



Natural Shoreline Infrastructure in Humboldt Bay for Intertidal Coastal Marsh Restoration and Transportation Corridor Protection

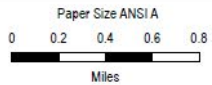
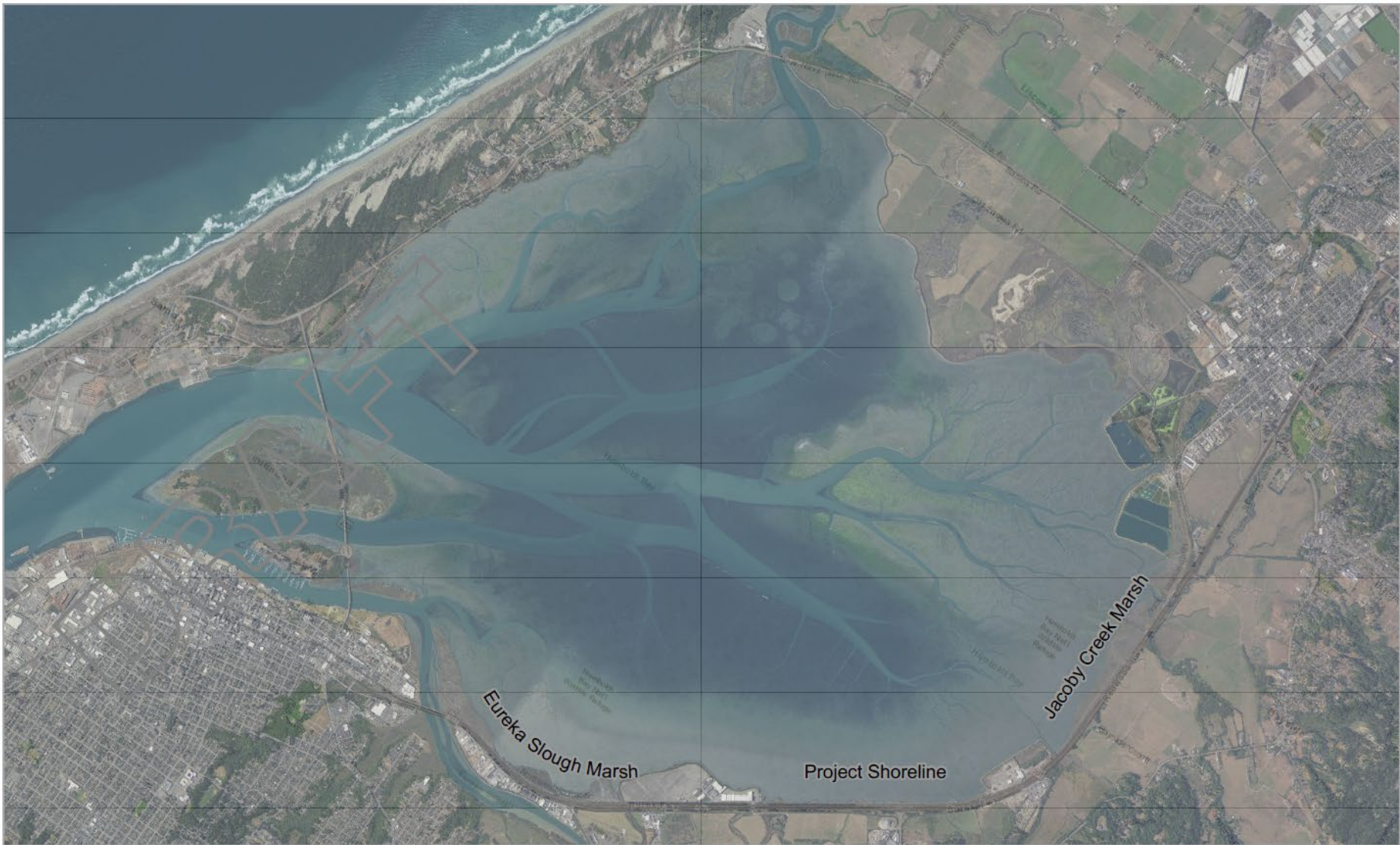
Technical Working Group Meeting #3
May 6, 2021



NFWF



OCEAN
PROTECTION
COUNCIL



Map Projection: Lambert Conformal Conic
 Horizontal Datum: North American 1983
 Grid: NAD 1983 StatePlane California I FIPS 0401 Feet



Humboldt County Department of Public Works
 Humboldt Bay Natural Shoreline Infrastructure

Project No. 11214987
 Revision No. -
 Date Dec 2020

Project and Reference Areas

FIGURE X

Scope of Work

Tasks

Task 1: Grant Administration / Project Management

Task 2: Stakeholder Engagement and Consultation

Task 3: Site Assessment

3.1 – Topographic and bathymetric survey

3.2 – Sediment characterization

3.3 – Habitat evaluation and vegetation mapping

3.4 – Geomorphic evaluation

3.5 – Hydraulic analysis

Task 4: Preliminary Design

4.1 – Goals and objectives

4.2 – Options evaluation

4.3 – Engineering design

4.4 – Re-vegetation plan

4.5 – Access and staging plan

4.6 – Monitoring plan

4.7 – Habitat effects analysis

Task 5: Reporting

Timeline (Updated)

Date	Key Milestones
August 3, 2020	<ul style="list-style-type: none">• Technical working group meeting #1 (introduction)
December 15, 2020	<ul style="list-style-type: none">• Technical working group meeting #2 (update on site assessment)
May 6, 2021	<ul style="list-style-type: none">• Technical working group meeting #3 (draft goals and objectives, preliminary design options)
May 31, 2021	<ul style="list-style-type: none">• Due date for receiving written comments on goals/objectives and preliminary design options
July 2021	<ul style="list-style-type: none">• Release draft report for site assessment• Technical working group meeting #4 (finalize goals/objectives, refine design options, discuss site assessment results)
September 2021	<ul style="list-style-type: none">• Technical working group meeting #5 (select preferred alternative)
TBD	<ul style="list-style-type: none">• Technical working group meeting #6 (and #7?)

