FODDERING FARM CAUSEWAY

SCOPING STUDY

Assessing Road Raising Alternatives to Reduce Flood Risk

NARRAGANSETT, RI

OCTOBER 2024

FUSS & O'NEILL

FODDERING FARM CAUSEWAY
Public Workshop

Assessing Road Raising Alternatives
to Reduce Flood Risk

October 29, 2024

FUSS & O'NEILL

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PROJECT TEAM & PARTNERS

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FUSS & O'NEILL

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1. ABOUT THE STUDY

Project Description
Project Background

PROJECT DESCRIPTION

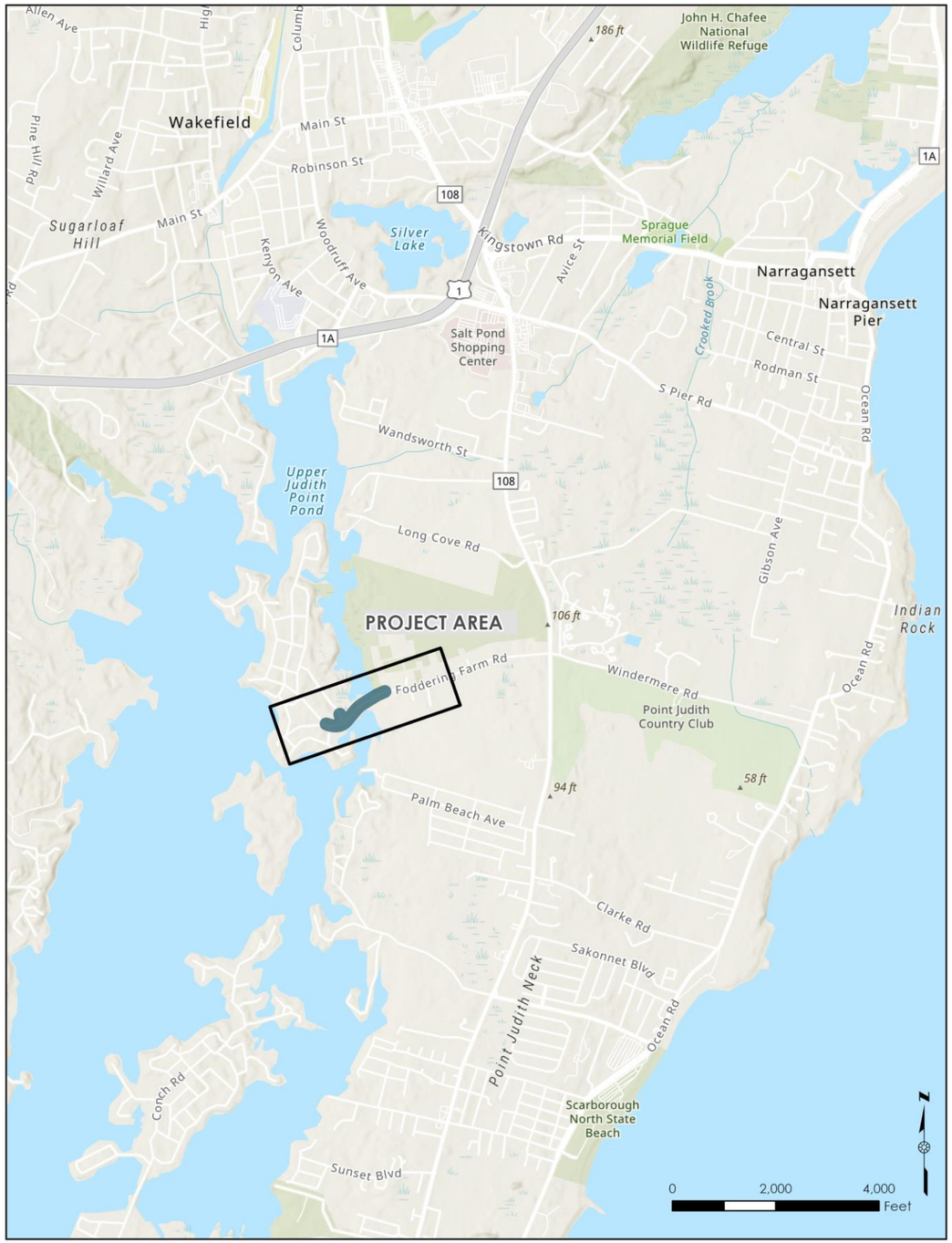
The Foddering Farm Causeway provides the only road connection, evacuation route and emergency access to Harbour Island, which contains approximately 325 to 350 homes.

