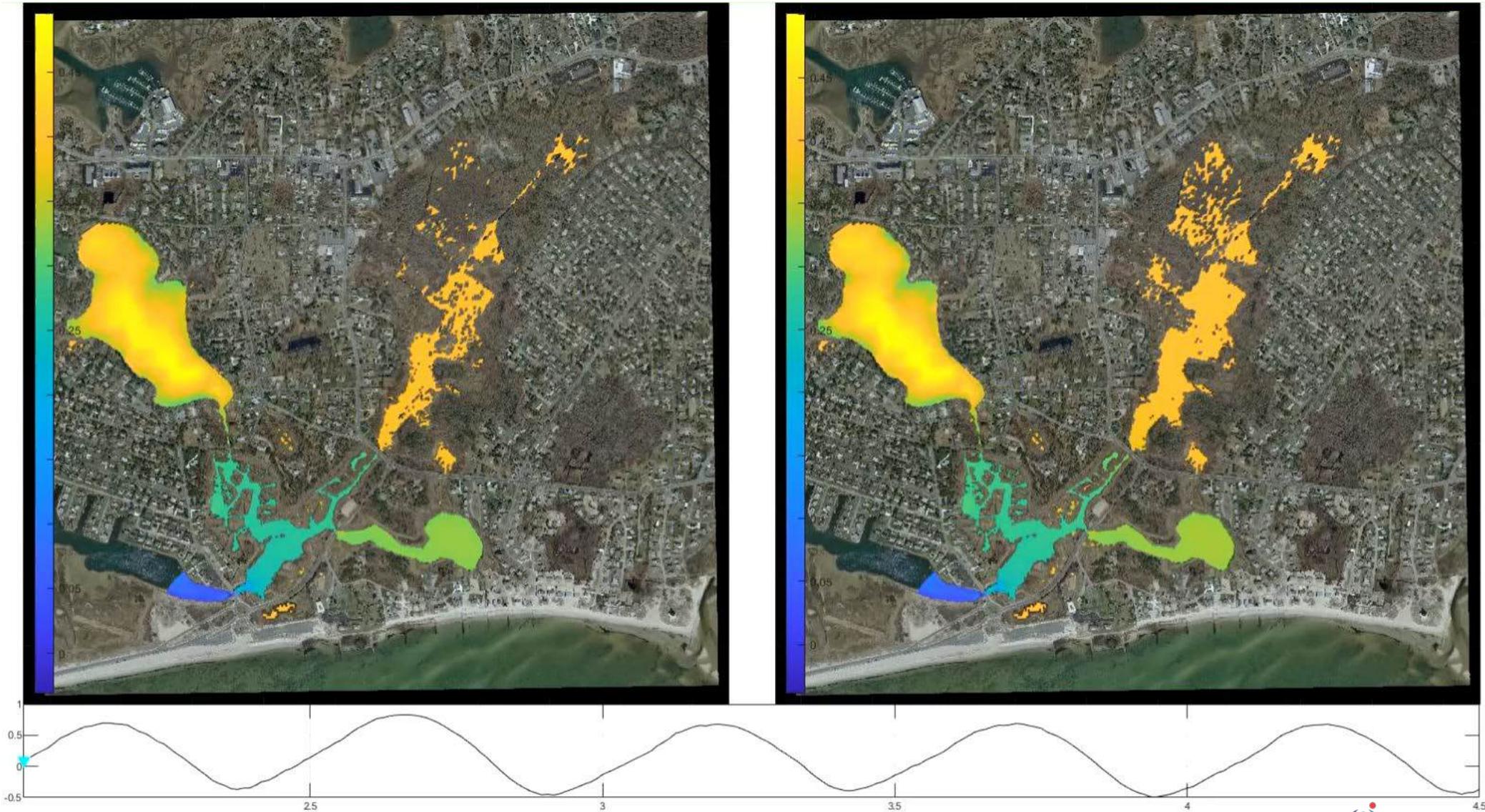


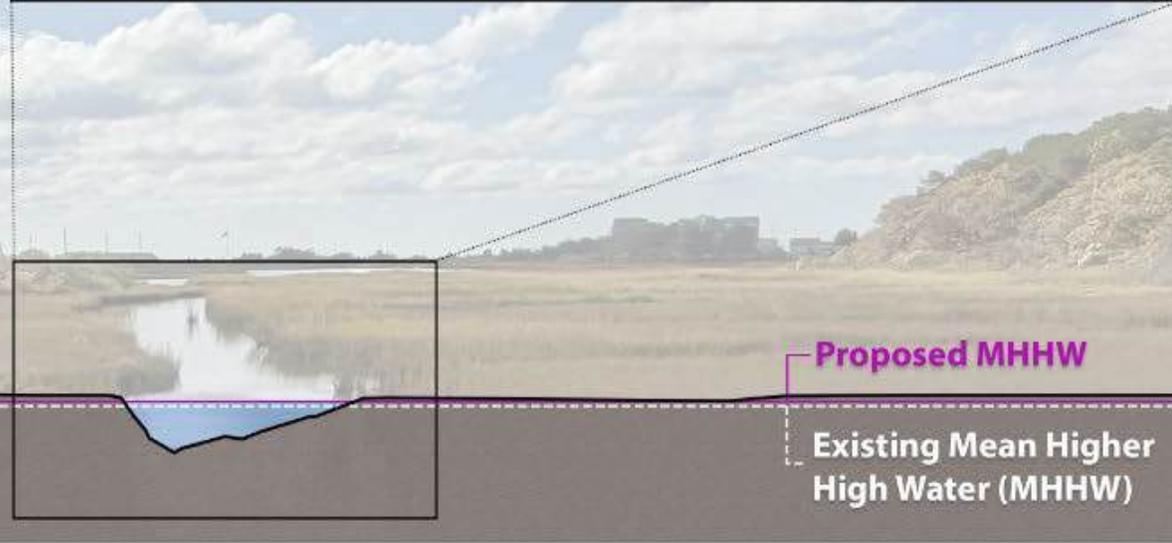
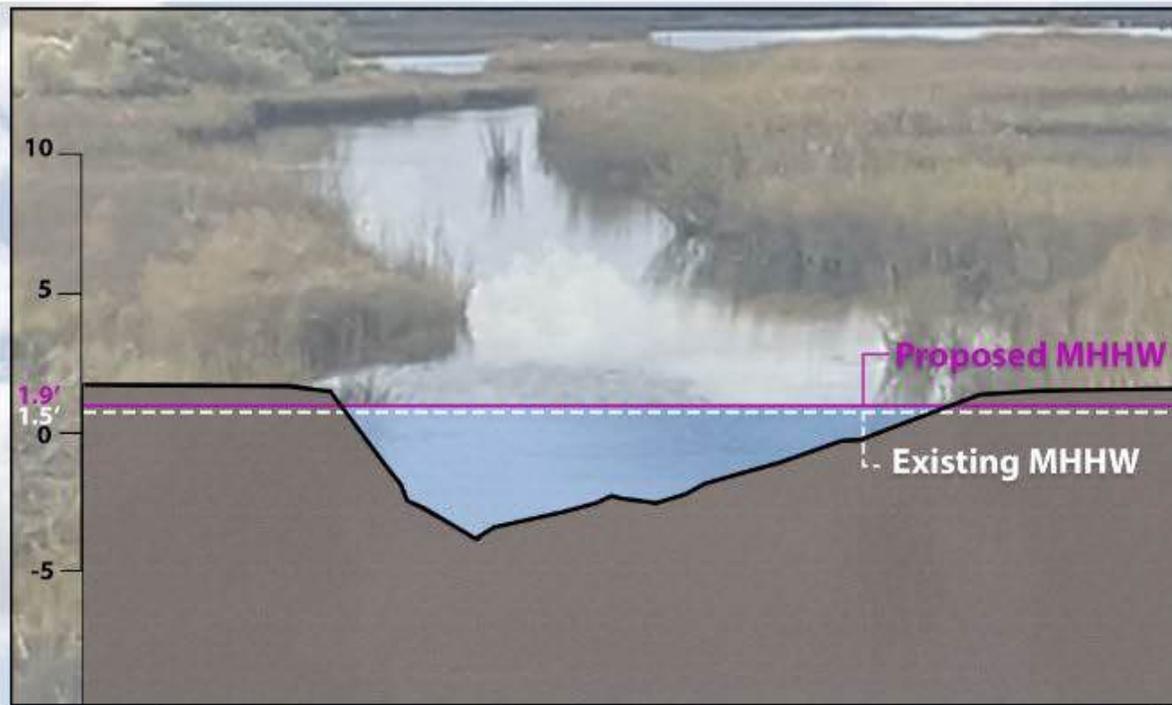