Task 3 – Site Assessment Progress Update



Task 3 – Site Assessment Progress Update

3.1 – Topographic and bathymetric survey

- a) Merge LiDAR and Topographic Surveys – completed

3.2 – Sediment characterization

- a) SedFlume Analysis – to be completed this month
- b) Sediment Sampling (Particle Size, Salinity, Organic Content) – to be completed this month

3.3 – Habitat evaluation and vegetation mapping

- a) Rare Plant Survey Completed in 2020, Plant Ecology Assessment – in progress
- b) Avian Use Assessment – complete
- c) Aquatic Species Use Assessment – scoping in progress

3.4 – Geomorphic evaluation

- a) Salt Marsh Edge/Typology Mapping - complete
- b) Historic Feature Mapping – complete
- c) Conceptual Model of North Bay and Adjacent Tidal Wetlands – in progress
- d) Currently Assessing LiDAR Differencing Options for Mudflat

3.5 – Hydraulic analysis

- a) Assessing Model Capabilities to Predict Erosion/Deposition Characteristics with Tides and Wind Waves

Task 4.1 – Draft Project Goals & Objectives



Draft Goals and Objectives

The fundamental concept of the project is to integrate the natural flood-risk reduction properties of salt marsh into the shoreline management strategy for the Eureka-Arcata Highway 101 transportation corridor in an area where salt marsh was historically abundant but currently exists only in small, isolated patches.

Goal 1: Restore and enhance intertidal coastal marsh habitat

Goal 2: Protect transportation infrastructure

Goal 3: Create opportunities for innovation and learning

Goal 1: Restore and enhance intertidal coastal marsh habitat

► Objectives:

1. Provide a tidal ecotone extending from intertidal mudflat through low, middle, and high marsh to the upland transition zone.
2. Increase the extent of salt marsh within the project area.
3. Increase habitat for native salt marsh plant communities and rare plant species.
4. Avoid infestation by the invasive dense-flowered chordgrass (*Spartina densiflora*).
5. Create landforms that are in dynamic equilibrium with hydraulic and geomorphic processes under current conditions and projected future conditions.
6. Create conditions where vertical accretion of sediment keeps pace with relative sea level rise.
7. Provide elevation gradients that allow upward migration of salt marsh in response to sea level rise.
8. Provide a diversity of habitat forms that emulate natural systems.

Goal 2: Protect transportation infrastructure

▶ **Objectives:**

1. Prevent substantial erosion of the shoreline by reducing wave height and energy.
2. Reduce wave runup and overtopping onto the railroad, Humboldt Bay Trail, and Highway 101.

Goal 3: Create opportunities for innovation and learning

▶ Objectives:

1. Serve as a demonstration project for natural shoreline infrastructure and nature-based sea level rise adaptation strategies within Humboldt Bay.
2. Explore the feasibility of beneficial reuse of dredged sediment.
3. Collect and publish monitoring data.

Task 4.2 – Preliminary Options Evaluation

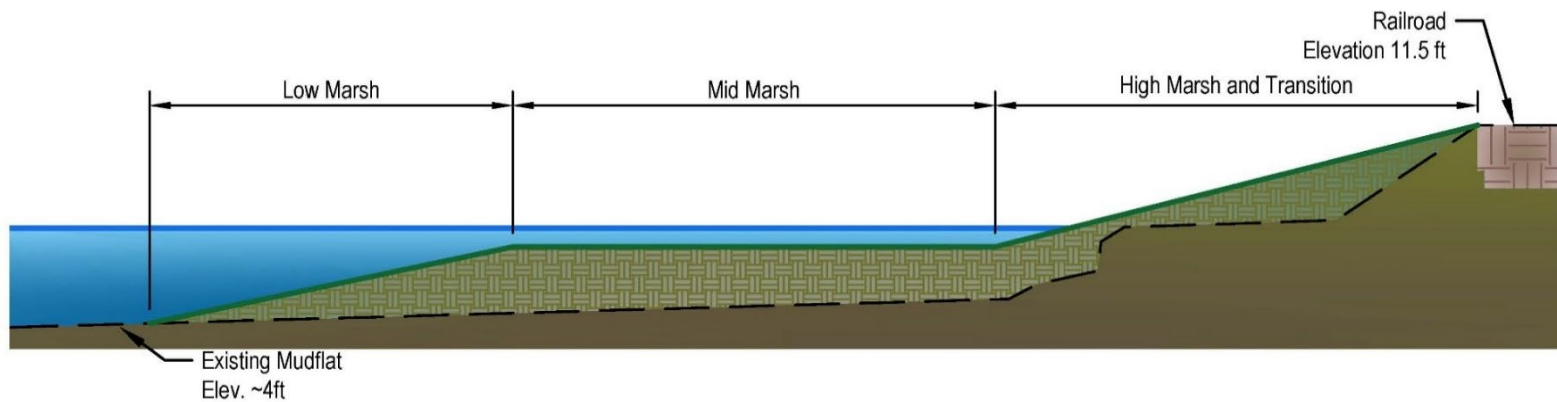
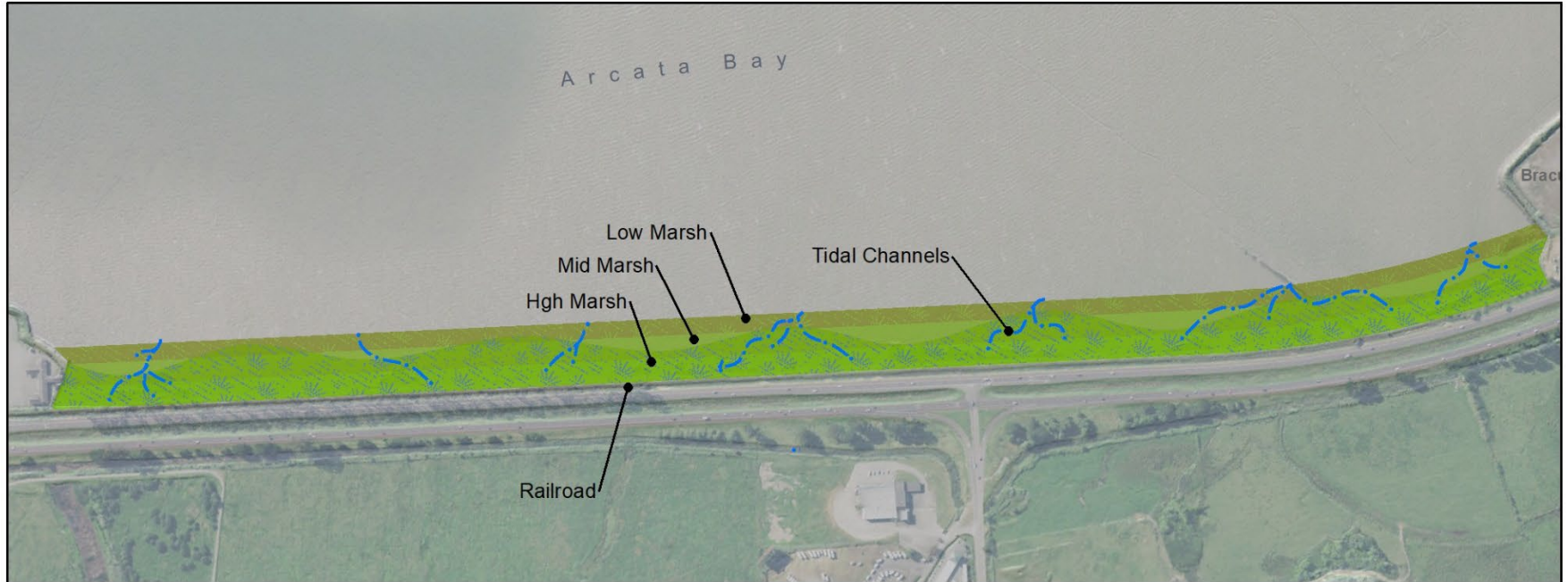


