Building Beach and Salt Marsh Resilience on the Coskata-Coatue Wildlife Refuge

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Nantucket Conservation Foundation

trustees

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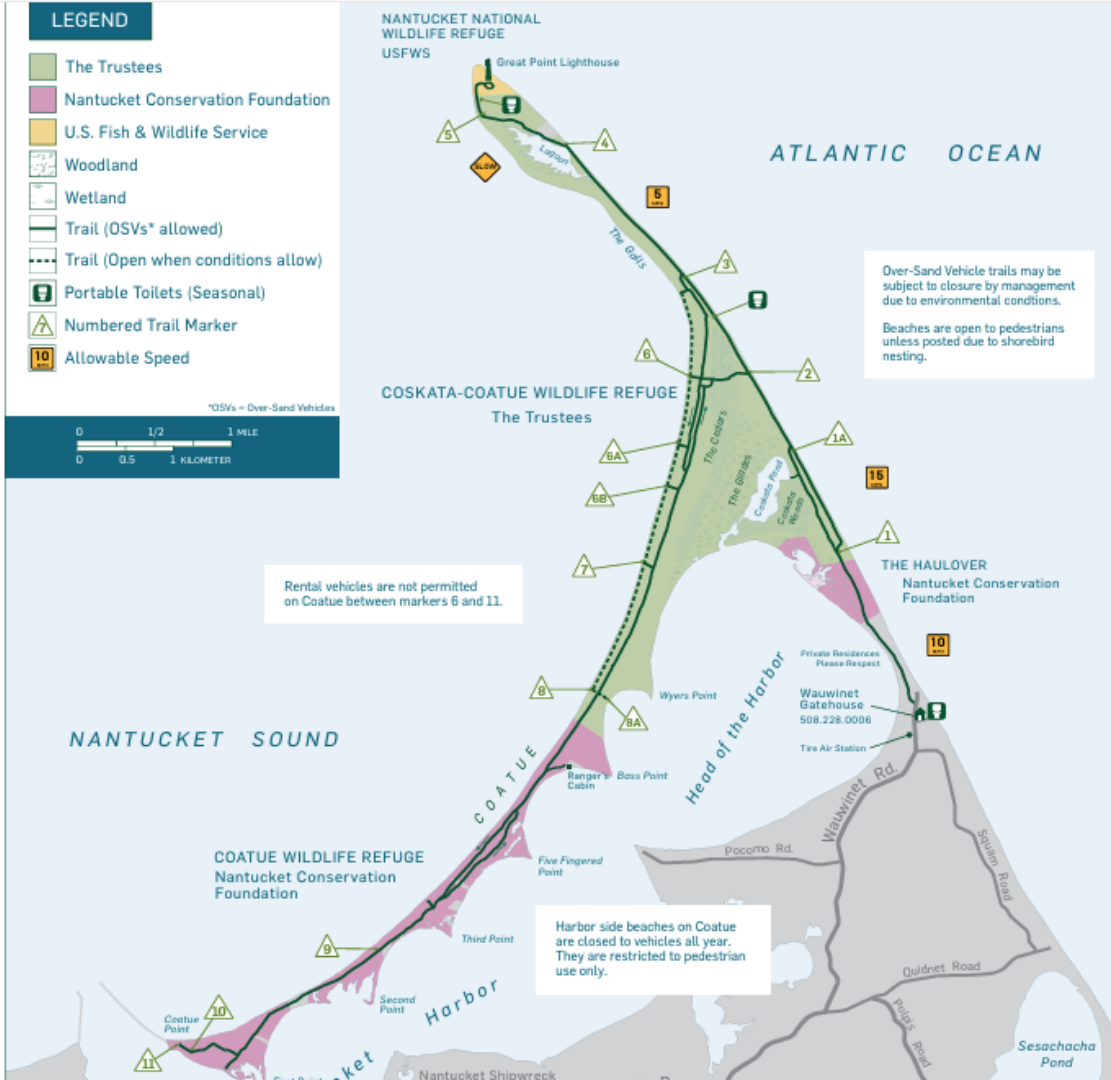
DESIGN WITH NATURE STUDIO BY GZA

Project Background

- Trustees and Nantucket Conservation Foundation Manage the Refuge in Parallel
- History of breach and erosion on the Refuge
- 2020: Joint effort to identify Areas at Risk, Initial Research with Woods Hole Group
- **High-priority site identification by Trustees & island partners**



Identified Resilience Challenges

SHORT-TERM AND LONG-TERM ISSUES

- **Key Short-Term Issues**
  - Beach flooding & erosion
  - Salt marsh flooding and loss
  - Impacts to trail access
  - Possible breach sites and Harbor impacts (Coskata Pond & Haulover)
- **Key Long-Term Issues**
  - Beach profile changes and loss
  - Habitat & Wetland changes and loss
  - Bluff erosion

Study Areas

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Resilience Goals

NATURE-BASED BARRIER BEACH RESILIENCE

- **Increase overall resilience to SLR and climate change**
- **Support habitat adaptation**
- **Use the Natural Resilience of a Barrier Beach to protect Nantucket Harbor**

Focus on enhancing natural processes through Nature-Based Solutions.

