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Duxbury Beach Reservation

2022-2023 CZM Resiliency Grant

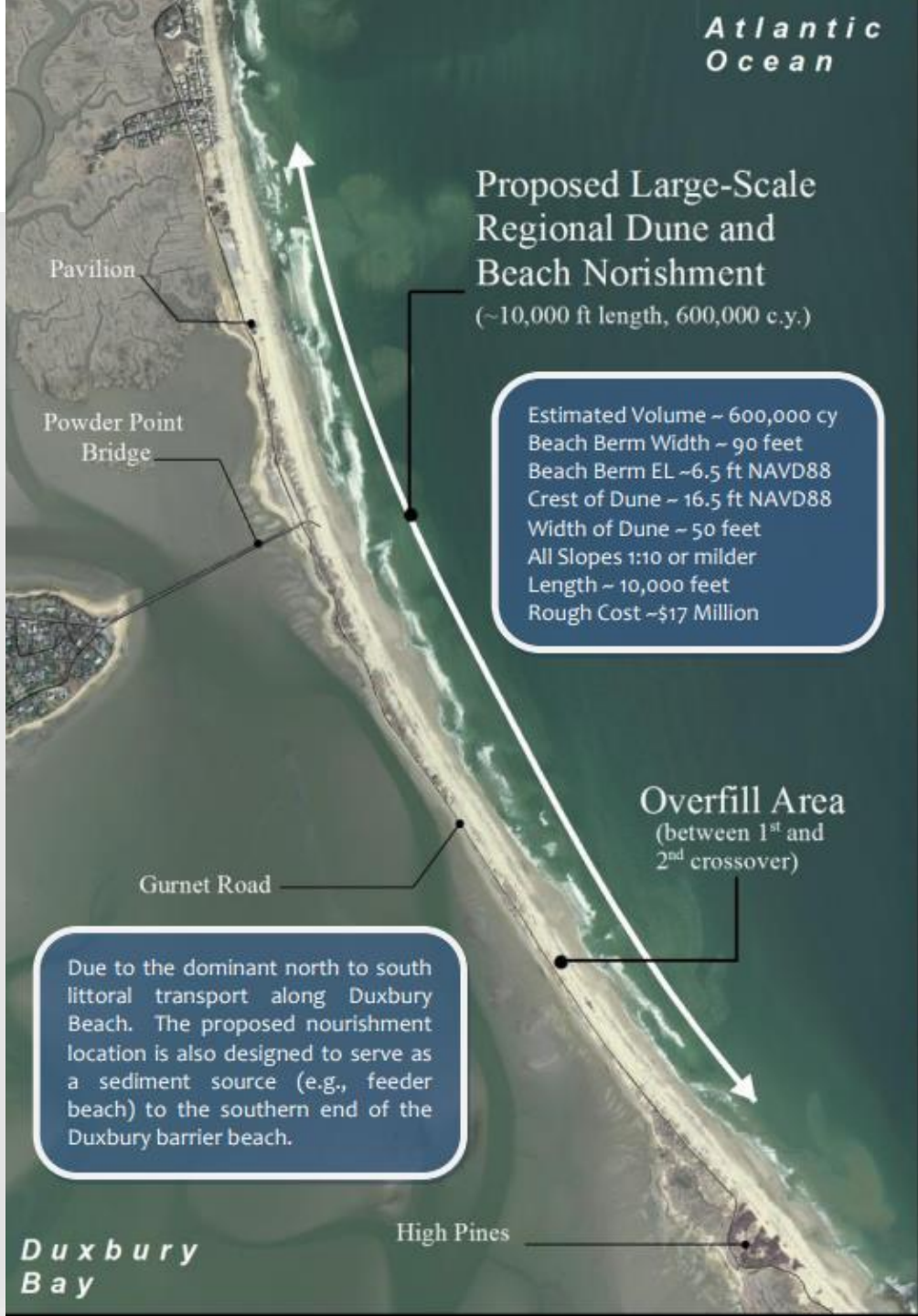
Beach & Dune Nourishment

DBR Commitment to Resilience

Regional Adaptation Strategy

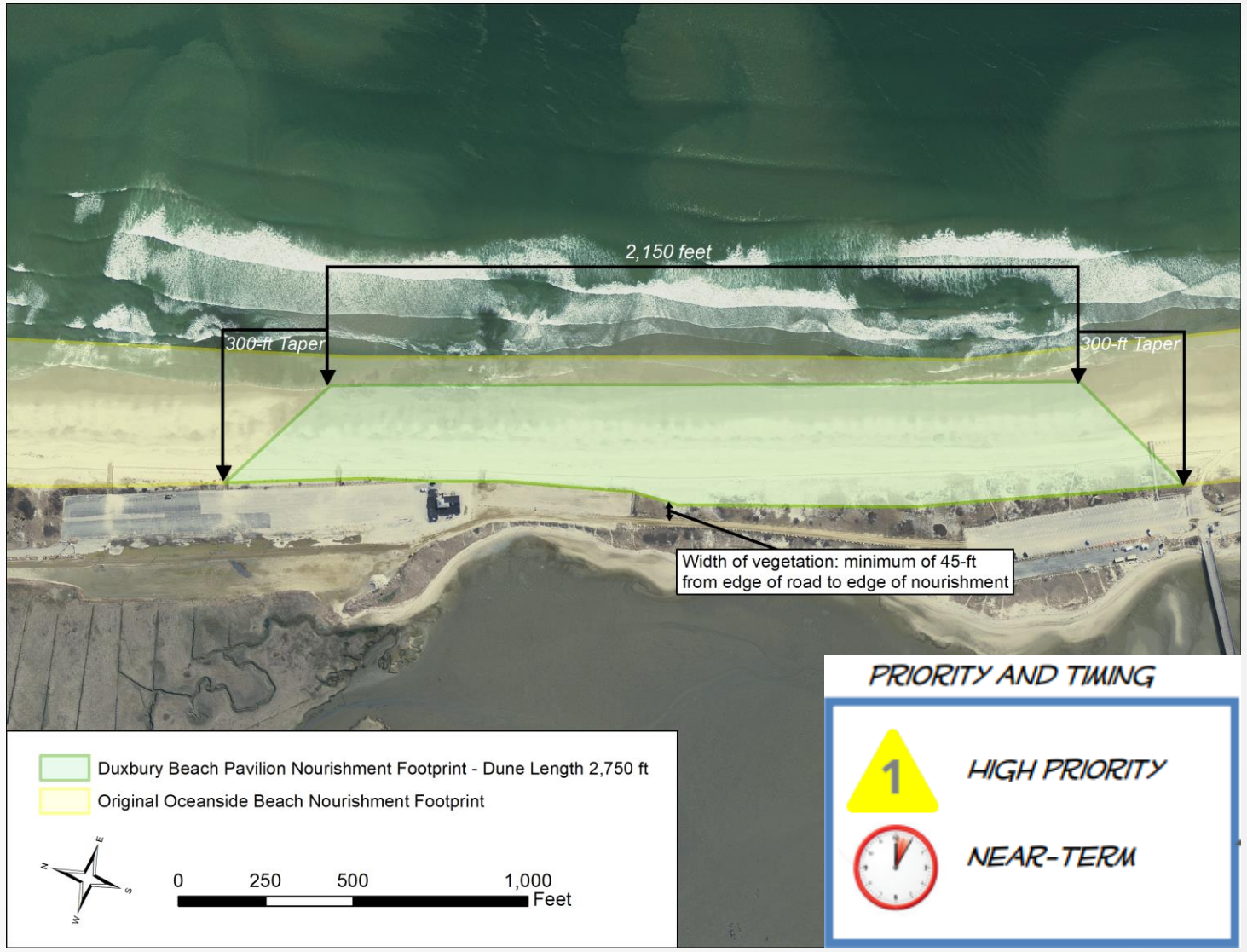
- Duxbury Beach is sediment starved – why?
- Improving the resilience of the beach and dune system involves adding nourishment to increase the sediment supply → no place that doesn't need sand!
- Permitting a large footprint allows DBR to
  1. Construct future nourishment projects to offset deficit
  2. Adaptively manage impacts as they occur
- Current project is strategically focused on improving the resilience of narrowest, most vulnerable section of the existing beach and dune.