Preliminary Alternative Concepts

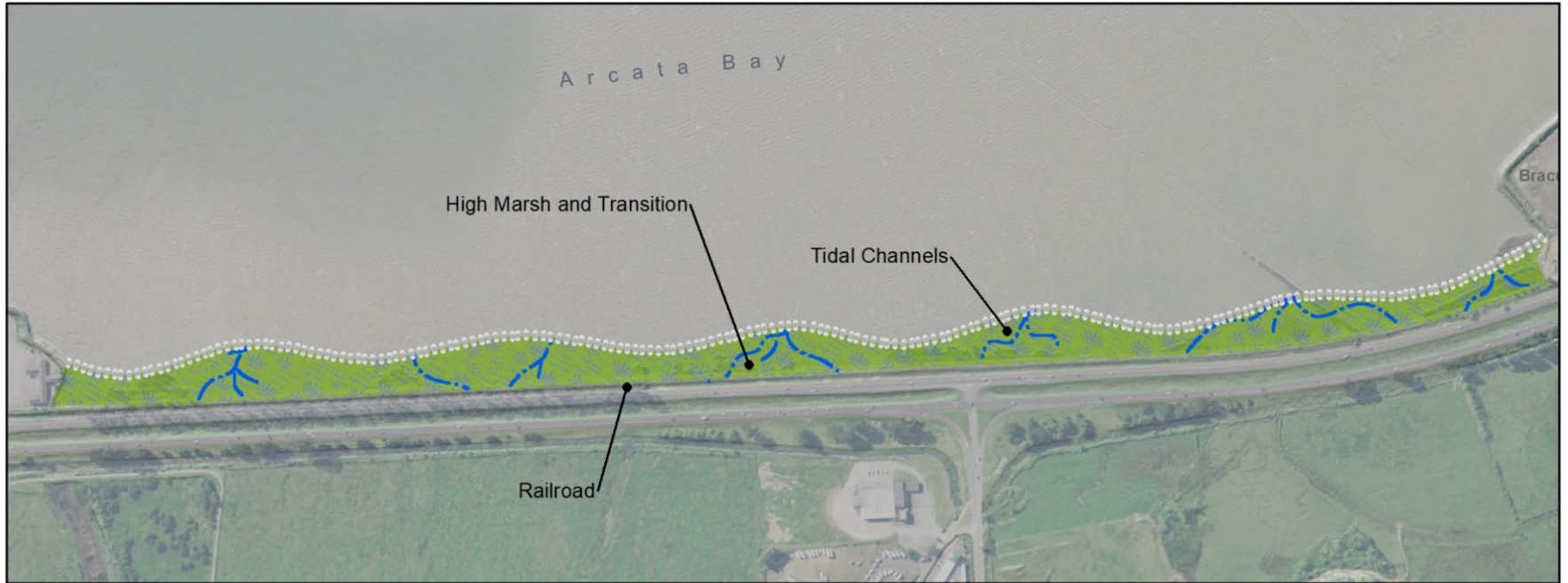
1. Horizontal Levee: Low, Mid, and High Salt Marsh Creation
2. Horizontal Levee: High Salt Marsh Creation with and without Armored Toe
3. Breakwater Reef with Passive and Active Salt Marsh Creation
4. Barrier Island Breakwater with Passive and Active Salt Marsh Creation
5. Groins with Passive and Active Salt Marsh Creation
6. Coarse Sediment Shore (sand/gravel/oyster hash)



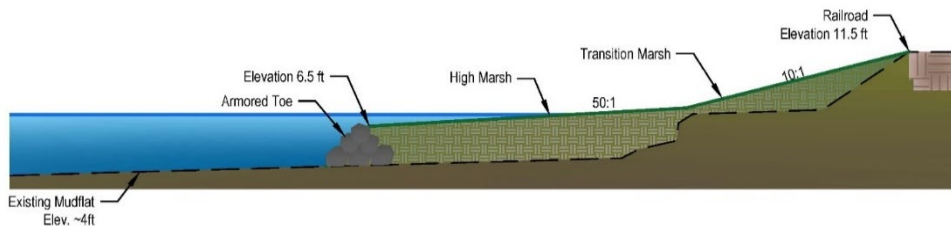
1. Horizontal Levee: Low, Mid, and High Salt Marsh Creation



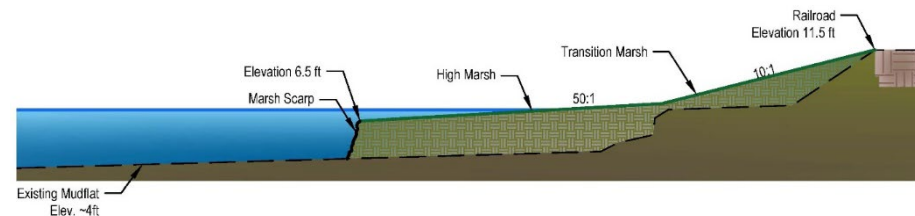
2. Horizontal Levee: High Salt Marsh Creation with and without Armored Toe