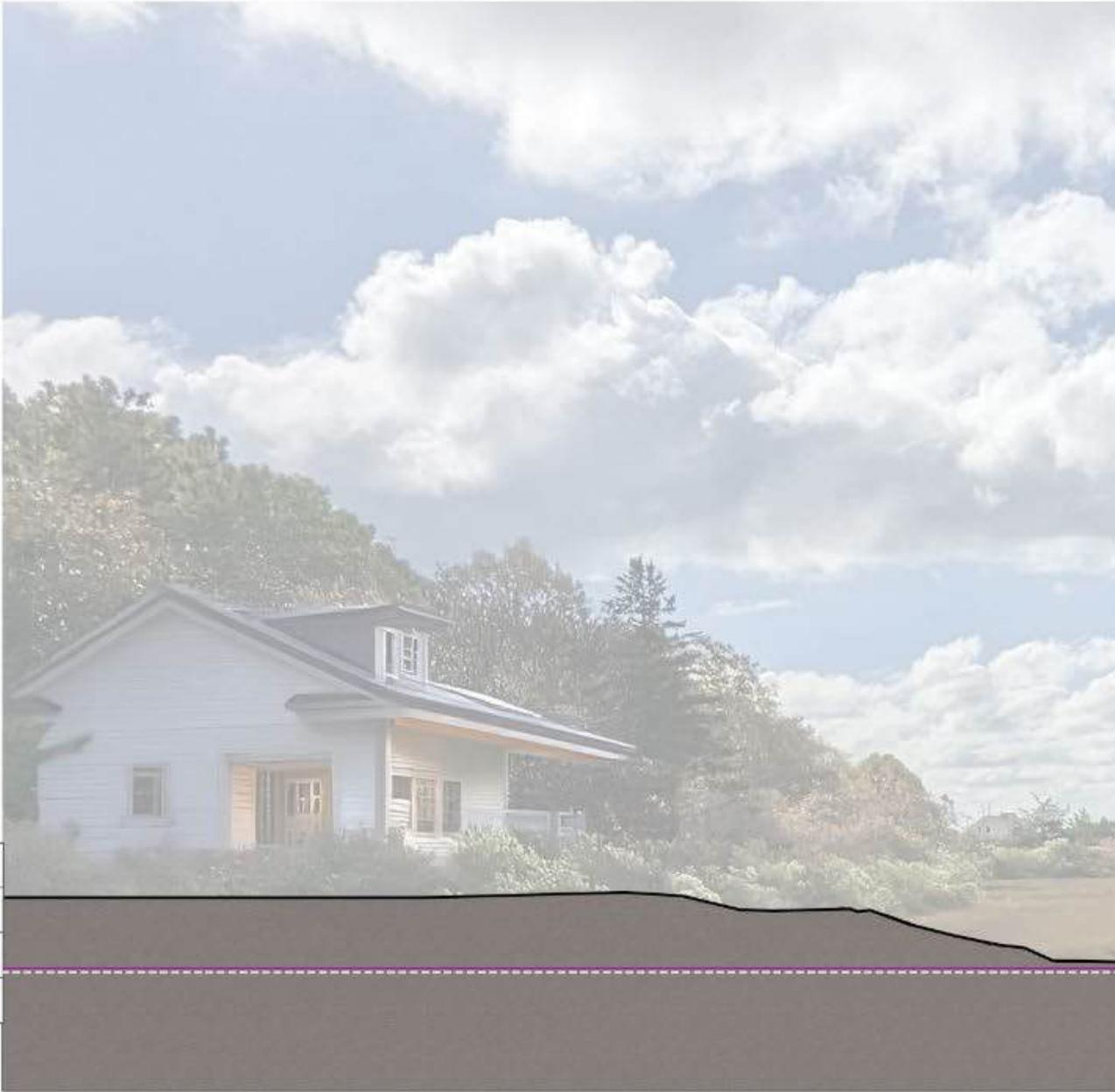


# TIDAL CYCLE COMPARISON

