

Building Shoreline Resiliency in Marshfield & Duxbury Through Beach & Dune Nourishment

Public Meeting – December 5, 2023

Source: Wicked Local



Source: marinas.com



Source: New England Air Photography

Meeting Agenda

- Project Background & Goals
- Upcoming Nourishment Project
- Construction Schedule
- Frequently Asked Questions
- Public Comment & Questions

Goal : Enhance Resiliency of Critically Eroded Shorelines

- Protect public & private properties from storm damage
- Protect existing seawalls & revetments
- Minimize wave overtopping & flooding
- Restore recreational beach
- Restore coastal ecosystem



Source: Patriot Ledger

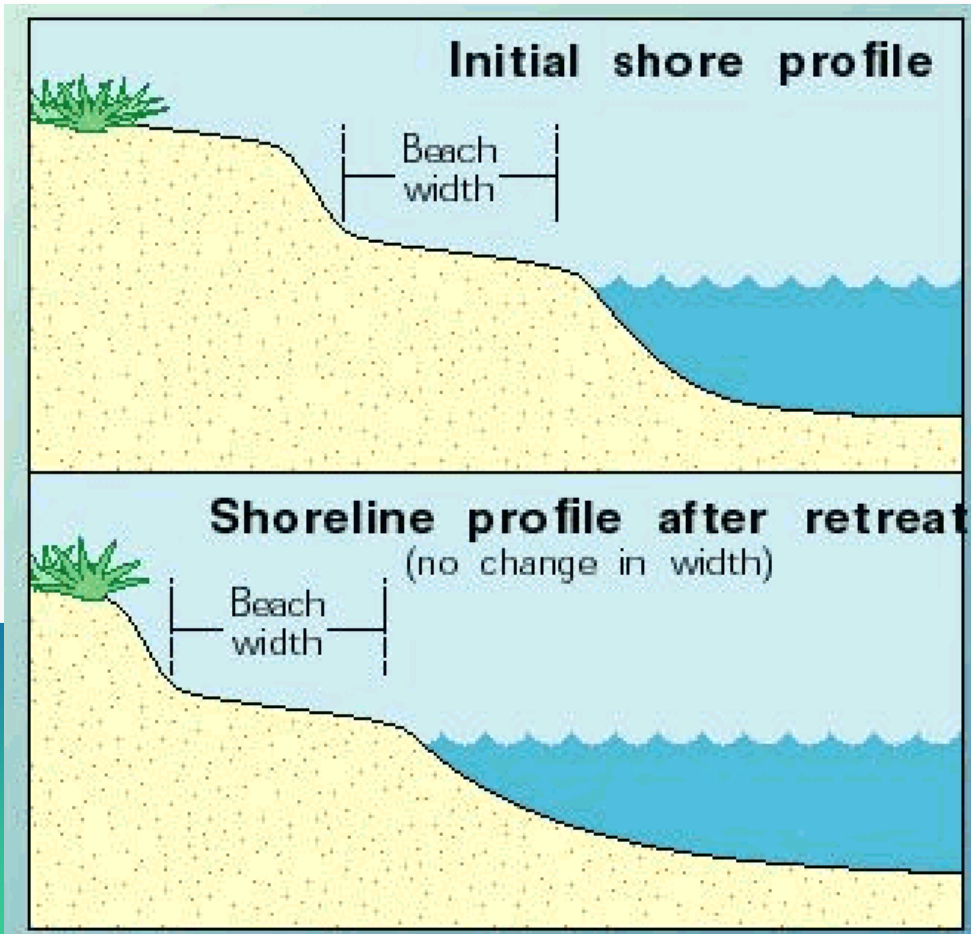


Source: Patriot Ledger

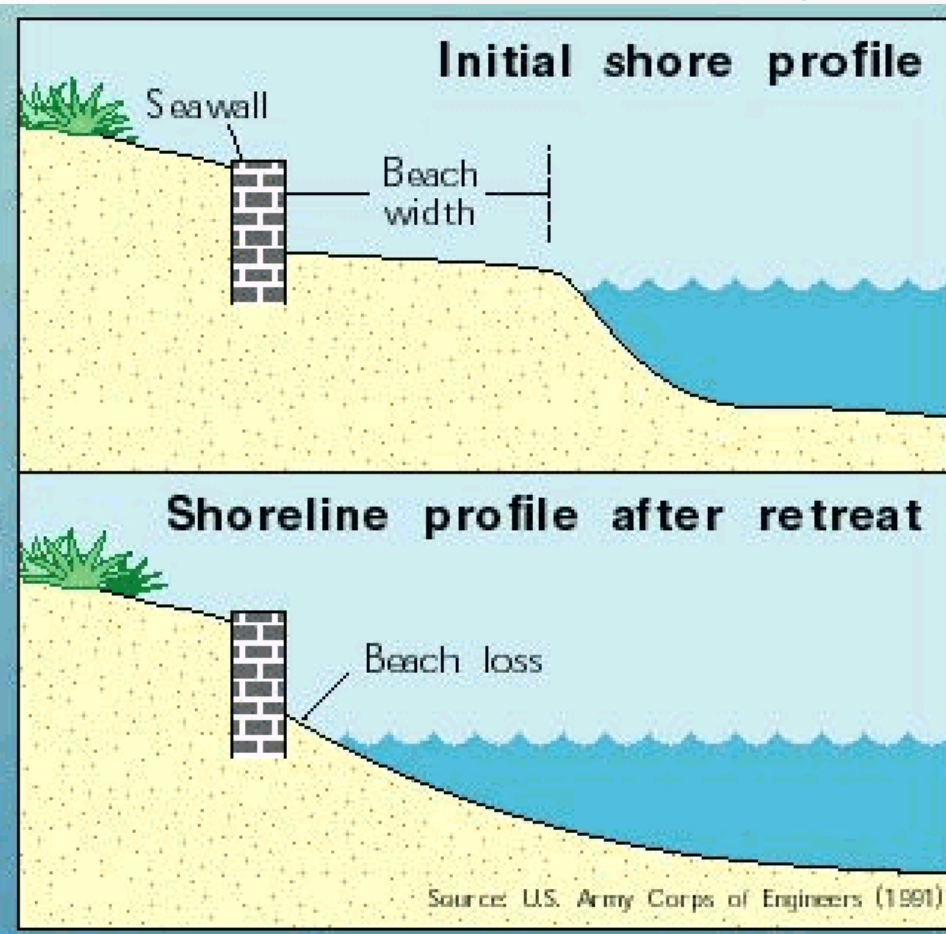
Coastal Armoring Impacts

- Benefits: last line of defense for erosion
- Disadvantage: adversely impacts beaches

*Natural beaches:
maintain beach width & elevation*

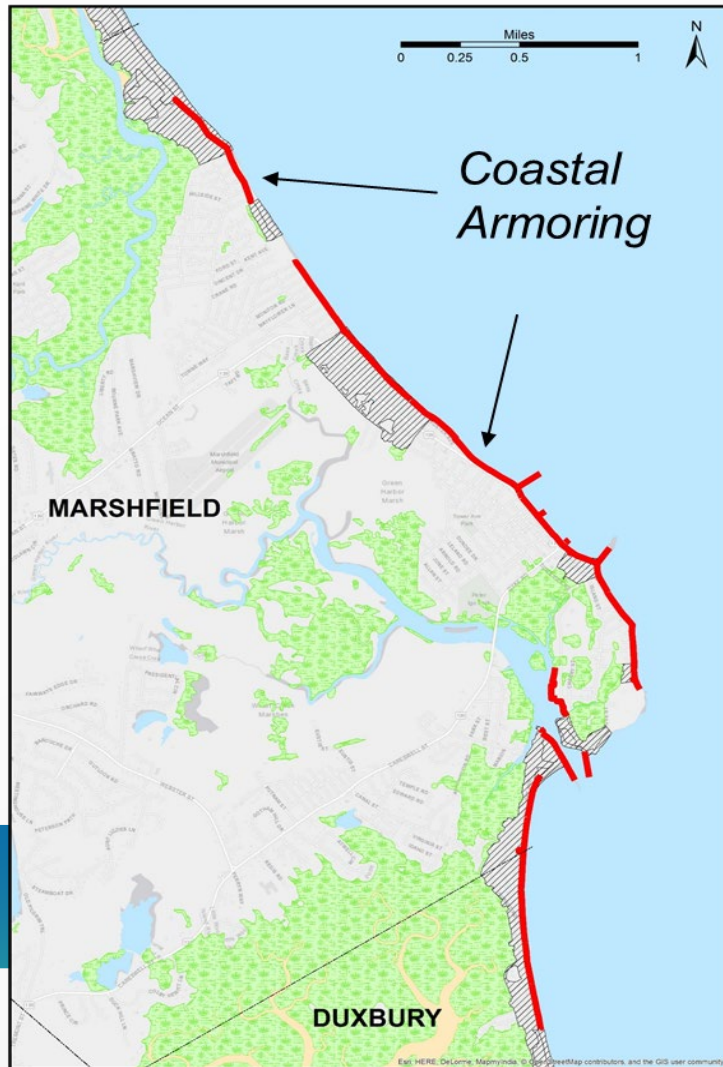


*Armored shorelines:
beach narrows & elevation drops*



Source: U.S. Army Corps of Engineers (1991)