Scope of Work

TASKS 1-3 & COMMUNITY ENGAGEMENT

TASK 1: SITE ASSESSMENT

- Existing Data Review
- Data Collection
  - *Topography survey (LiDAR)*
  - *Field reconnaissance*
  - *Vegetation mapping*

TASK 2: FEASIBILITY STUDY

- Vulnerability Assessment & Site Selection
- Alternatives Analysis
- Feasibility Report

TASK 3: PRELIMINARY DESIGN

- Metocean data analysis
- Numerical modeling
- Preliminary design

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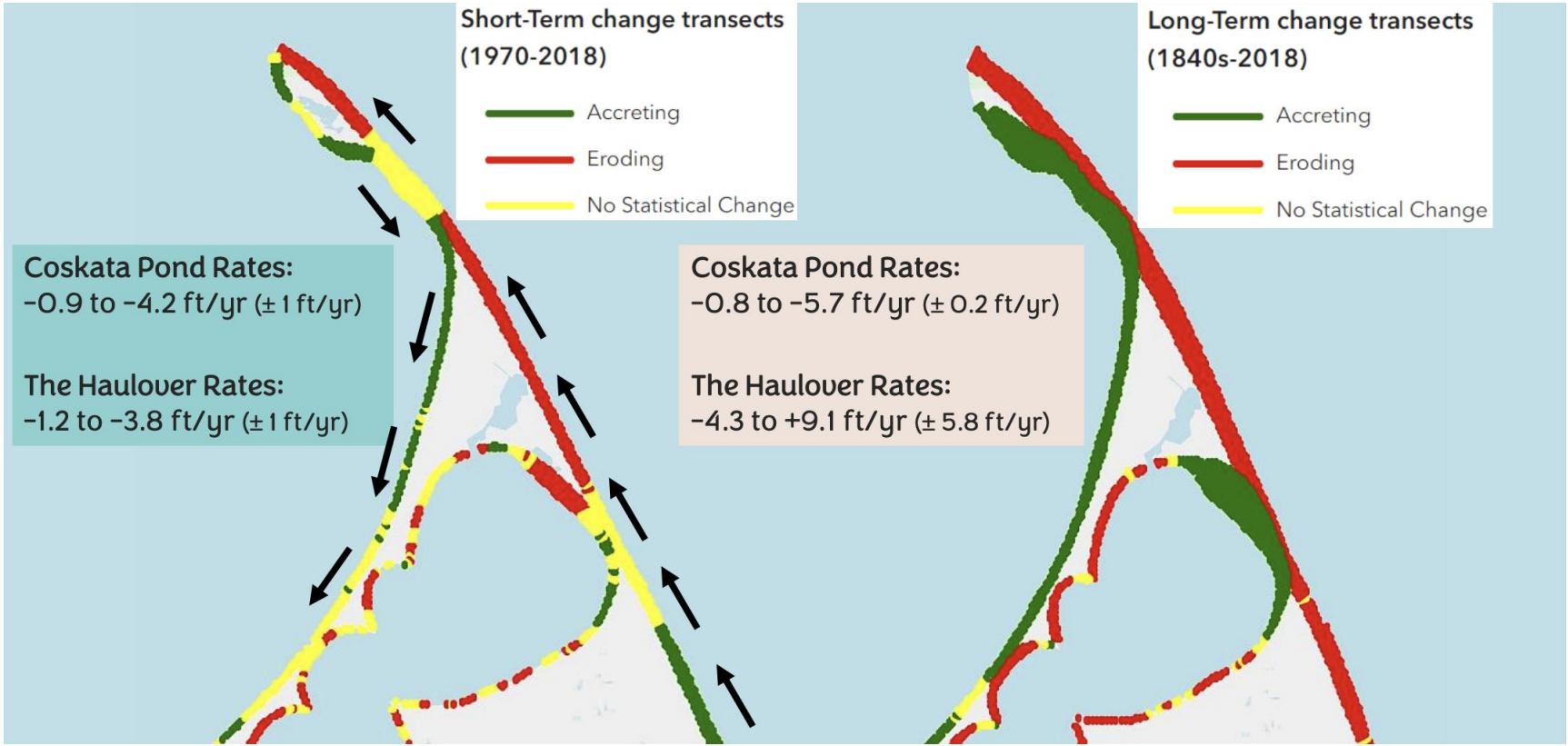
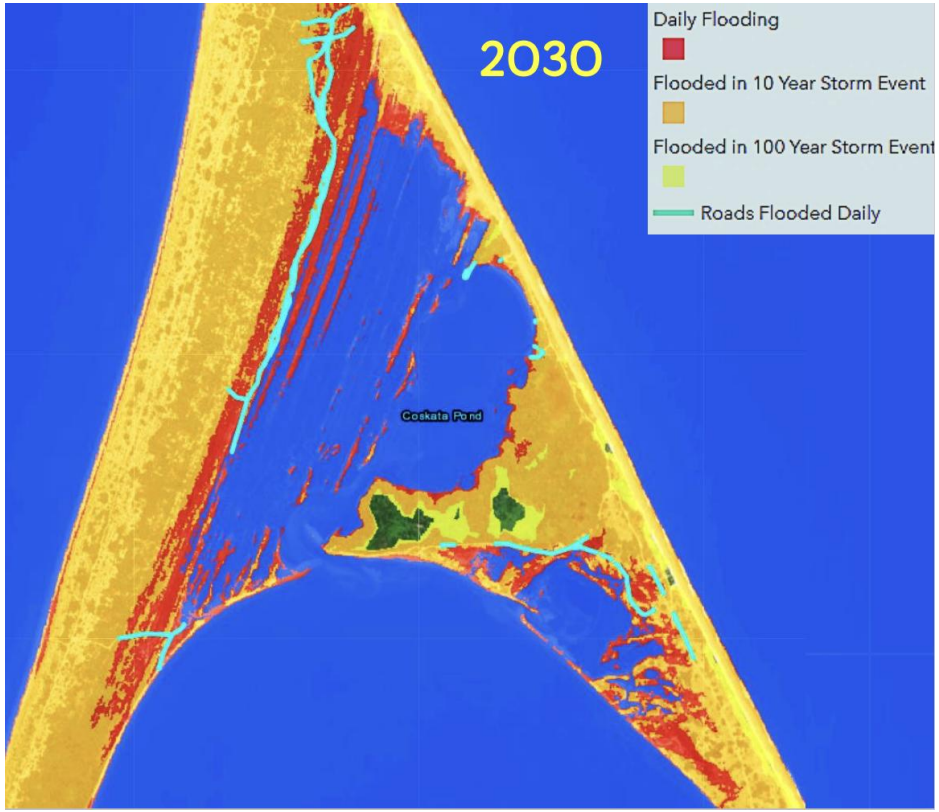
Shoreline Erosion & Accretion