The roadway currently experiences flooding caused by coastal storms and extreme high tides.

The frequency of high tide flooding is predicted to increase in the coming decades, as is the risk of inundation from increasingly severe coastal storms.

The Town of Narragansett retained Fuss & O'Neill to:

- Develop two previously identified alternative concepts with further detail to facilitate the selection of a preferred alternative;
- Assess how nature-based approaches can be incorporated into the project to improve overall sustainability of the road.



PROJECT BACKGROUND

A vulnerability assessment of Foddering Farm causeway, completed in December 2021, identified future flood risks from sea level rise (SLR) and coastal storms.

The following results were identified from the original vulnerability assessment:

- Tidal flooding would begin to occur daily between 2030 – 2050[1]
- Under present day conditions, nominal flooding may be experienced during the annual coastal flood[1]
- Under present day conditions, up to 1.3 feet of flooding is anticipated during a 5-year storm event, making the road impassible by passenger vehicle[1]

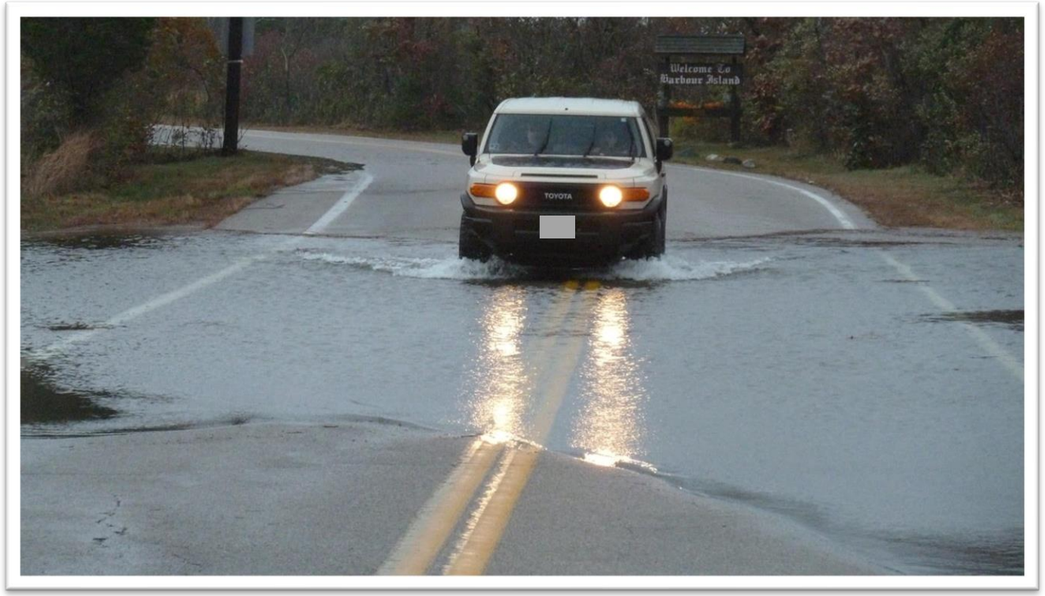


Figure 2 (Top): Water adjacent to Foddering Farm Road under high tide on 10/8/2021 (Credit: Rick Black)
Figure 3 (Bottom): Flooding on Foddering Farm Road in October 2012 (Credit: Jill Sabo)

[1] NOAA 2017 Relative Sea Level Change Scenario curve for Newport, RI, high curve

PROJECT BACKGROUND

The 2021 study offered three road raising alternatives to manage risks and improve the long-term resilience of the causeway:

- Alternative 1 – Raise the Roadway to El. 7.0 ft (+3 feet maximum grade change)
- **Alternative 2 – Raise the Roadway to El. 9.0 ft (+5 feet maximum grade change)**
- **Alternative 3 – Raise the Roadway to El. 11.0 ft (+7 feet maximum grade change)**

Working with stakeholders, it was decided to further develop road raising **Alternatives 2 and 3**, as Alternative 1 would still result in more limited resilience benefits. The development of these two alternatives will allow the selection of a preferred alternative that will best satisfy Benefit-Cost Ratio goals, as well as address the community's overall needs.

PROJECT BACKGROUND

In developing these alternatives, we sought a broad range of possible roadway enhancements that would reduce the probability and depth of inundation through the planning horizon utilizing the then current StormTools data.