Coastal Armoring Impacts

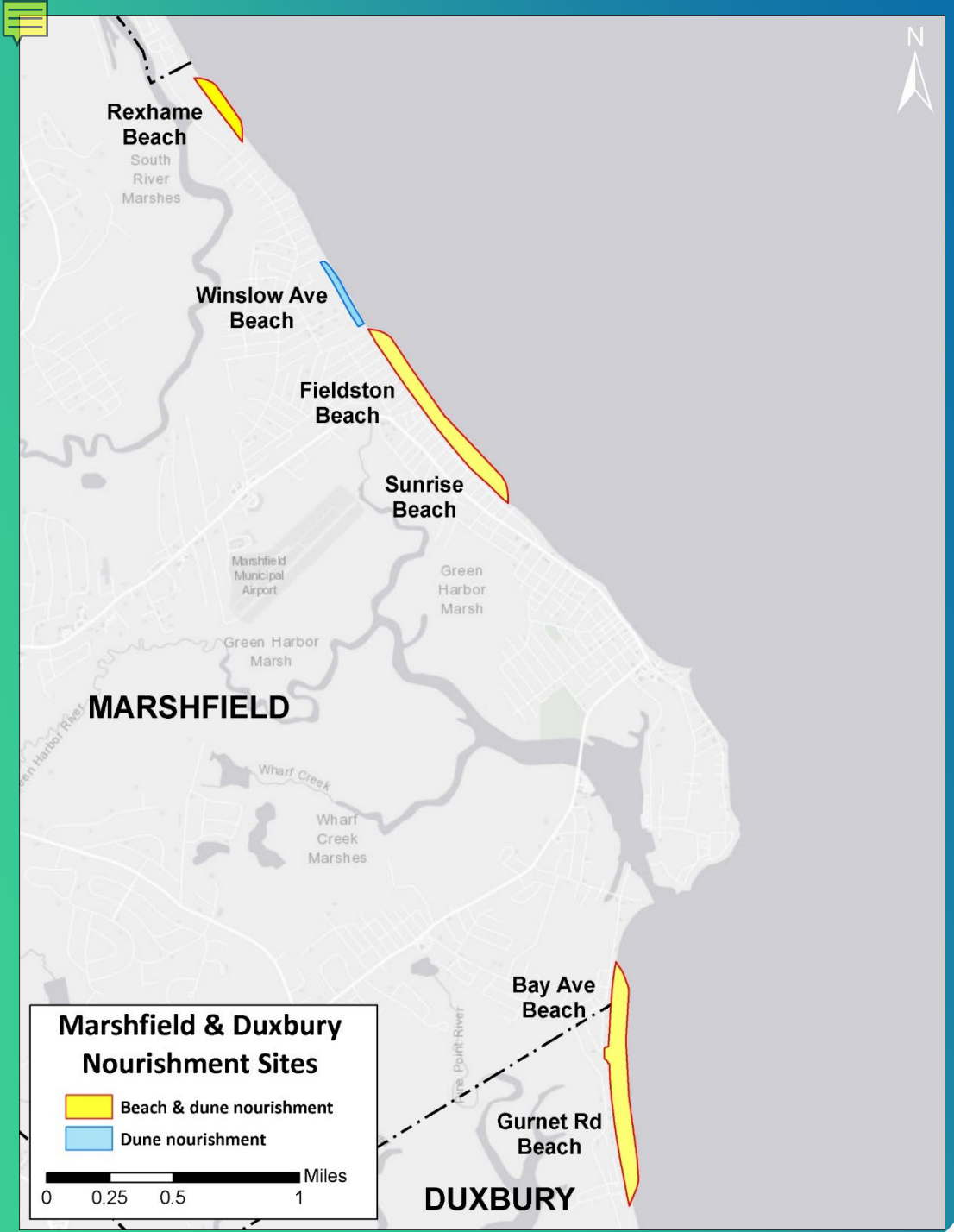


- *Lower beach elevation → deeper water during storms*
- *Deeper water → larger waves impacting the walls*
- *Larger waves → more overtopping*
- *More overtopping → increased damage*



Coastal armoring

- *Marshfield – 83%*
- *Duxbury – 91%*



Accomplishments To Date

Funding via CZM Coastal Resiliency Grants

- FY20: \$234,546
 - ✓ ID beaches suitable for nourishment
 - ✓ Develop engineering designs
- FY21: \$281,318
 - ✓ Filed permit applications
- FY23: \$94,141
 - ✓ Respond to agency questions
 - ✓ Follow-up to ensure permits issued
- FY24: \$4.3 million
 - ✓ Construction of Bay Ave/Gurnet Rd. beaches
- Public outreach included in each year