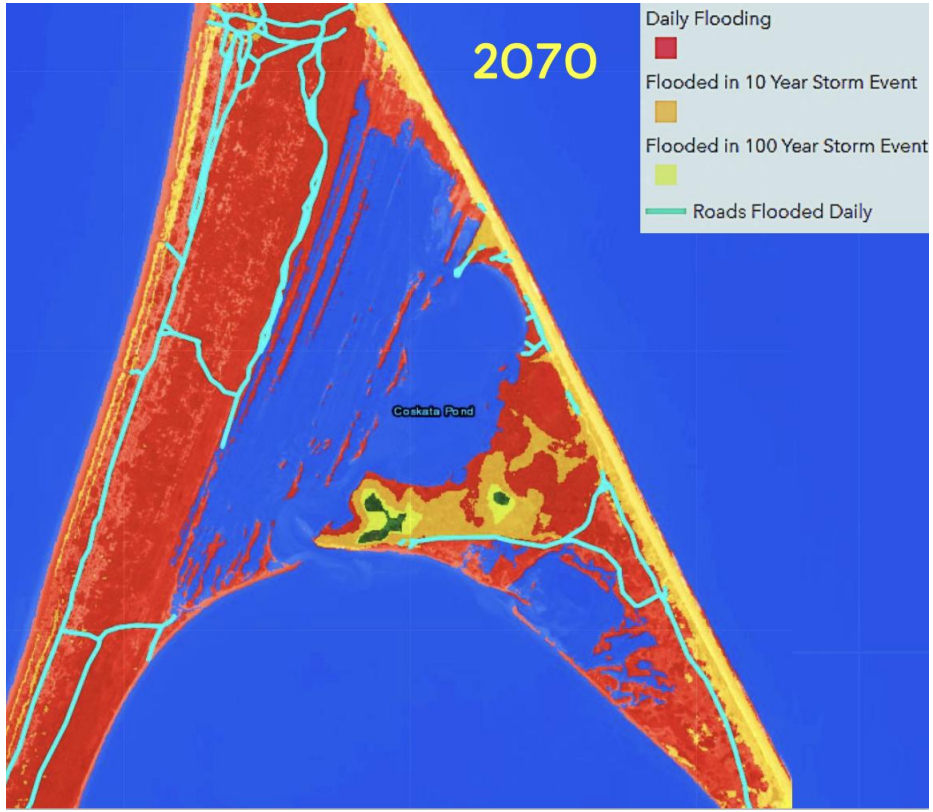
LONG-TERM AND SHORT-TERM CHANGES



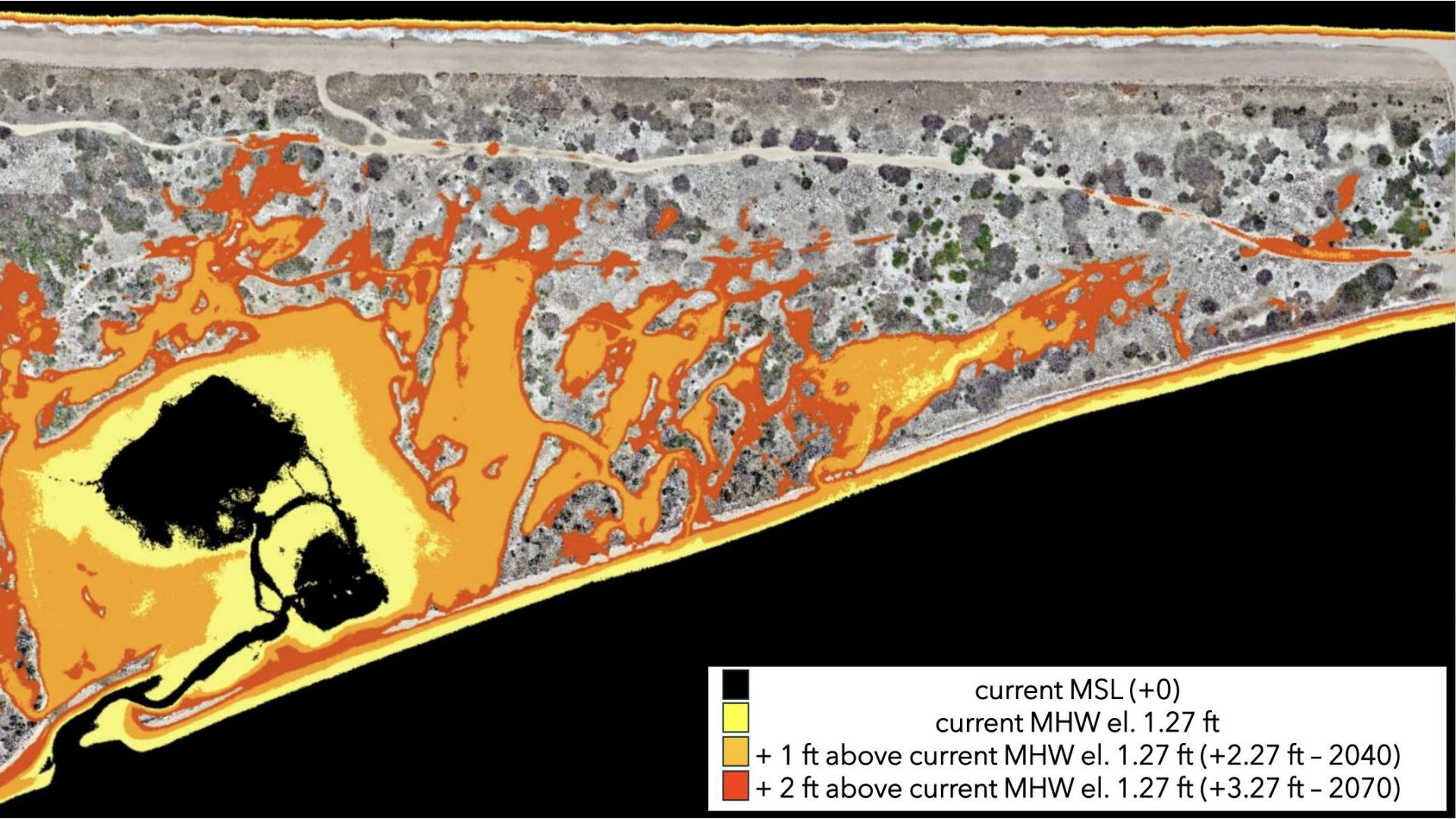
Increased Flooding & Road Access

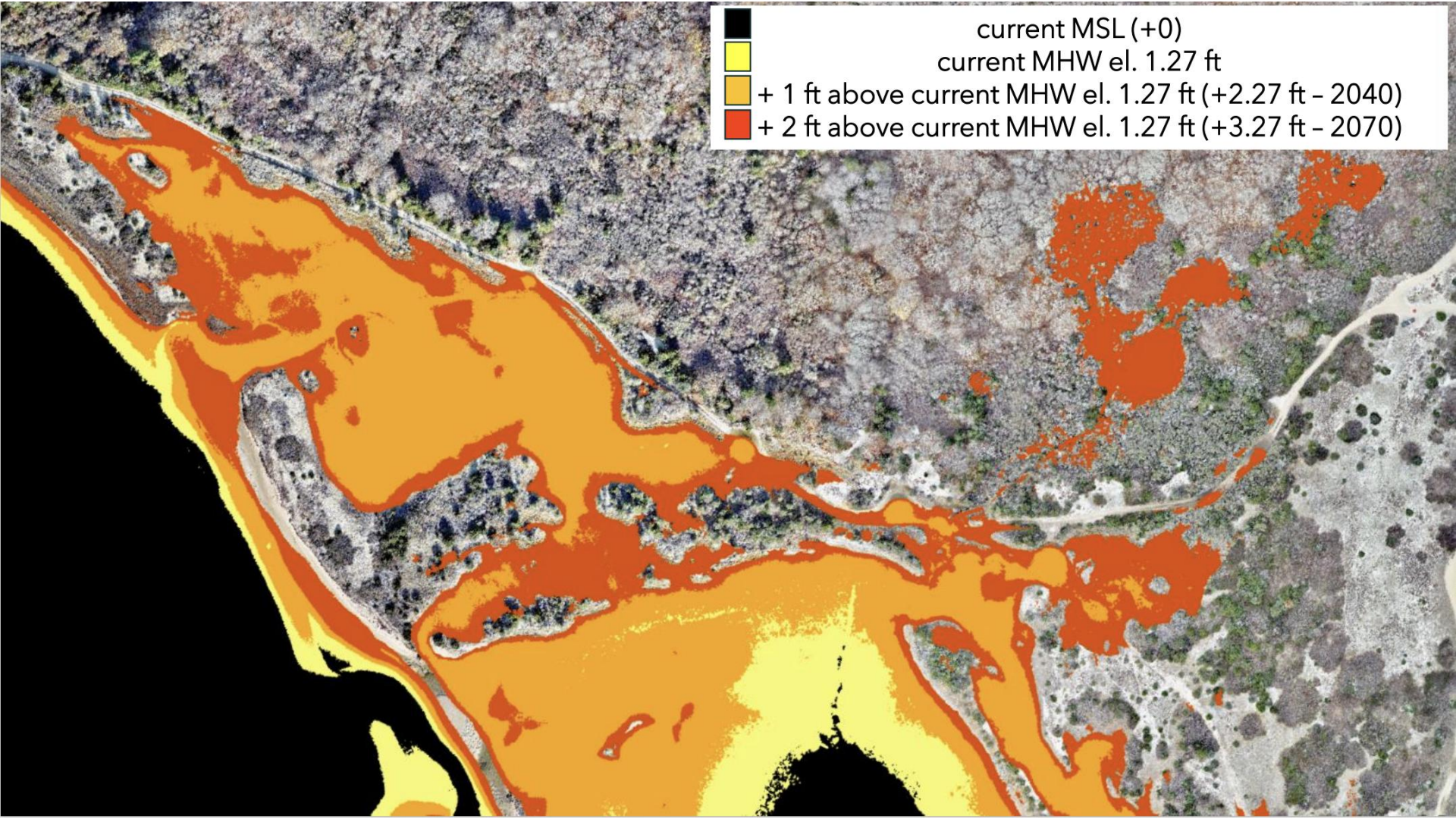
DAILY MHHW & STORM EVENTS





The Haulover and Trails


current MSL (+0)
current MHW el. 1.27 ft
+ 1 ft above current MHW el. 1.27 ft (+2.27 ft – 2040)
+ 2 ft above current MHW el. 1.27 ft (+3.27 ft – 2070)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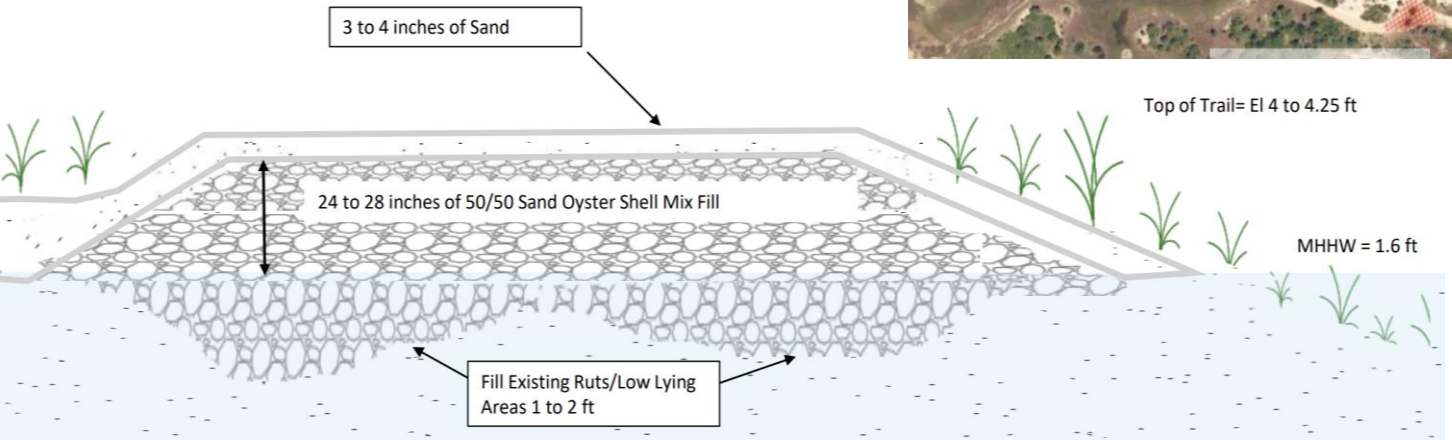
Haulover main trail

Coskata Woods trail



The Haulover

KEY SITE ISSUES & PREFERRED ALTERNATIVES

1. Harborside Shoreline Erosion and Dune Breach
2. Loss of salt marsh habitat from flooding

Alternative 1A. Living Shoreline with Wave Protection (Primary)	Alternative 1B. Active Plantings with Micro to Small Scale Topographic Changes (Secondary)
Install oyster reef balls and castles for wave protection, with active vegetation planting for shoreline stabilization.	Implement active plantings with micro/small-scale topographic changes and soil hardening techniques for enhanced soil and marsh stability.


Oyster castles
Eel Grass
Approximately 2300 linear feet of Living Shoreline
Active planting
Reef balls