*Regional adaptation recognized as a **high priority; long-term goal** outlined in 2017 Coastal Processes and Resiliency Study.*



2022 – 2023 Duxbury Beach Park Nourishment Project

Strategic Action



- Subset of larger, regional adaptation
- Focus on narrowest section of beach
- Primary impacts include **Wave Attack & Erosion, Prolonged Inundation, & Sediment Transport**
- Design based on review of existing conditions along *this* section of the beach – intended to: Improve resilience of communities located landward of barrier, provide habitat, support recreation.
- Ranked the **highest priority project** outlined in the 2017 Coastal Processes and Resiliency Study

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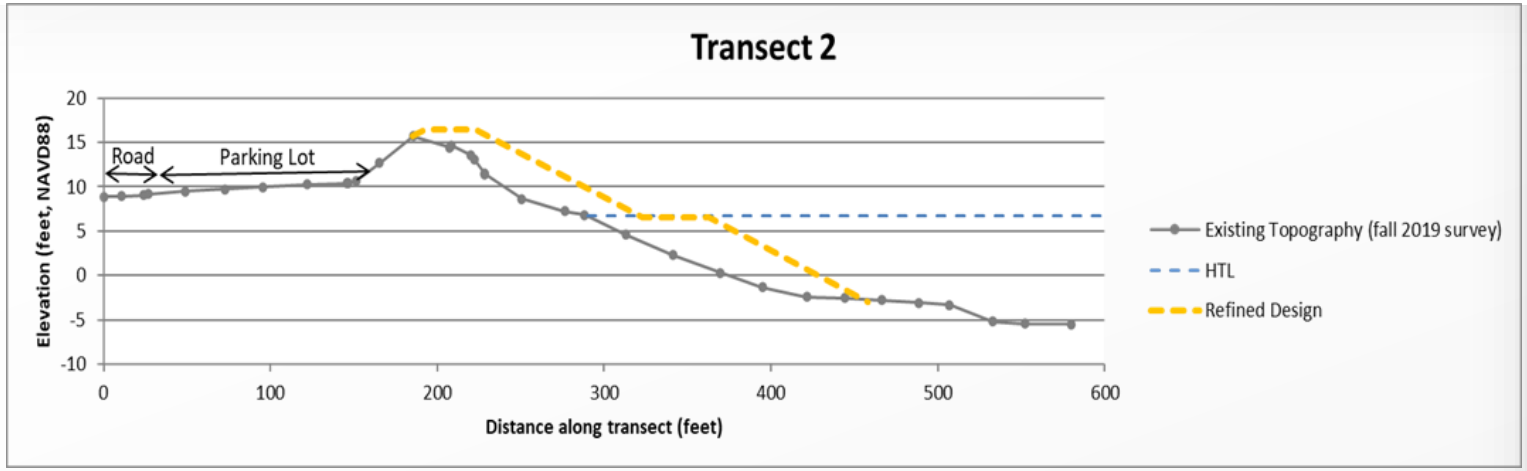
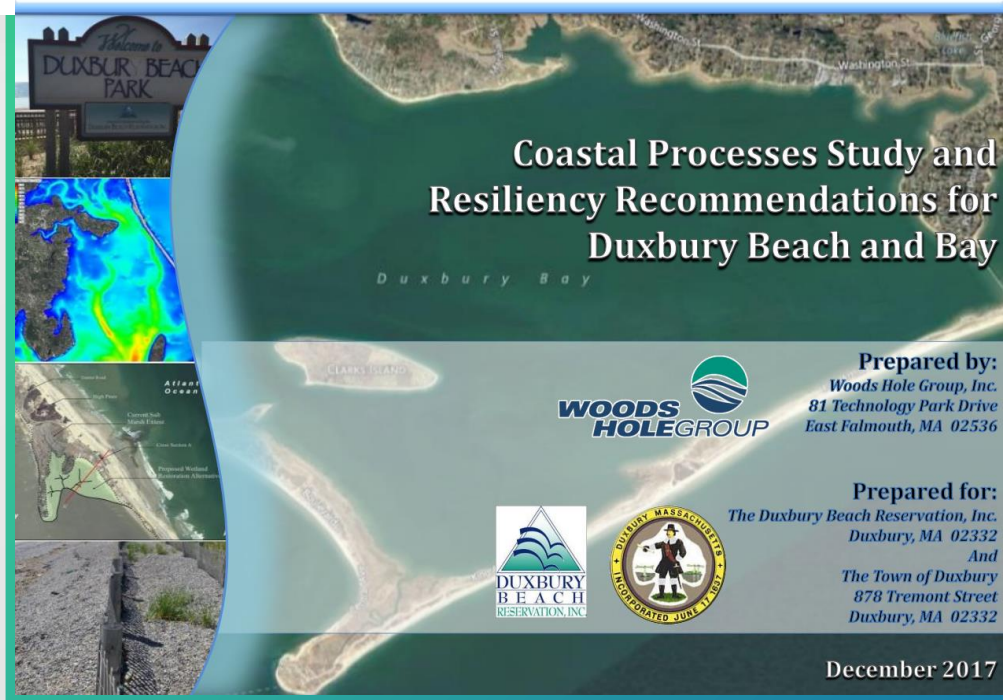
2022 – 2023 Duxbury Beach Park Nourishment Project