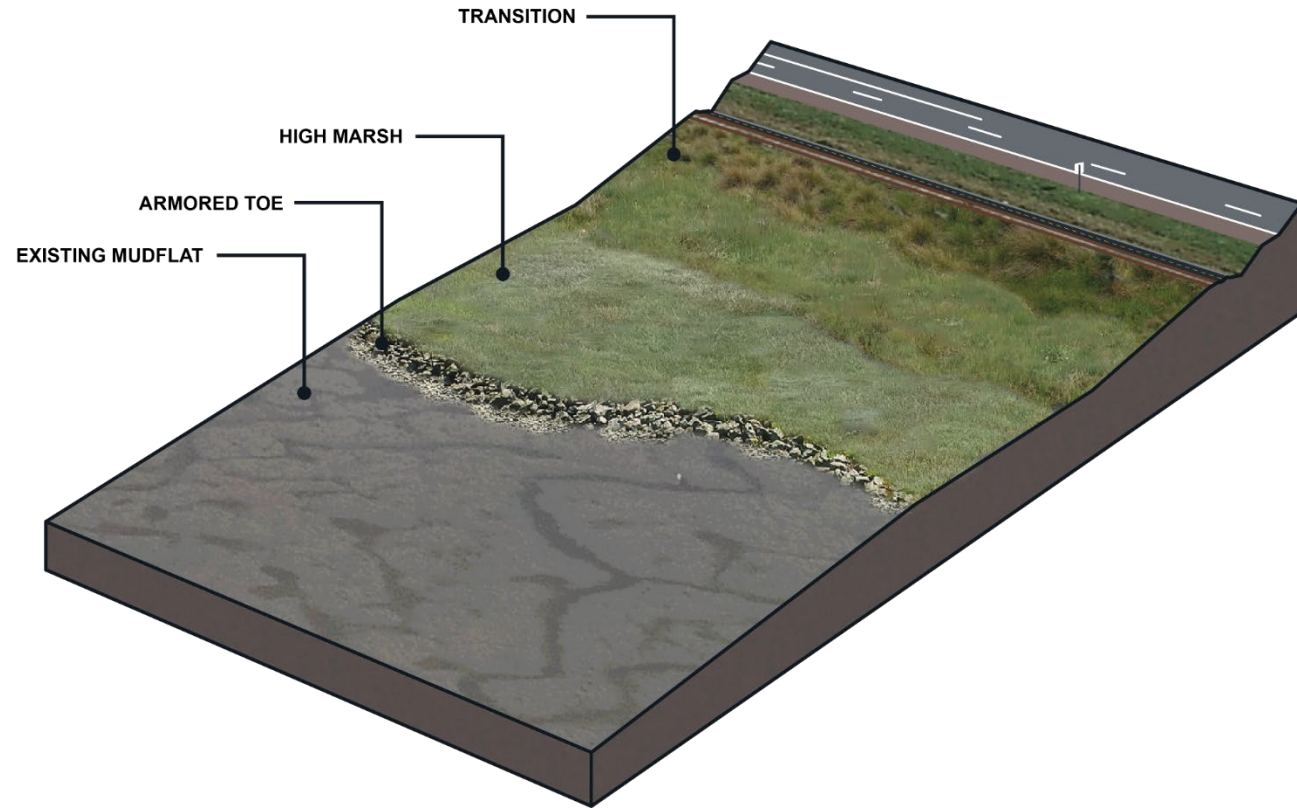
Armored Toe



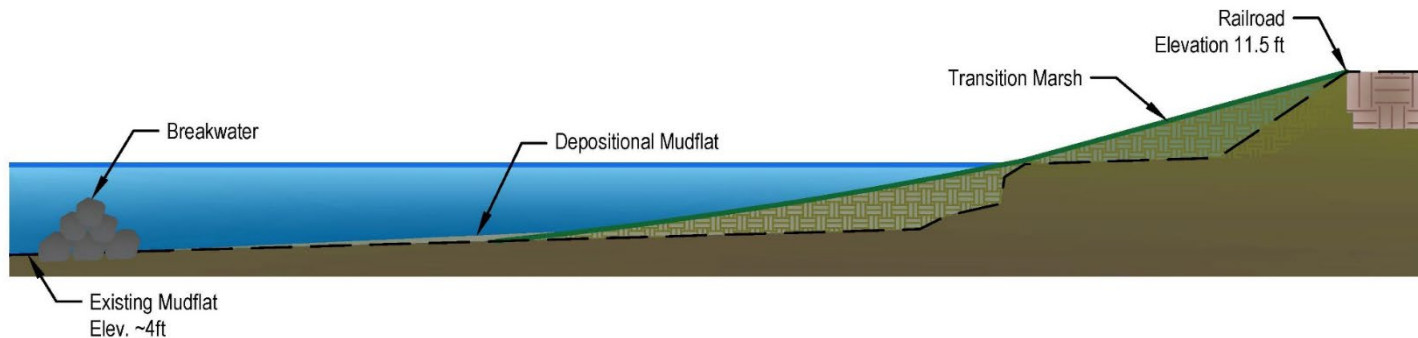
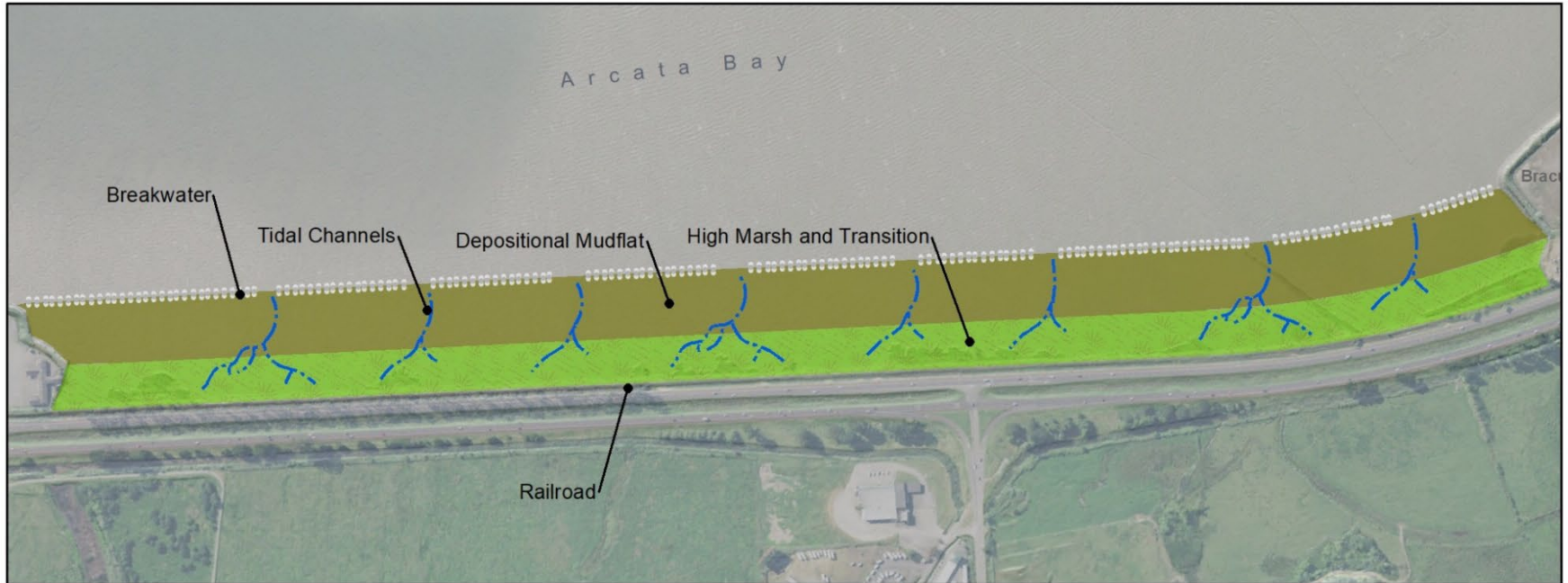
Unarmored Toe