Bay Ave. & Gurnet Rd. Nourishment Design

- 38.1 acres
- 480,640 cy sand mixed with gravel & cobble (84,977 cy in Marshfield/395,663 cy in Duxbury)
- 5,090 linear ft (900 ft in Marshfield/4,190 ft in Duxbury)
- 16 properties in Marshfield
- 66 properties in Duxbury
- Benefits for:
 - ✓ Storm damage protection
 - ✓ Reduced wave overtopping
 - ✓ Recreation
 - ✓ Shorebird habitat



Bay Ave. & Gurnet Rd.

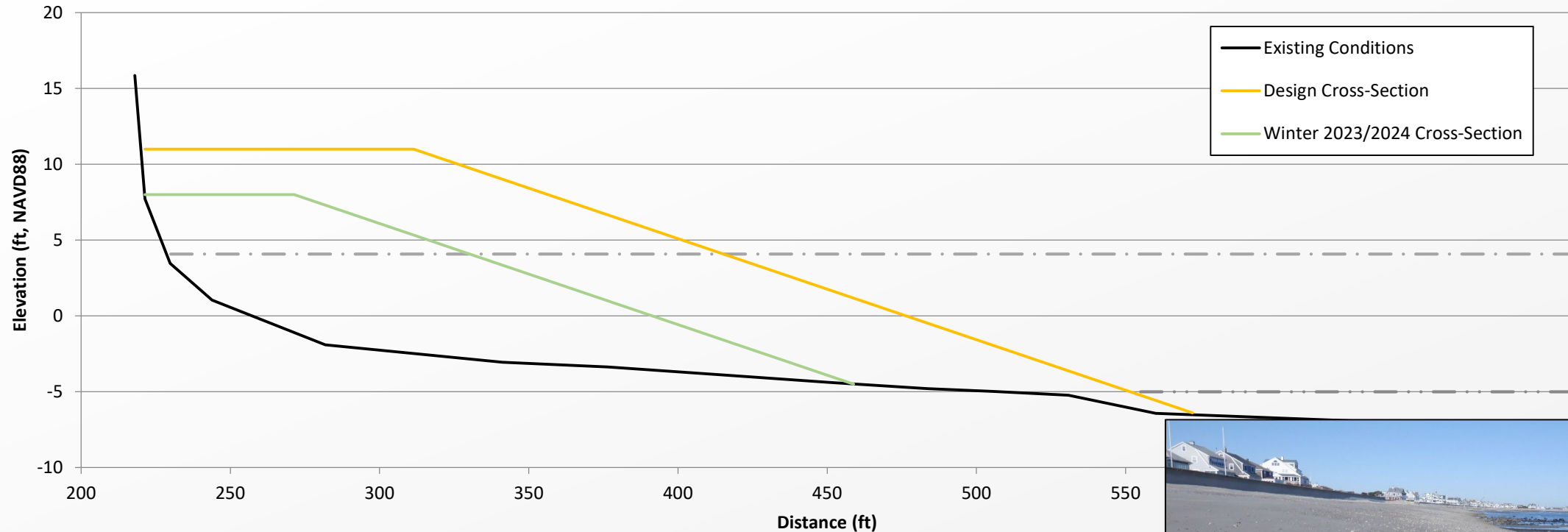
Phase I Construction – Winter 2023-2024

- Funds available for ~ 16 to 20% of designed nourishment volume
- Marshfield ~ 27,000 to 36,000 cy
- Duxbury ~ 48,000 to 64,000 cy
- Nourishment design will be adjusted/optimized once final volumes are known (once bids submitted)
- ~ 16 properties in Marshfield
- ~ 19 to 25 properties in Duxbury



Bay Ave. & Gurnet Rd. Beaches – Design Cross Section

Typical - Bay Ave Beach



- Berm width decreased from 90 to 30 ft wide
- Berm elevation decreased from 11 to 8 ft NAVD
- Gradual 15H:1V seaward slope
- Sand mixed with gravel & cobbles