Alternatives – the Haulover Harborside Shoreline

1. Living shoreline
   - Oyster reef balls, oyster castles & high marshes

3. Active plantings with micro to small topographic changes.

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Coskata Pond
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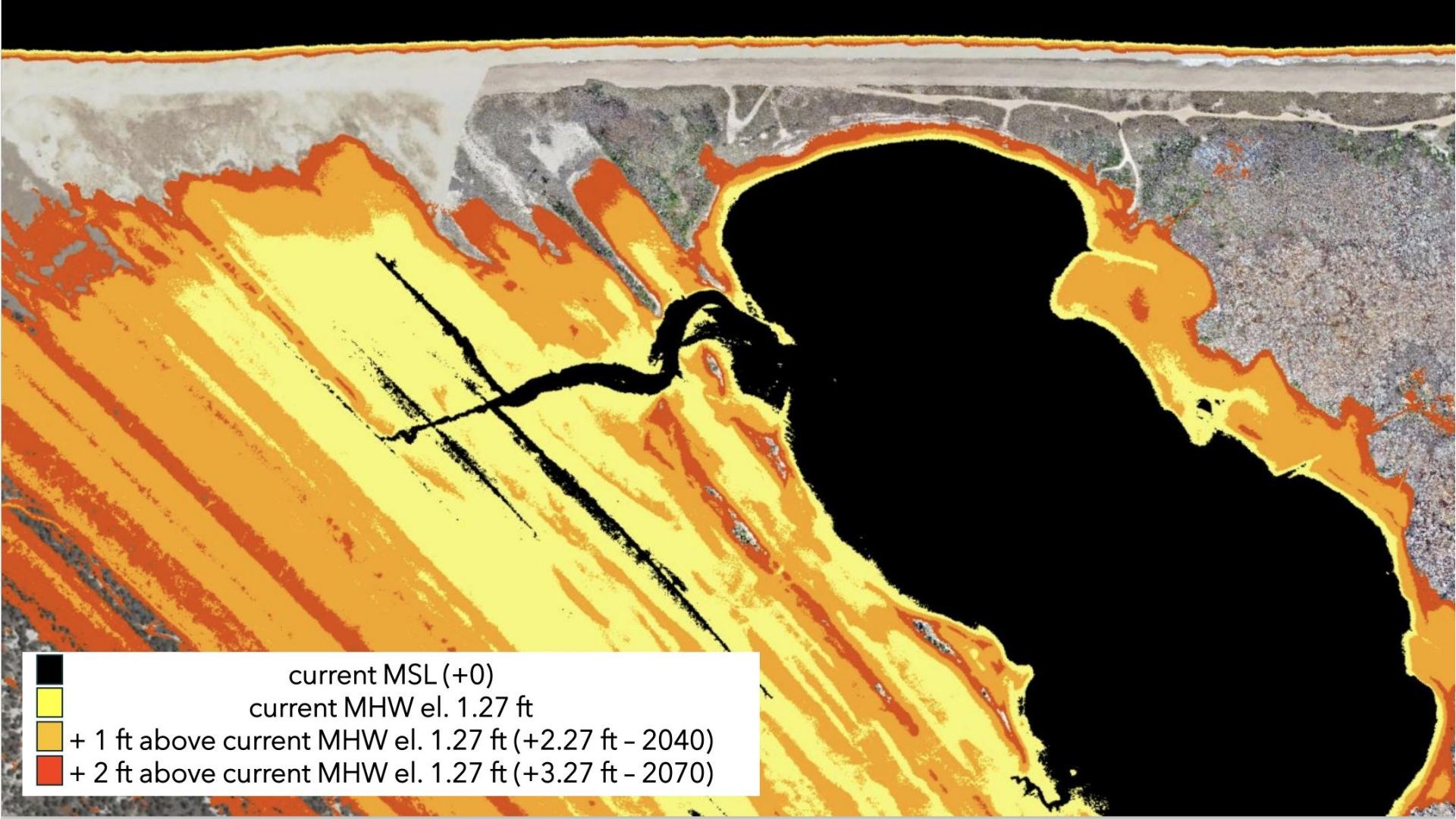
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Coskata Pond