A new approach…



- Includes *both* beach and dune nourishment – a first for DBR.
  - 74,475 cubic yards → 104,265 tons → lots of trucks!
- Necessary to compensate for sediment starved conditions.
- Sediment placed below the high tide line will quickly leave the project footprint but will not be lost from the system.
- Re-distributed sediment is working!
  - Builds offshore bars, attenuates wave energy, migrates back to shore and acts as a sediment source for downdrift (southern) sections of the beach.



The current project is an important step in implementing the vision outlined in the 2017 study. The study outlines a comprehensive strategy that can be implemented sequentially to improve the resilitnce of Duxbury Beach.

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So how about that sand?

Sourcing materials

- Where does nourishment material come from?
  - Upland sources (used on current project)
  - Dredged sources (not used on this project)
- Sediment Evaluation
  - Source material analyzed to ensure grain sizes match existing conditions
  - In this case, coarse sand, with some cobble mixed in – representative of the mix of grain sizes found on Duxbury Beach.
- Coarse sand and cobble are more stable and less erosive than fine-grained sand
  - Goal is to maintain the landform!

Samples are available for viewing

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So how about that sand?

Gauging expectations

- Sediment Transport
  - Sand placed below the high tide line will move outside the project area and down the beach.
- Iron Staining
  - **Sand on the beach** has been washed, bleached, and tumbled – producing a white coloration
  - **Sand from upland sources** is coated in fine-grained sediment rich in iron. At first, it has an orange appearance. Over time, it will become washed, bleached, and tumbled.
- Sediment Plumes
  - The fine-grained sediment coating the sand grains gets suspended in the near-shore when the nourishment sand gets wet – it may appear as a cloudy plume until the sediment is washed.

Key Takeaways & Expected Outcomes

Implementing the vision of the 2017 Coastal Processes and Resilience Study:

- *One of the primary causes of coastal erosion is a deficit of sediment within the coastal littoral cell.*
  - *To offset this deficit, nourishing the beach with compatible sediment placement is a logical means for improving the resiliency of a shoreline.*
- *A large-scale beach nourishment project is the recommended regional adaptation.*
- *The Duxbury Beach Reservation ranked this location as the highest priority site to receive nourishment.*

- Beach nourishment doesn't stop erosion, but it does **strengthen and improve the resilience of the system.**
- **Damage to landward areas is reduced** by extending the shoreline seaward.
- Although nourished sand is eventually displaced alongshore or transported offshore, the nourished **sand that is eroded fills areas that would normally have been lost** or eroded during a storm event.

For coastlines with a dwindling sediment supply and faced with rising seas, this is critical for long-term success!

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Questions?

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