Trucking Route to Bay Ave. Ramp



- 50 trucks/day
- Mon - Friday
- 7 AM to 5 PM
- Mid Dec. thru Feb. 29

Construction Access at Bay Ave. Ramp

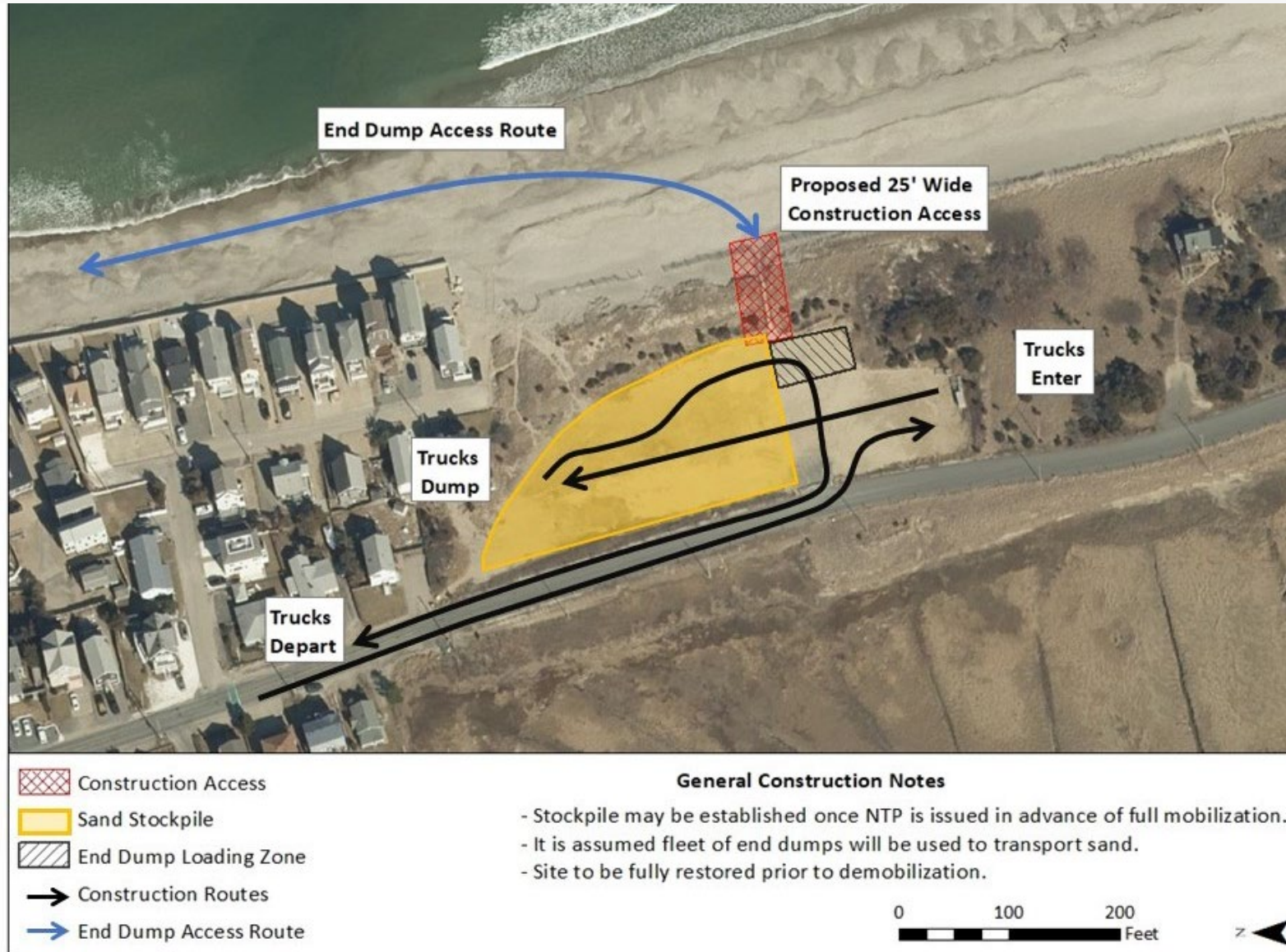


Trucking Route to Duxbury Beach Reservation Northern Lot

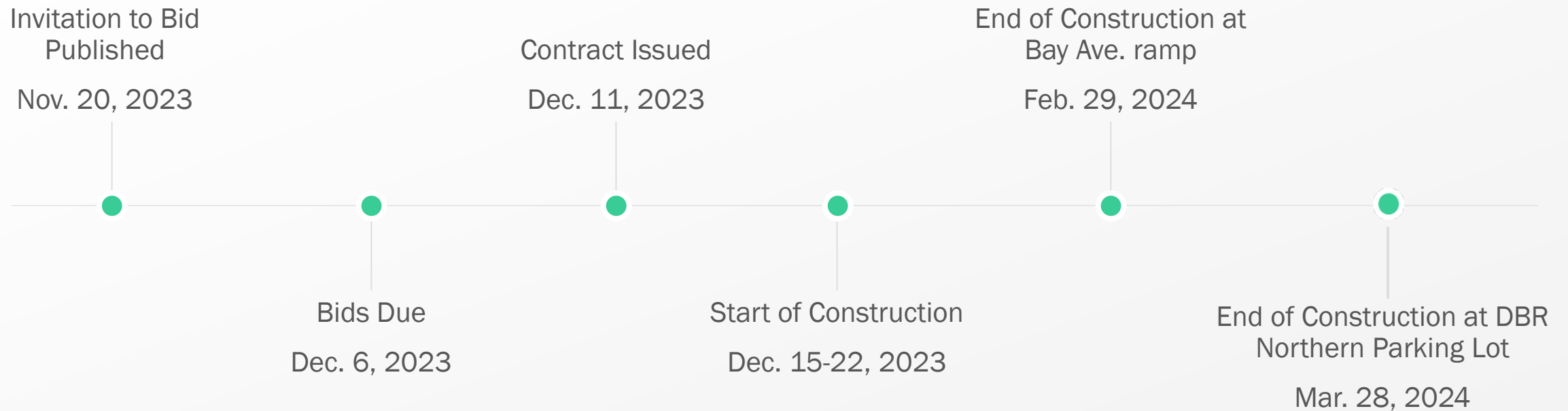


- 50 to 100 trucks/day
- Mon - Friday
- 7 AM to 5 PM
- Mid Dec. thru Mar. 28

Construction Access Southern End – Duxbury Beach Reservation Northern Parking Lot



Anticipated Schedule



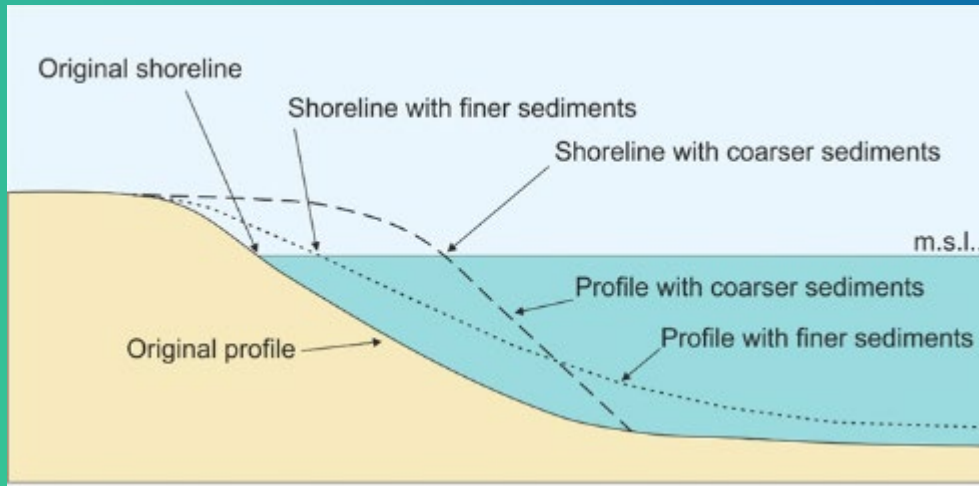
Dec. 5, 2023

Frequently Asked Questions

What type of sediment will be used for the nourishment?

- *The nourishment must match current sediments on the beaches; mixture of sand, gravel, cobble.*
 - 60 to 78% sand
 - 15 to 20% gravel
 - 3 to 10% cobble
- *Sediments will be mixed throughout the project footprint*





Frequently Asked Questions

Why can't the beach be nourished with sand to make a better recreational beach?

- *The permits issued for this project require that the nourishment material match what is currently on the beach.*
- *Maps of sediment texture between 2019 and 2023 show that the beach contains a mixture of:*
 - *Cobble ≥ 2.5 inches*
 - *Gravel ≥ 0.07 inches & < 2.5 inches*
 - *Sand < 0.07 inches*
- *Coarser-grained sediments help to maintain the beach longer, since bigger waves are needed to move the larger particle sizes.*
- *Sandy material is more easily transported offshore, while the coarser-grained sediments are retained on the beach.*
- *Waves will redistribute the coarser-grained sediments much like what is seen on the beach today.*

Frequently Asked Questions

Where will the sediment come from?

- *The nourishment material will be sourced from sand and gravel pits located in neighboring counties.*
- *Upland sediment used for nourishment will initially have a reddish iron staining, but this will bleach out over time as the material is washed, bleached, and tumbled by the water.*





Frequently Asked Questions

How will the sediment get to the beach?