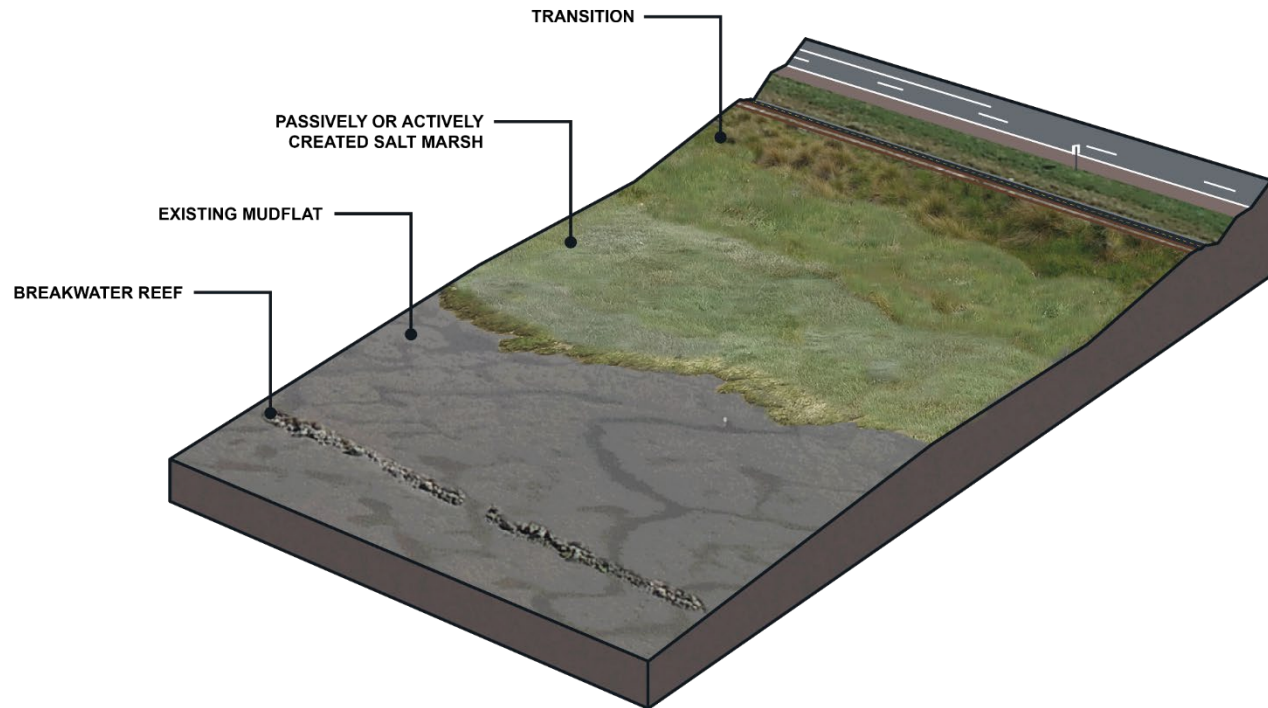
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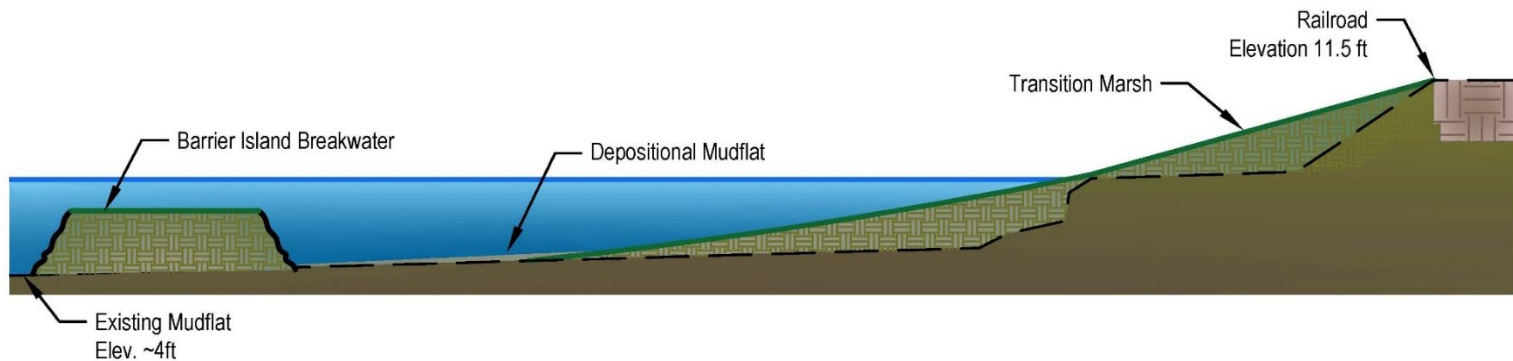
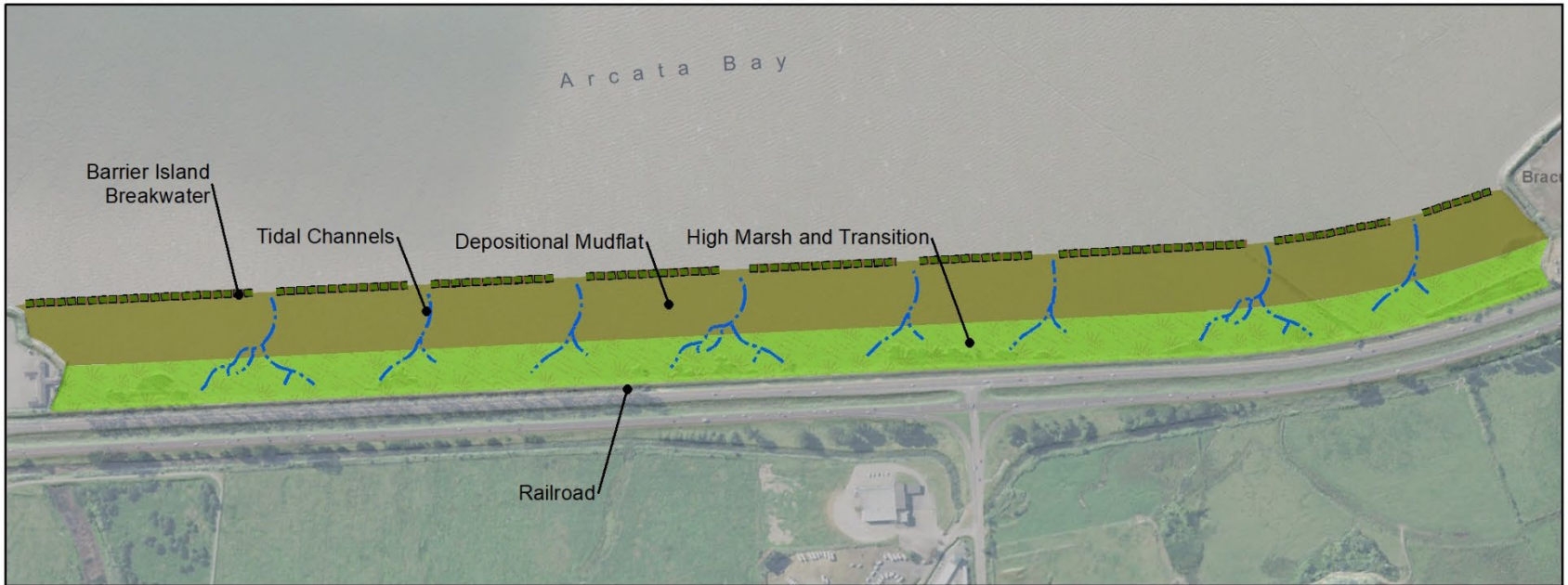
3. Breakwater Reef with Passive and Active Salt Marsh Creation