These alternatives would improve long-term resilience of the roadway infrastructure, reduce the frequency of roadway closures, and improve access and safety for residents and emergency vehicles.

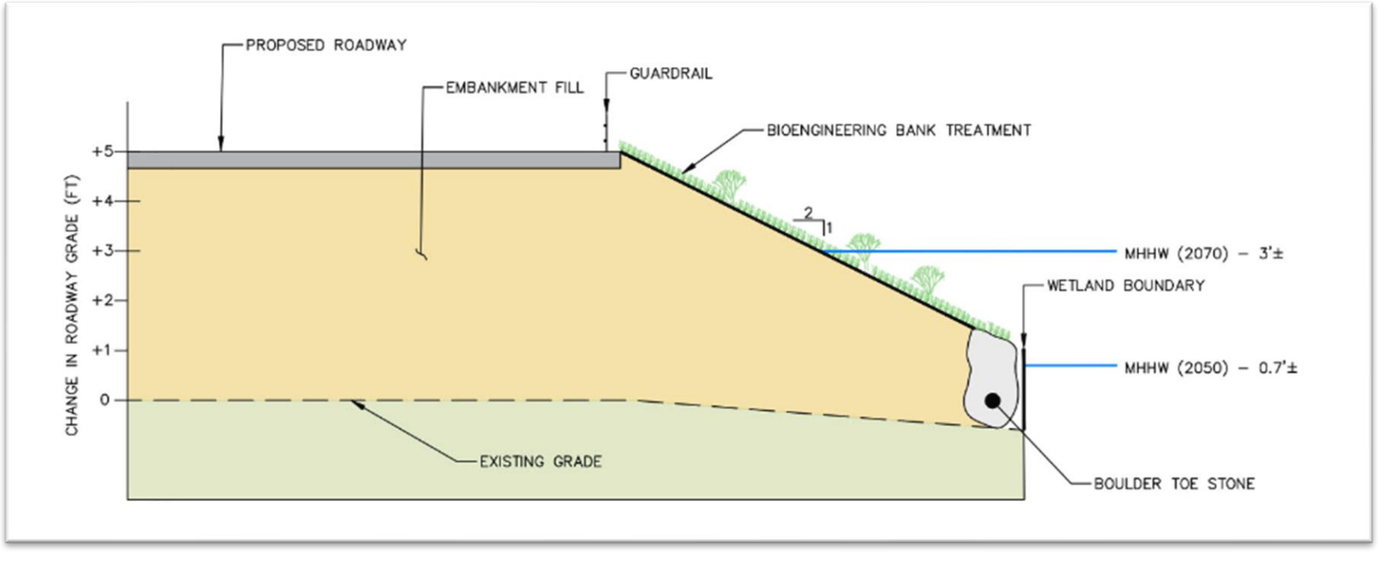


Figure 4: Representative cross section of previously developed Alternative 2: raising the road to elevation 9'