- Sediment will be trucked to the beach in tractor trailers. At the Bay Ave. ramp it will be dumped directly onto the beach and then graded using a front end loader. At the south end of the site, sediment will be stockpiled in the DBR northern parking lot and then reloaded into end dumps for transport up the beach. Front end loaders will then spread the sediment to meet the nourishment design.

How long will it take to construct the project this winter?

- Construction will be ongoing for 3 to 3.5 months between mid December and the end of March.

What volume of truck traffic can be expected?

- Approx. 3,000 cubic yards (or 100 truck loads) of sediment will be delivered to the beach each day.



Frequently Asked Questions

How will trucks access the beach at the two entry points?

- At the northern entry point, trucks will back directly down the Bay Ave. ramp and dump sediment on the beach at the end of the ramp.
- At the southern entry point end dump trucks will travel between the stockpile in the parking lot and the beach via a path over the dune.

Are the requirements of the contractor to restore the beach access routes?

- Yes, the contractor is required to restore the beach access routes to their pre-existing conditions. At the DBR northern lot this will require restoration of the dune with additional sand, beach grass plantings, and regrading of the parking lot.



Frequently Asked Questions

Will the project include additional controls for public safety during construction?

- *Electronic and/or temporary signage will be installed at key locations on Rt. 139, Beach St., Bay Ave., and Gurnet Rd. directing trucks to the approved travel routes.*
- *Signage will also be installed to redirect vehicle traffic away from the trucking routes and beach access points.*
- *If traffic congestion becomes an issue during construction, a police detail will be established to maintain public safety.*
- *Police patrols and/or electronic speed limit signs will be used to ensure that delivery trucks are obeying the posted speed limits.*

Will the public still have access to the beach?

- *Construction access points at the Bay Ave. ramp and DBR northern parking lot will be closed to the public; however, the beach will still be open to the public.*
- *Public asked to exercise caution when on beach.*

Frequently Asked Questions

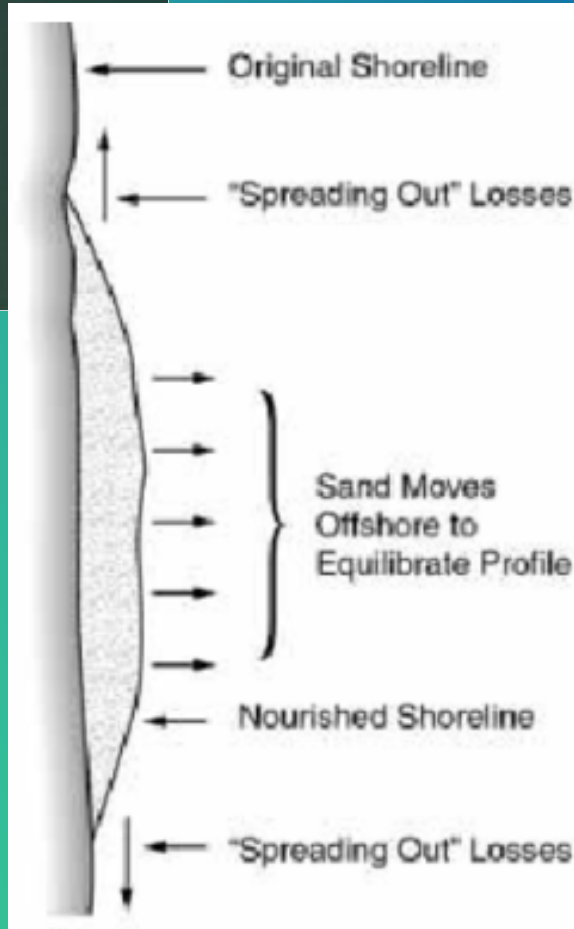
How long will the nourishment last?

- Engineering analyses for the full 480,640 cubic yard design suggest that renourishment will be needed every five years when approximately 80% of the sediment has spread outside the original footprint.
- Since the 2023/2024 project will place 16-20% of the full design, the sediment will spread more quickly as it reaches an equilibrium profile.
- Residents should expect the sediment to be redistributed to the north and south along the beach, as well as into the nearshore zone. In a sediment starved system incremental additions of nourishment can help to build resiliency.

Frequently Asked Questions

How long will the nourishment last?

- Engineering analyses for the full 480,640 cubic yard design suggest that renourishment will be needed every five years when approximately 80% of the sediment has spread outside the original footprint.
- Since the 2023/2024 project will place 16-20% of the full design, the sediment will spread more quickly as it reaches an equilibrium profile.
- Residents should expect the sediment to be redistributed to the north and south along the beach, as well as into the nearshore zone. In a sediment starved system incremental additions of nourishment can help to build resiliency.