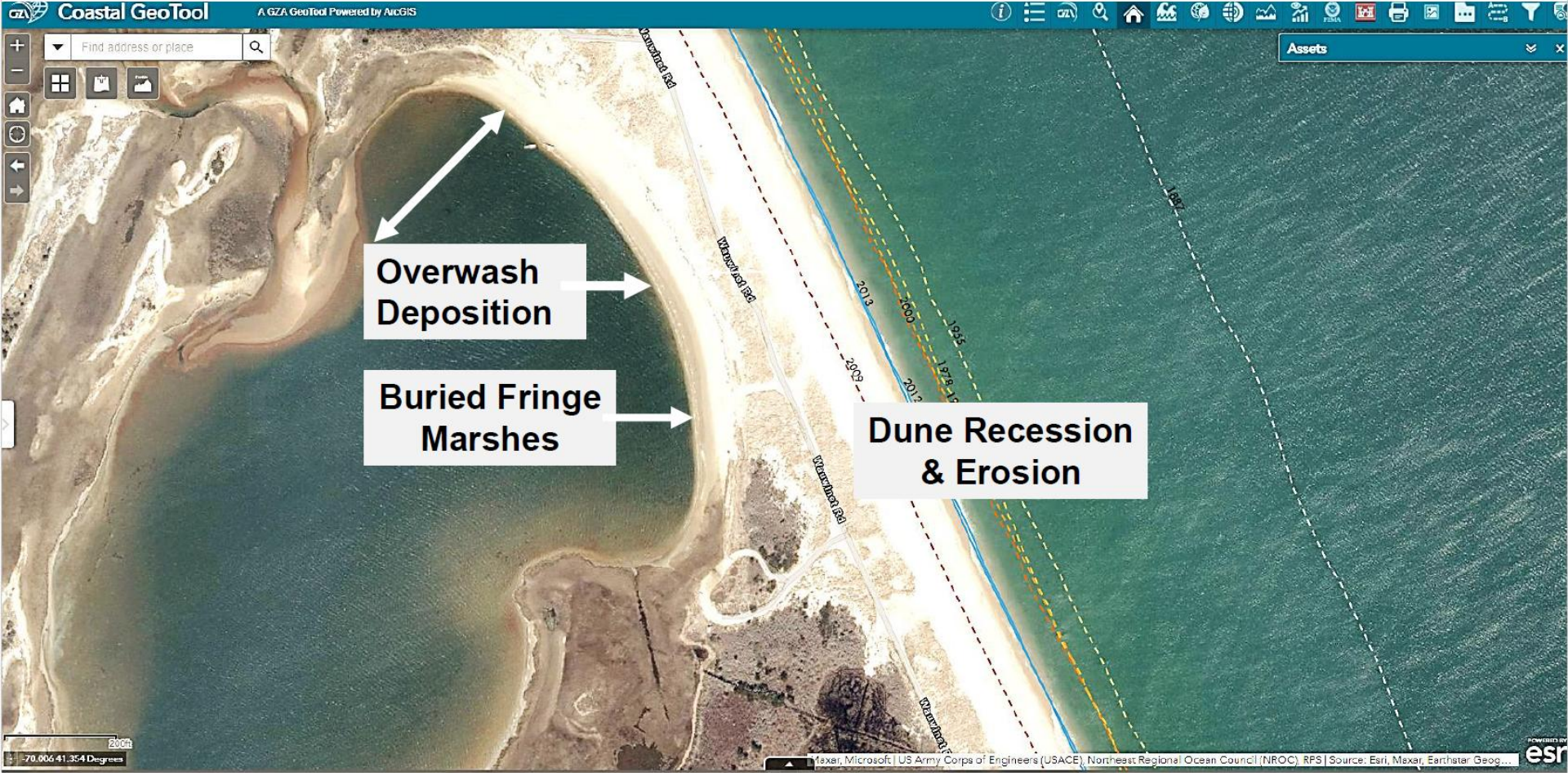
KEY SITE ISSUES & PREFERRED ALTERNATIVE

1. Shoreline erosion
2. Dune retreat and migration
3. Dune over-wash and flood pathways
4. Loss of salt marsh
5. Loss of sediment

Alternative 1. Living Shoreline with Active Vegetation Planting
Oyster castles with active vegetation planting for sediment stabilization and habitat restoration.