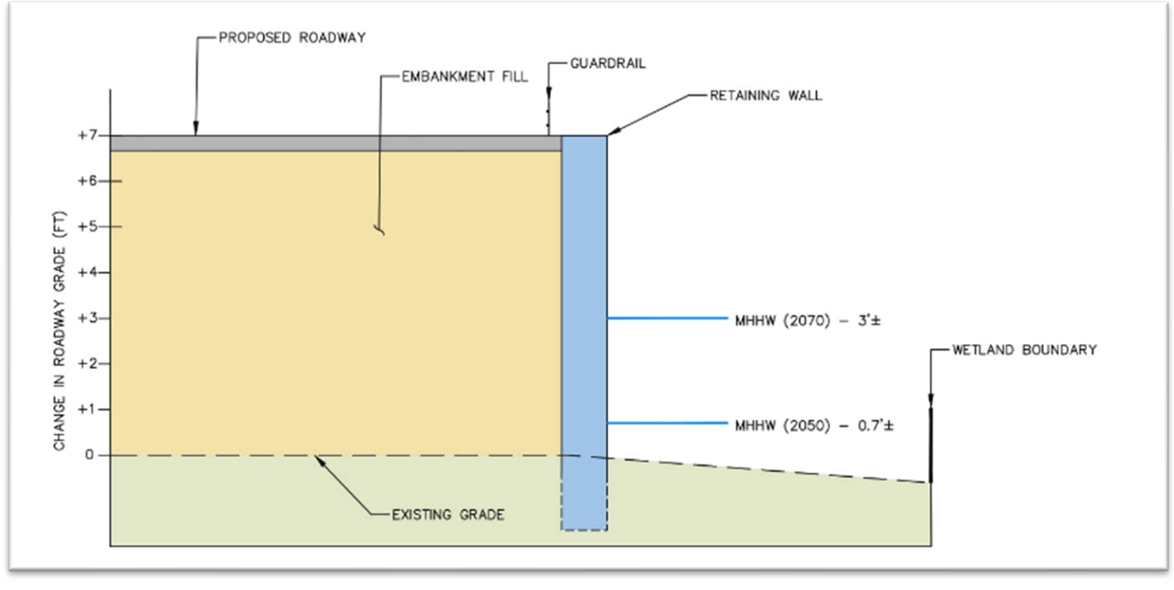


Figure 5: Representative cross section of previously developed Alternative 3: raising the road to elevation 11'

2. VULNERABILITY UPDATES

Updates to Sea Level Rise Predictions
2050 Sunny Day Flooding
2050 Projected Storm Inundation Depths
Estimated Present Day Water Levels
Cumulative Risk

UPDATES TO SEA LEVEL RISE PREDICTIONS

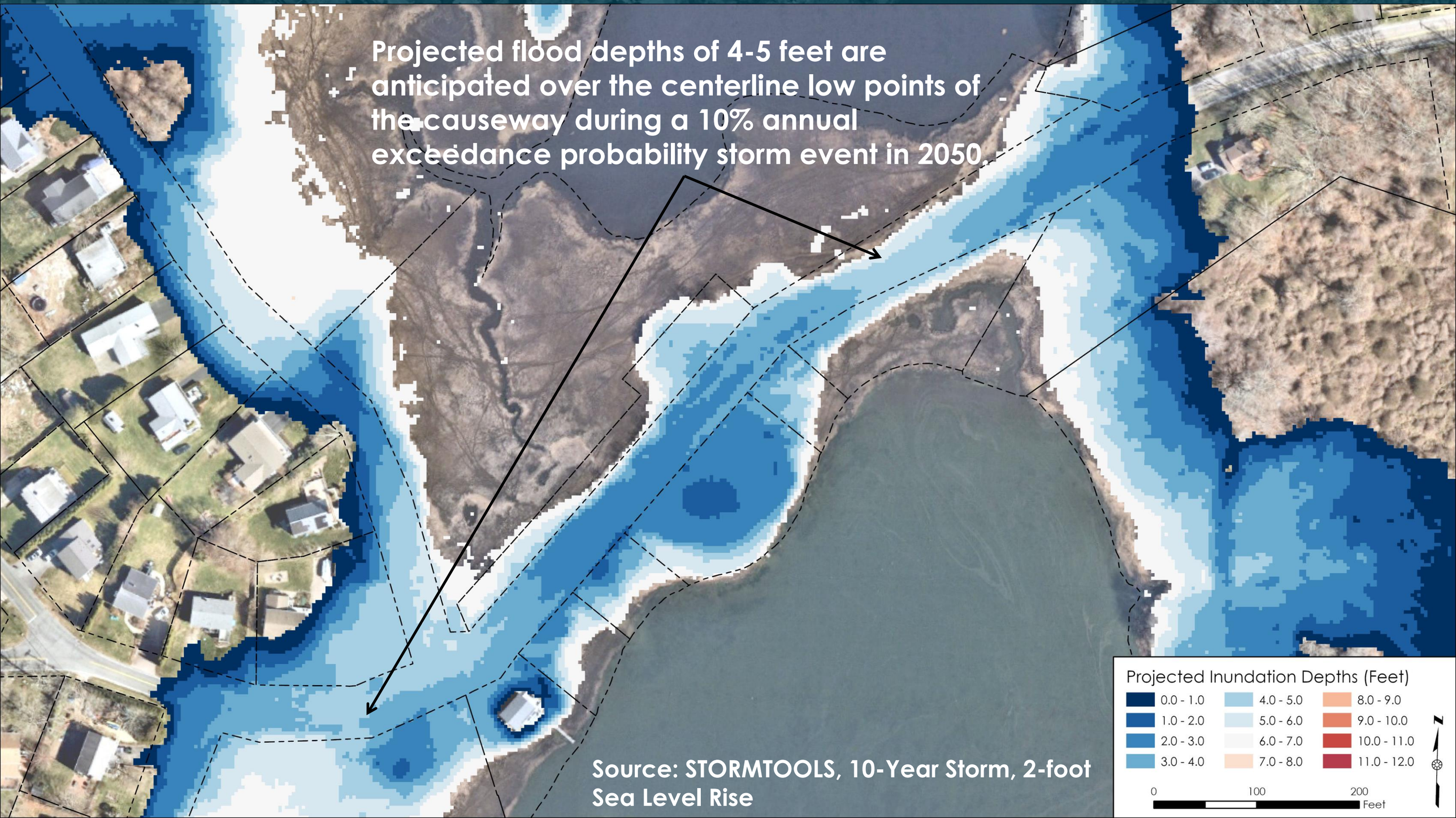
- The previous report, completed in December 2021, utilized NOAA relative sea level rise (SLR) scenario curves, developed in 2017.