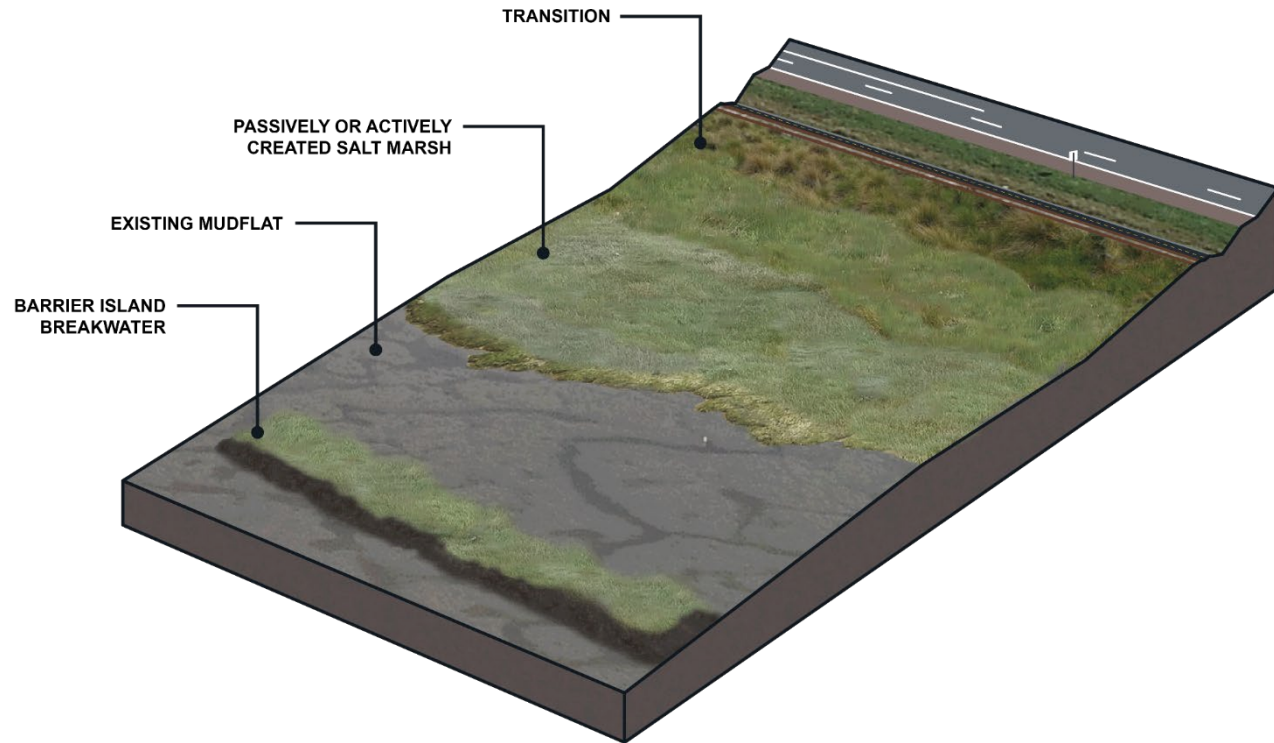
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4. Barrier Island Breakwater with Passive and Active Salt Marsh Creation