2009 Historical Orthoimagery: Coskata Pond Area

2019 Historical Orthoimagery: Coskata Pond Area



Alternatives – Coskata Pond

1. Living shoreline
   - Oyster castles
   - Low and high marshes

...to establish a wider beach, restore the tidal marsh ecosystem, and enhance system resilience against a potential breach event.

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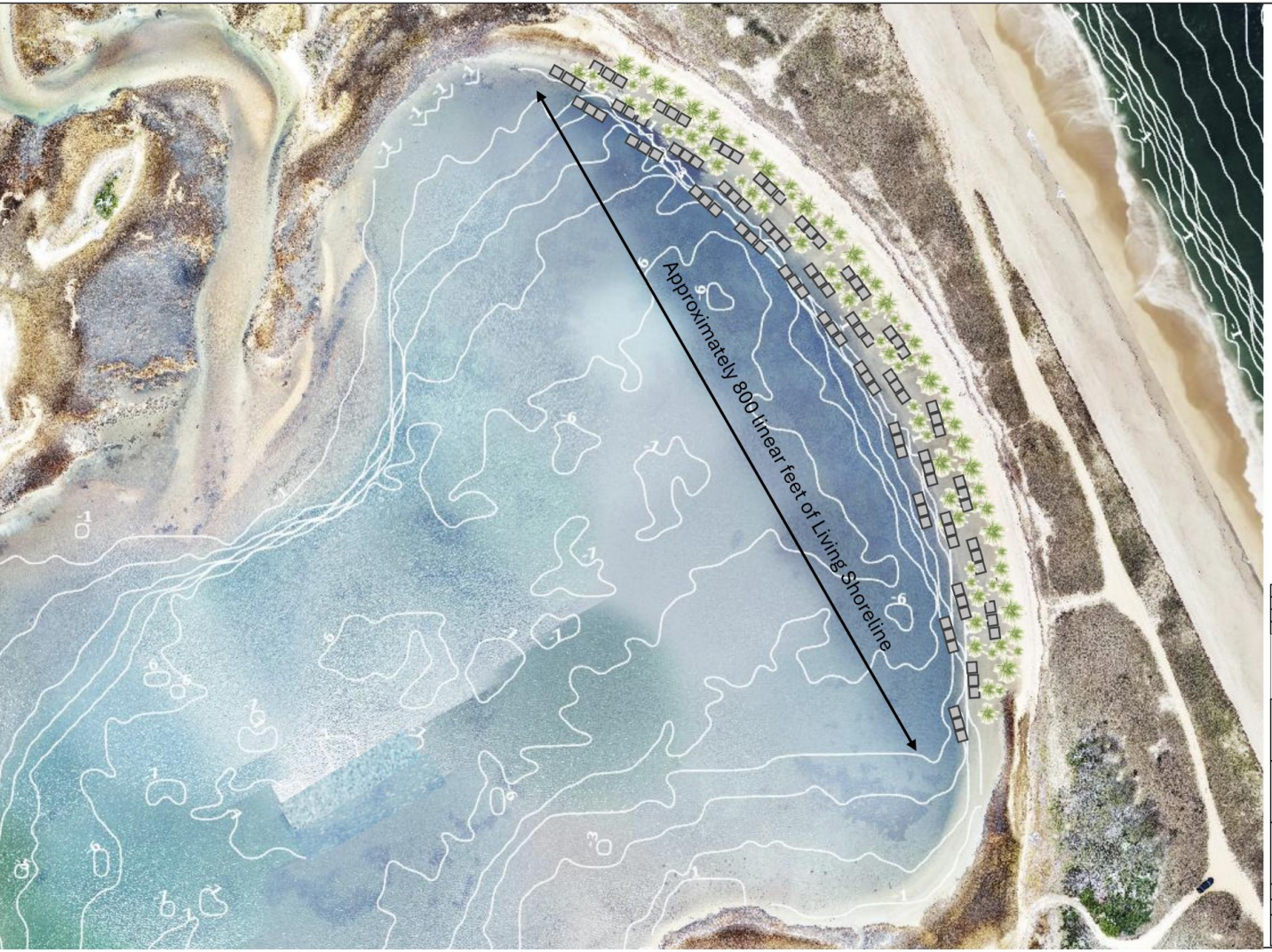