- In 2022, NOAA updated the relative sea level change scenario curves (High Scenario) resulting in a 1ft lower projected sea level rise for 2050 and a 2ft lower projected sea level rise for 2070

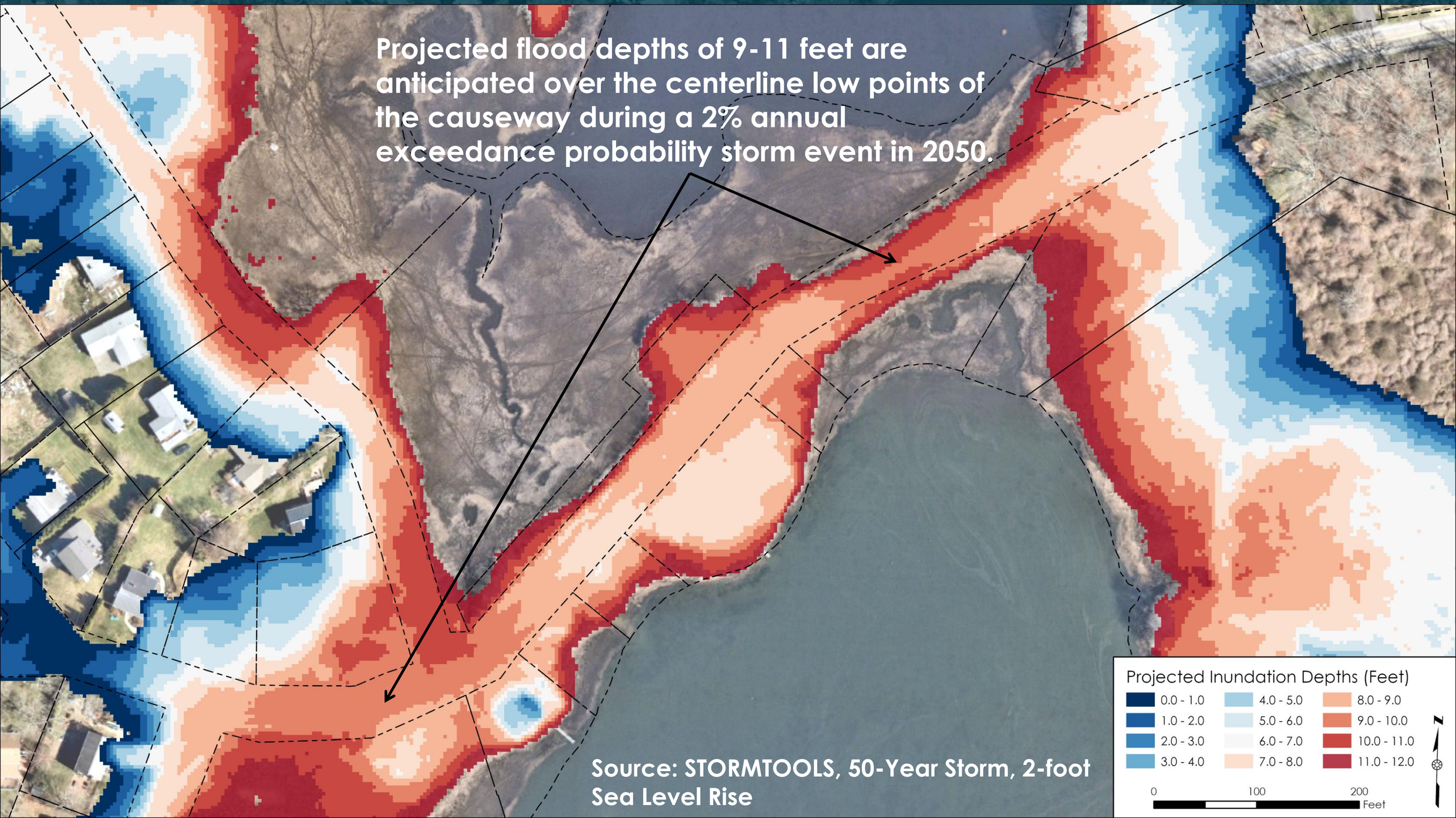
		Present Day	2050	2070
STORMTOOLS map layer to predict flooding due to SLR (ft)	**2021 Report**	+1ft	+3ft	+5ft
	Current Analysis	+1ft	+2ft	+3ft