Frequently Asked Questions

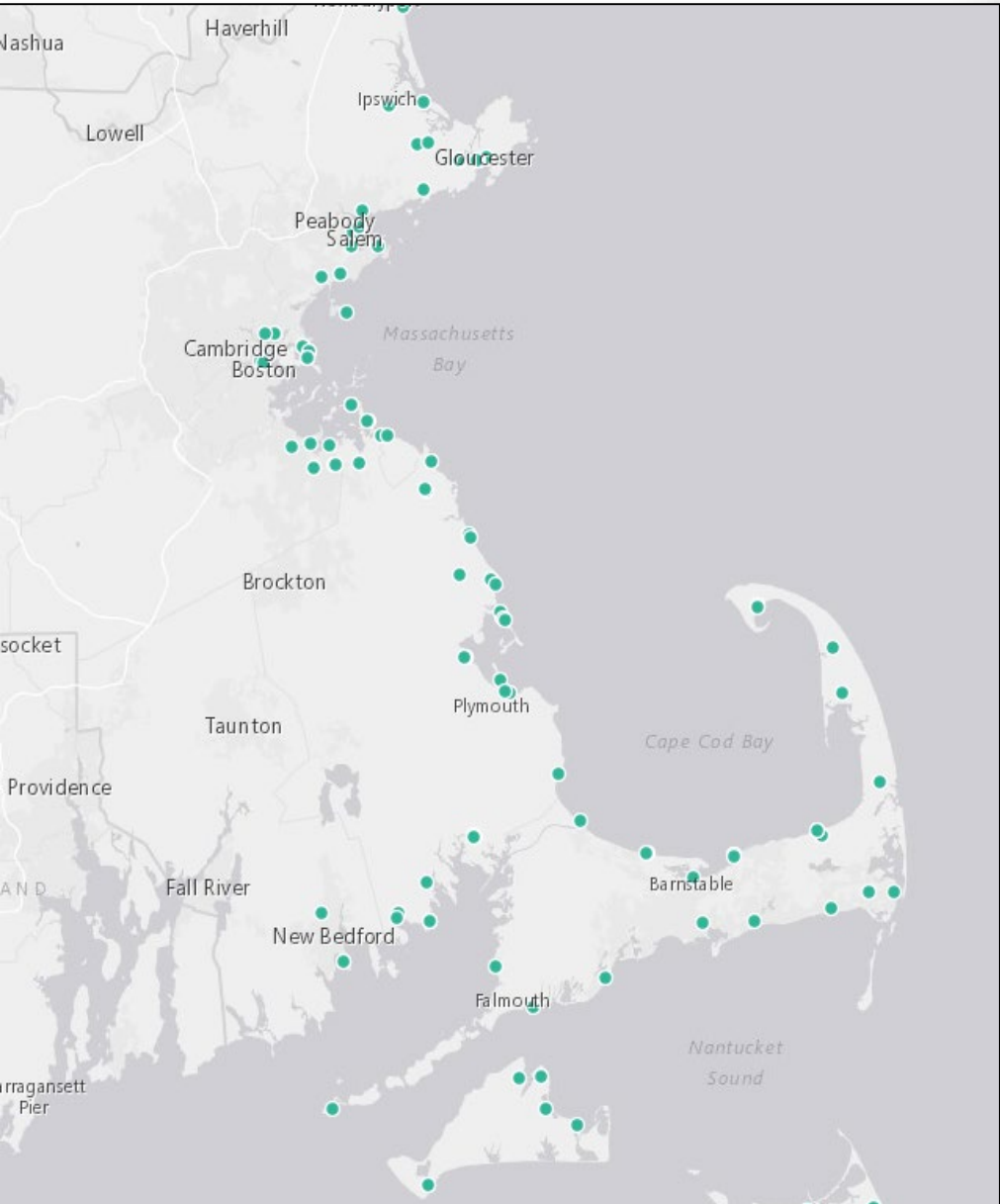
Will there be impacts to water quality during the nourishment?

- *Fine-grained material in the upland sediments will become suspended in the water column when the tide is high. A cloudy plume may appear in the nearshore area until the fines are washed away.*
- *Experience at other similar project nearby project sites indicates increased turbidity for 1-2 days after material is placed on the beach.*
- *Increased turbidity will be minimized by the use of coarser-grained sediments.*

Thank you

Question and Answer Session

Submit Written
Questions/Comments to:
gguimond@townofmarshfield.org
ssgarzi@duxbury-ma.gov



Public Meeting Dec. 5, 2023