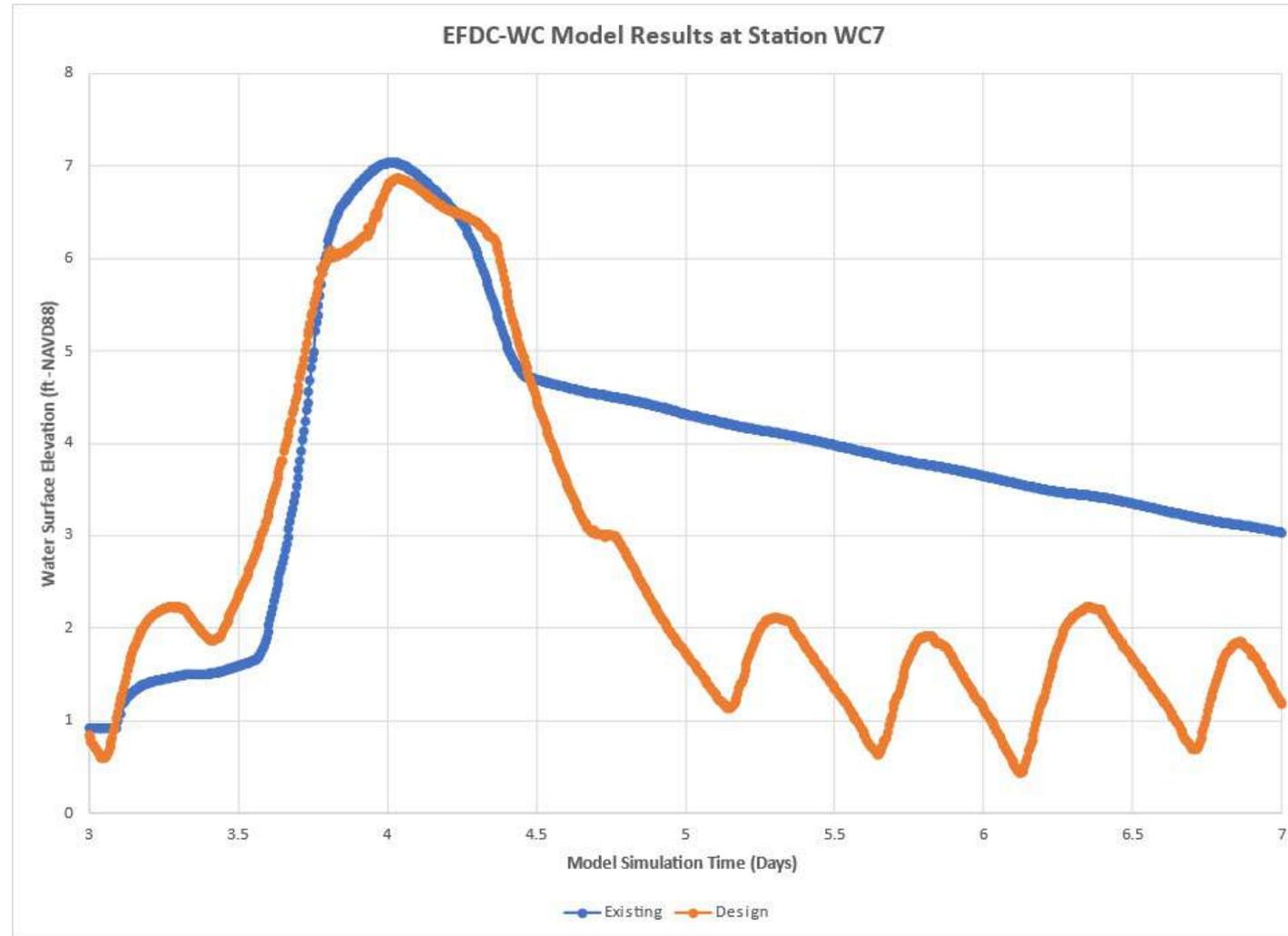
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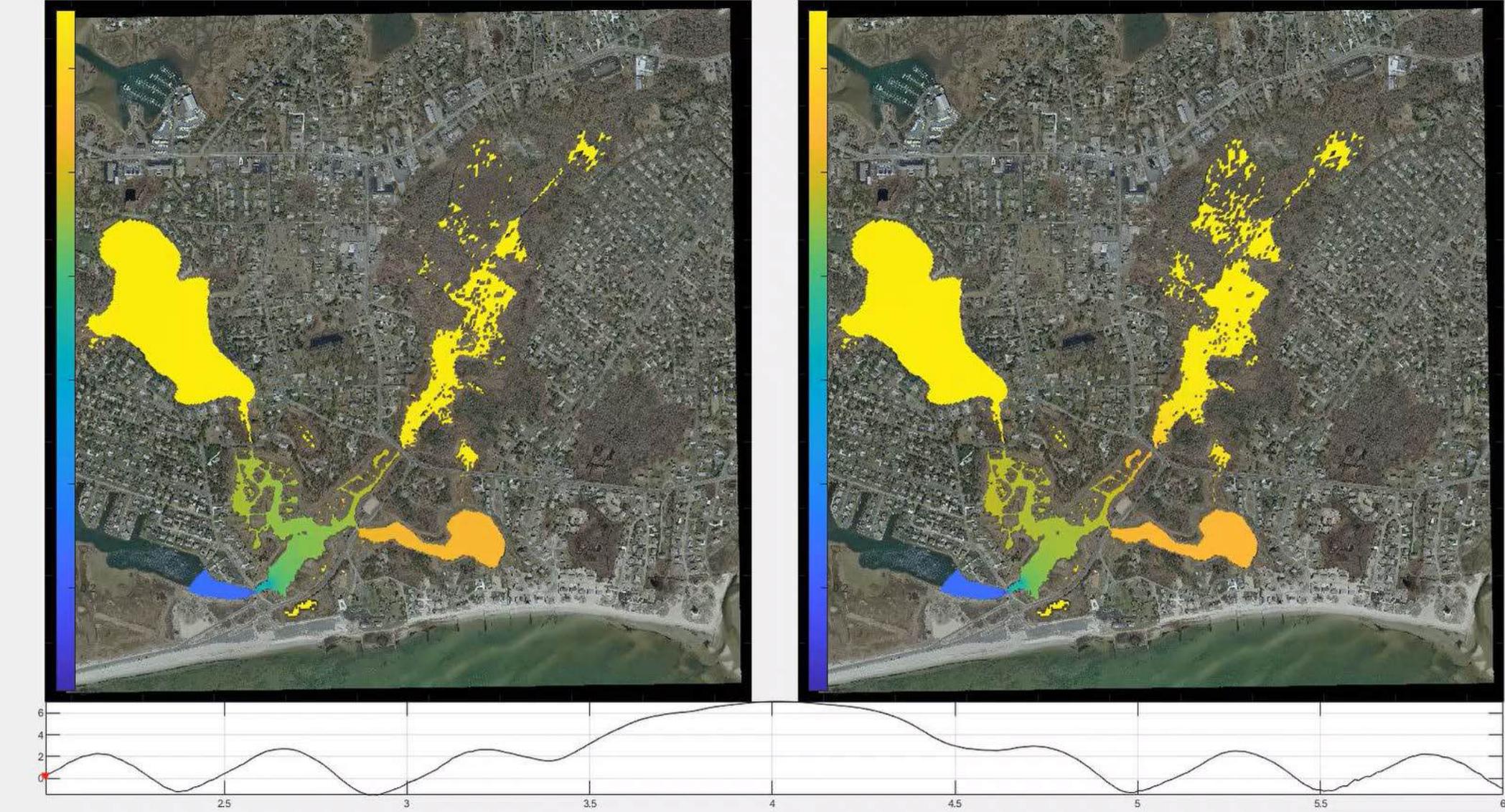