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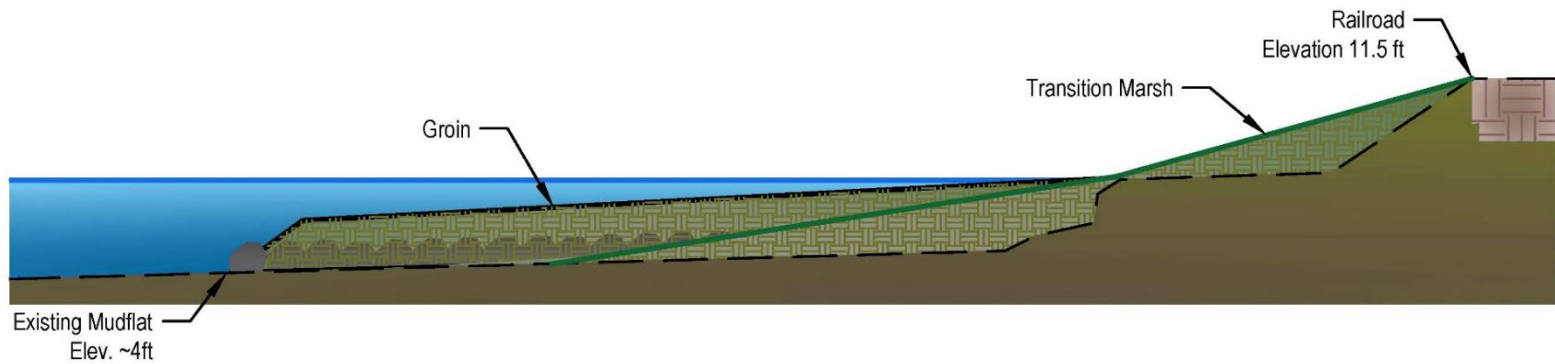
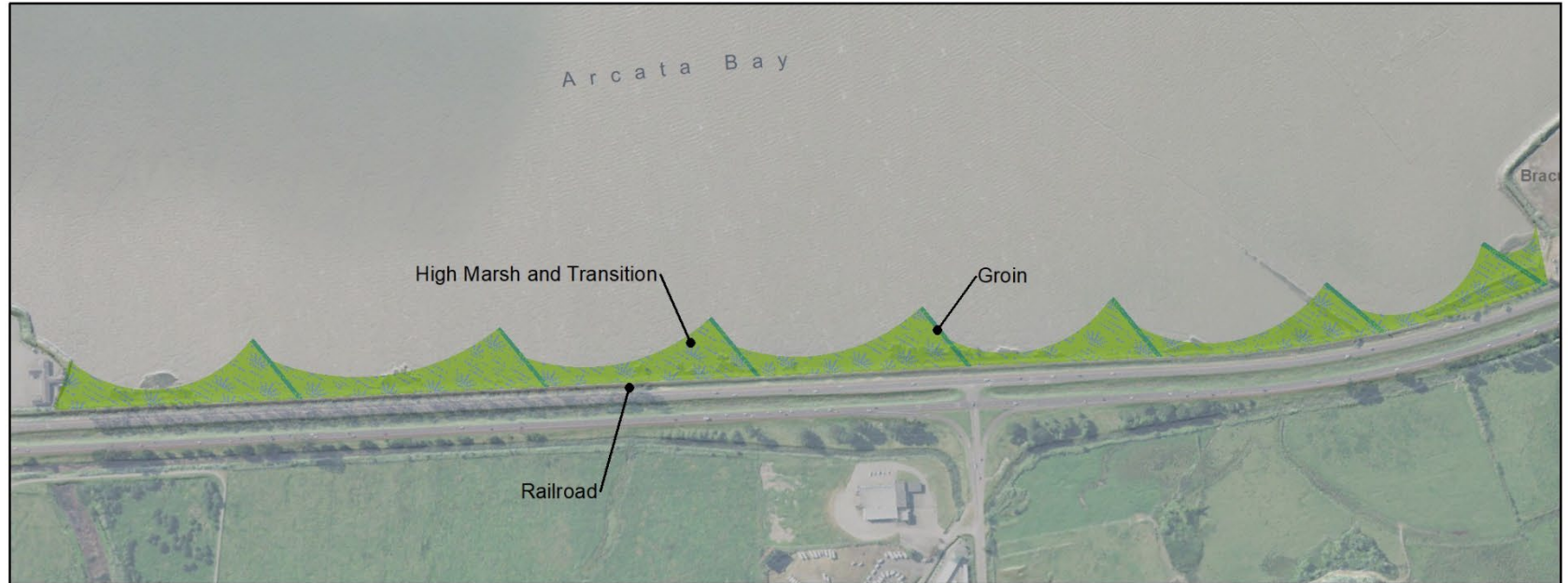


4. Barrier Island Breakwater with Passive and Active Salt Marsh Creation



Example Photo: White Slough, HBNWR (Laird)