1. Contours shown are referenced to NAVD 88.

LEGEND

- Active Vegetation Planting
- Oyster Castle

Conceptual Purposes Only

NO.	ISSUE/DESCRIPTION	BY	DATE

COSKATA – COATUE WILDLIFE REFUGE
NANTUCKET, MA

NANTUCKET BARRIER BEACH & MARSH RESILIENCE
COSKATA POND LIVING SHORELINE

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
THE TRUSTEES OF RESERVATIONS
NANTUCKET CONSERVATION FOUNDATION

PROJ MGR: MP	REVIEWED BY: DS	CHECKED BY: MJP	FIGURE 13
DESIGNED BY: MJP	DRAWN BY: MP	SCALE:	
DATE: 03/26/2025	PROJECT NO. 03.0035415.00	REVISION NO.	SHEET NO.

Timeline & Next Steps

Draft Feasibility Report

March 2025

April 2025

Trustees, NCF, & GZA Planning Workshop

Finalize Alternatives by Site

April 2025

Spring 2025

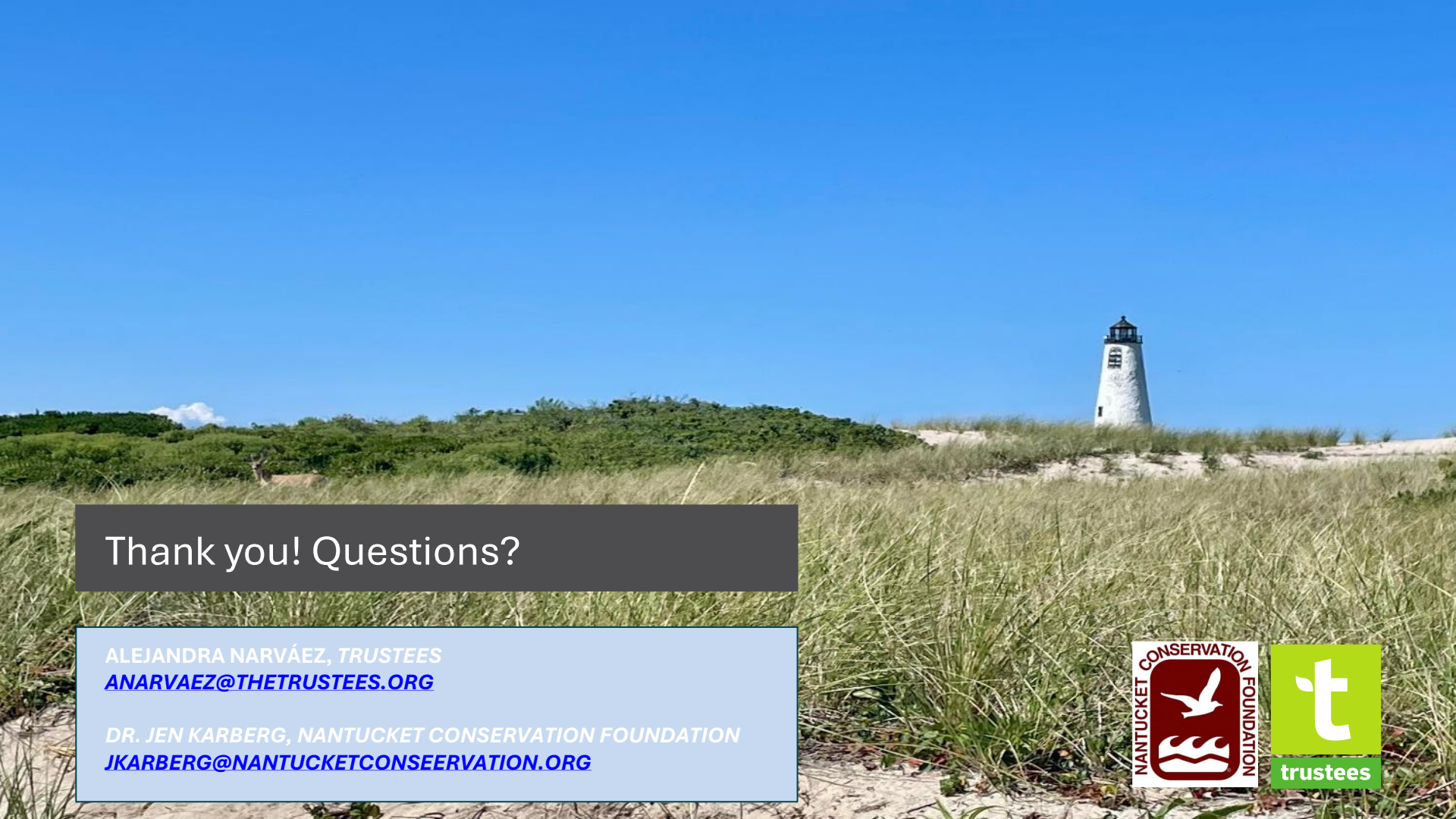
Model Alternatives

Public Meeting

May 2025

August 2025

Preliminary Design



Thank you! Questions?

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