# 10% STORM COMPARISON



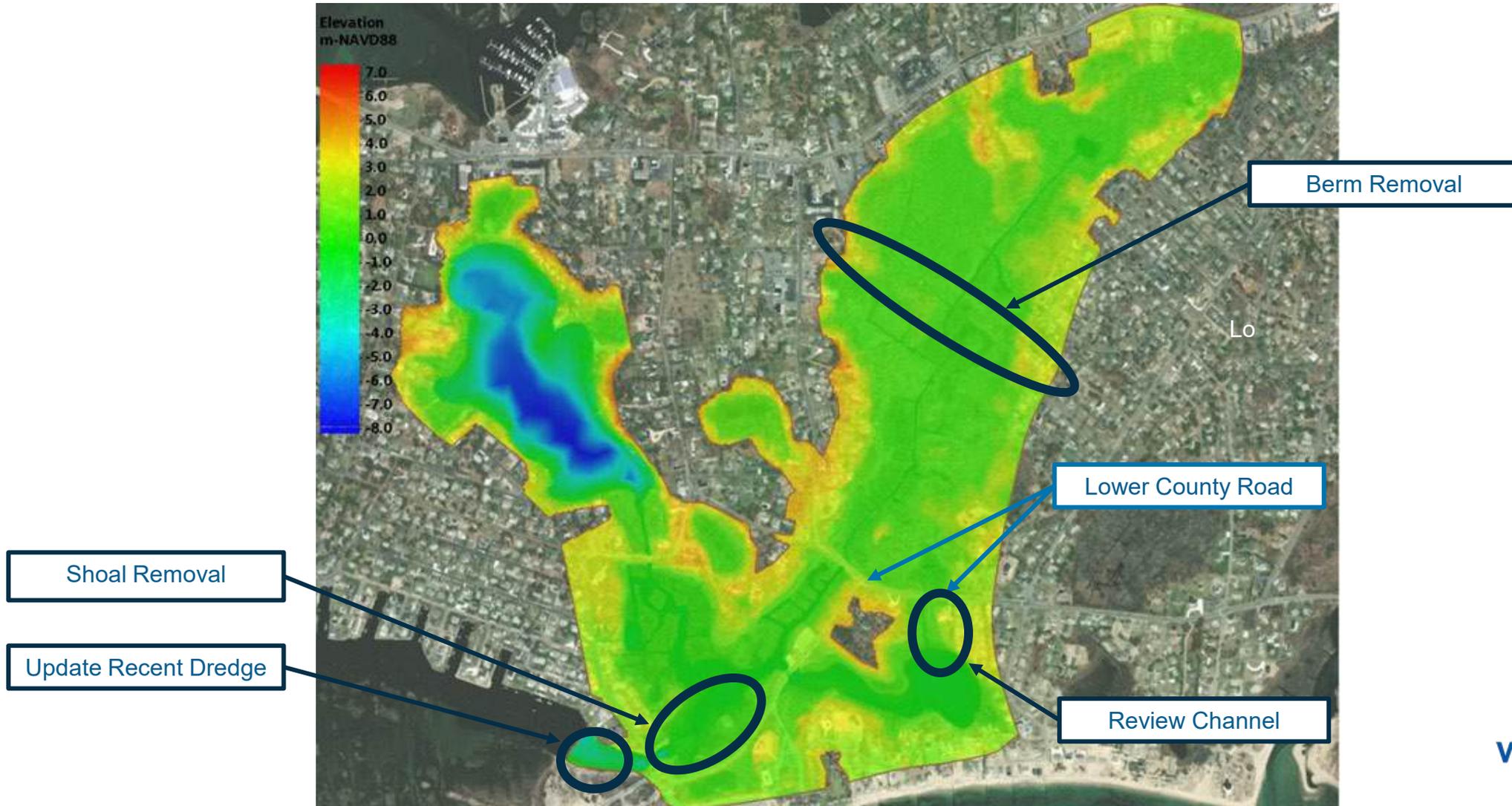