5. Groins with Passive and Active Salt Marsh Creation

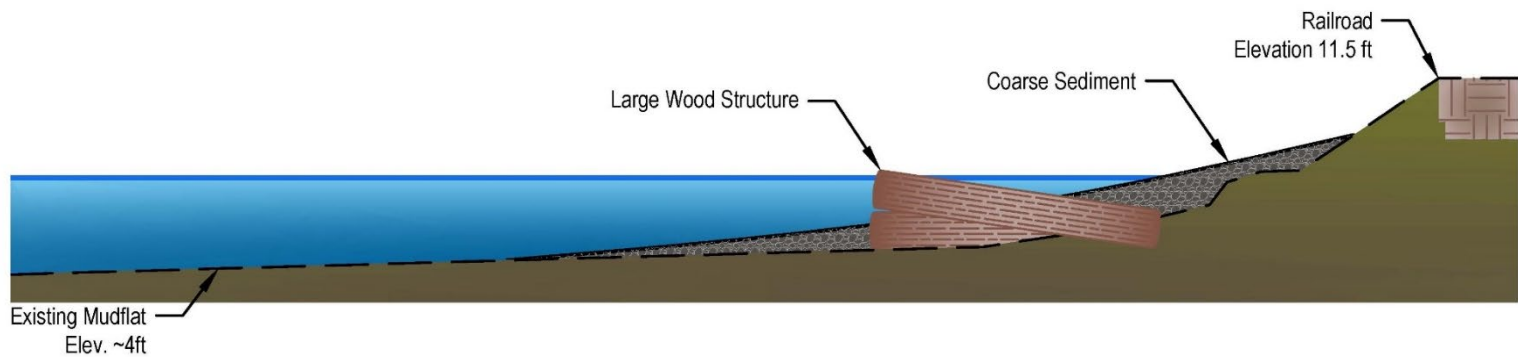
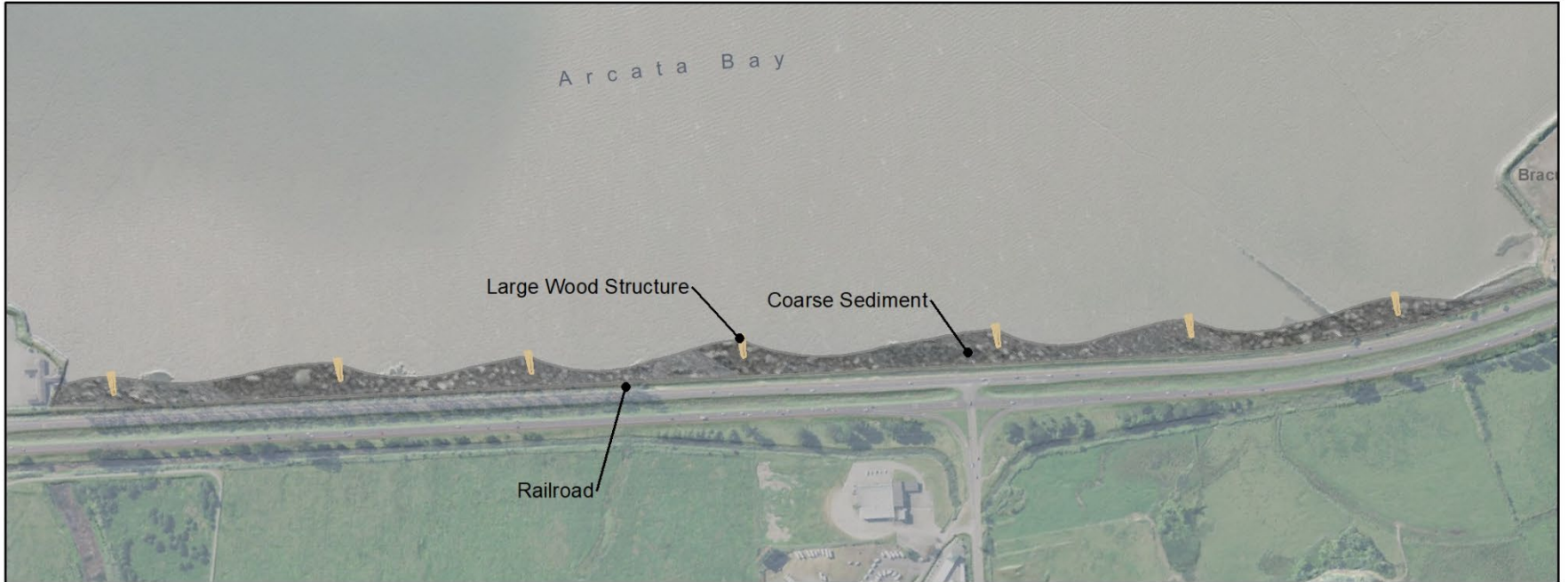


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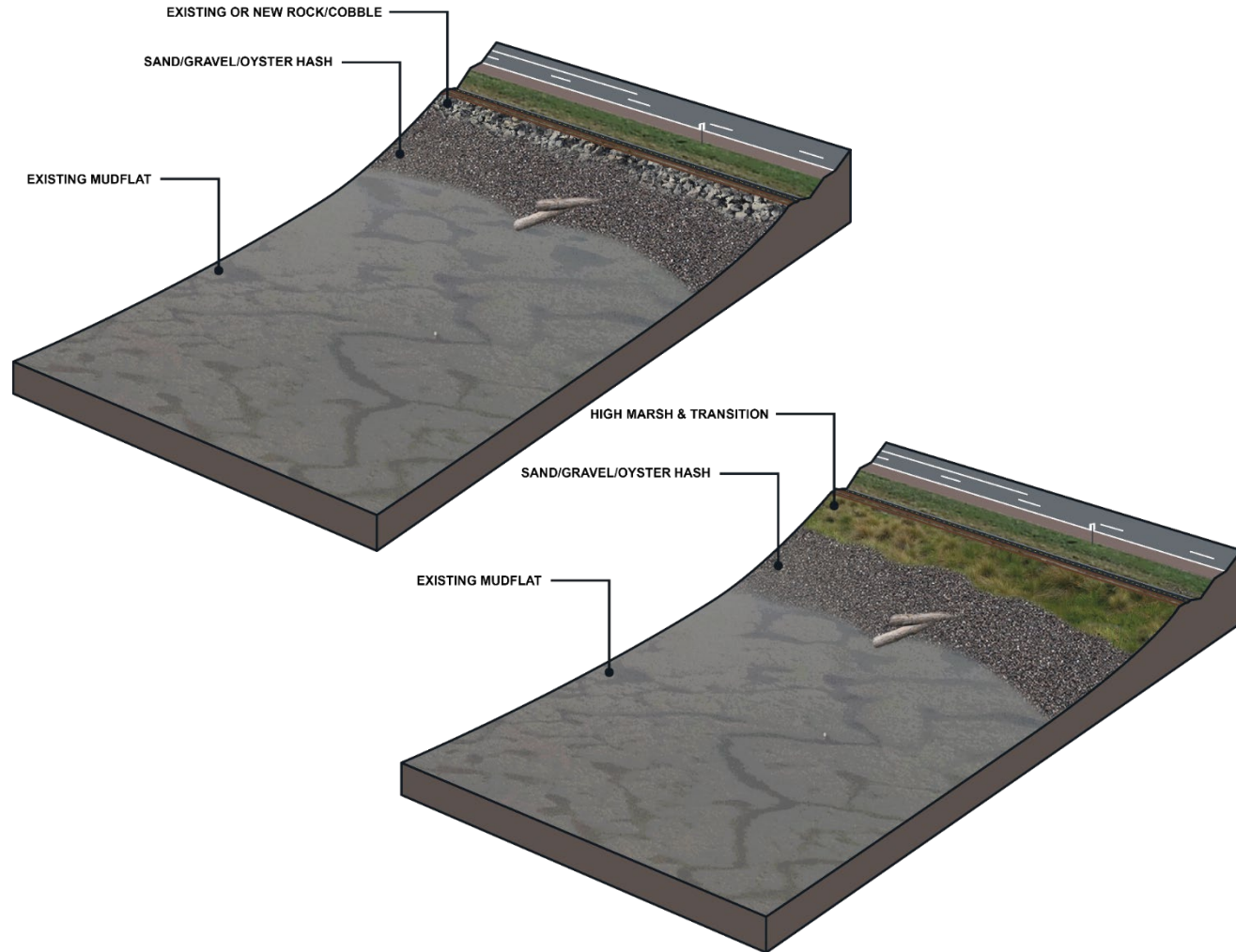
Example Photo: Project Area Shoreline (25mph north wind, ~6ft tide NAVD 88, April 2021)



6. Coarse Sediment Shore (Sand/Gravel/Oyster Hash)



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Example Photo: Brainard Shoreline (January 2021)



Example Photo: San Francisco Bay