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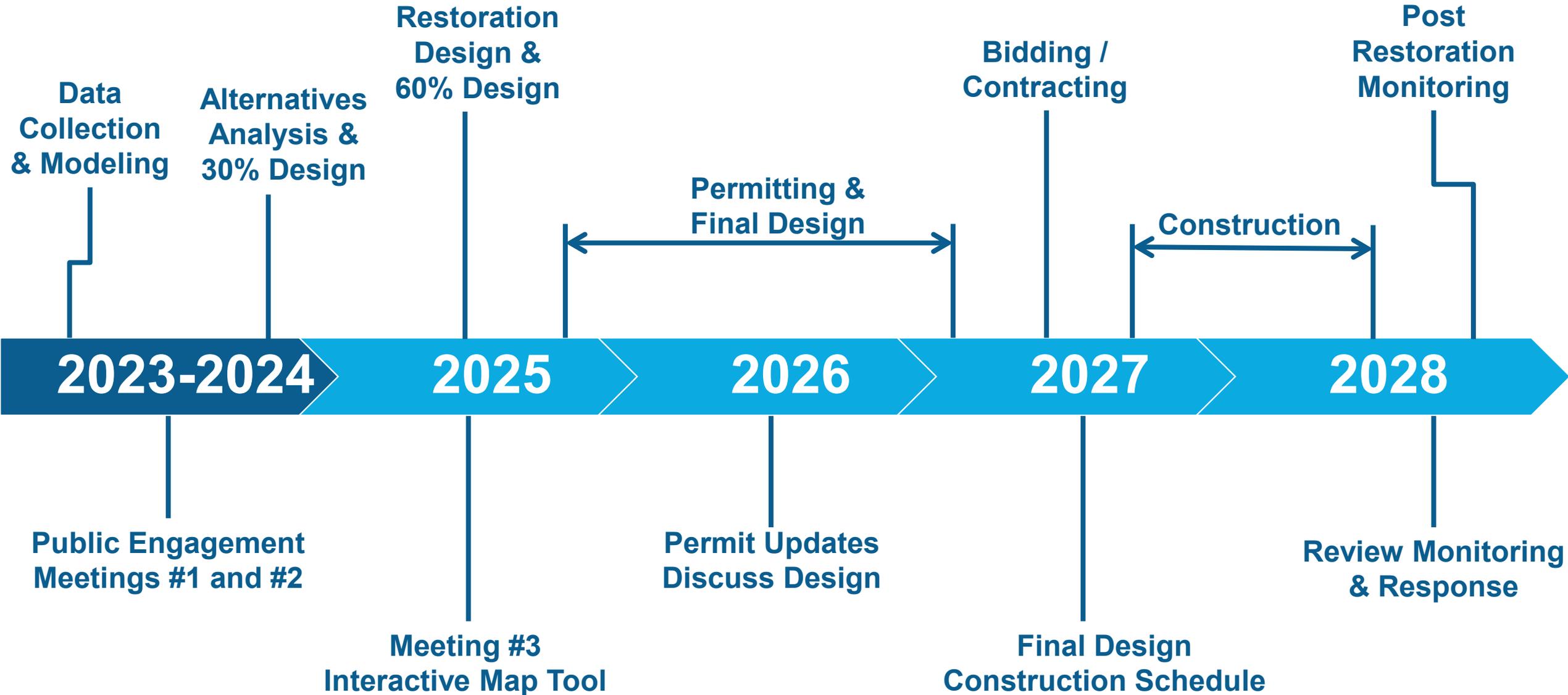
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# NEXT STEPS



# SCHEDULE



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](mailto:jmora@apcc.org)





*Introducing the online **Weir Creek Tidal Viewer***

<https://arcg.is/yqLiy0>