2050 SUNNY DAY TIDAL - MEAN HIGHER HIGH WATER (MHHW) FLOODING (+2 FEET SLR)

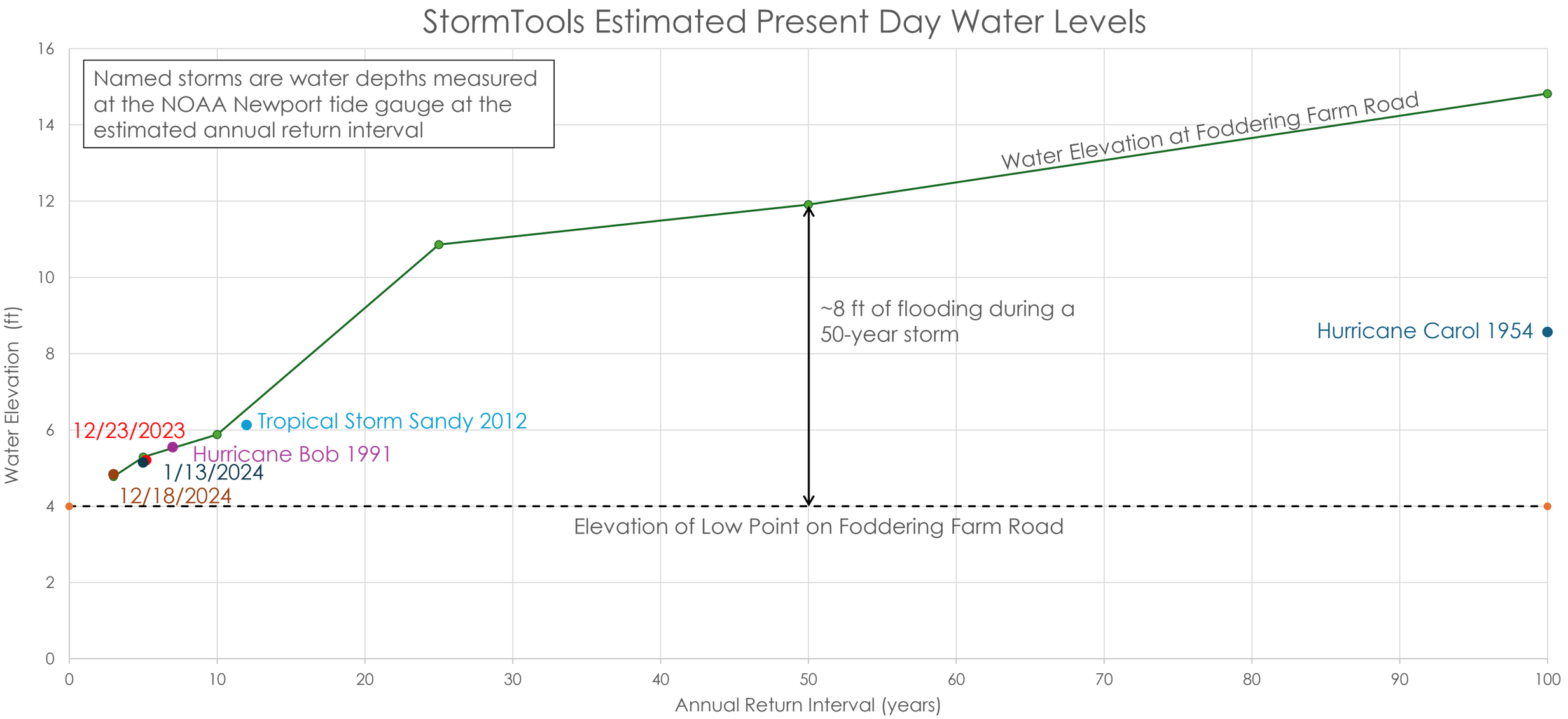
2050 – 10% ANNUAL EXCEEDANCE PROBABILITY STORM SURGE



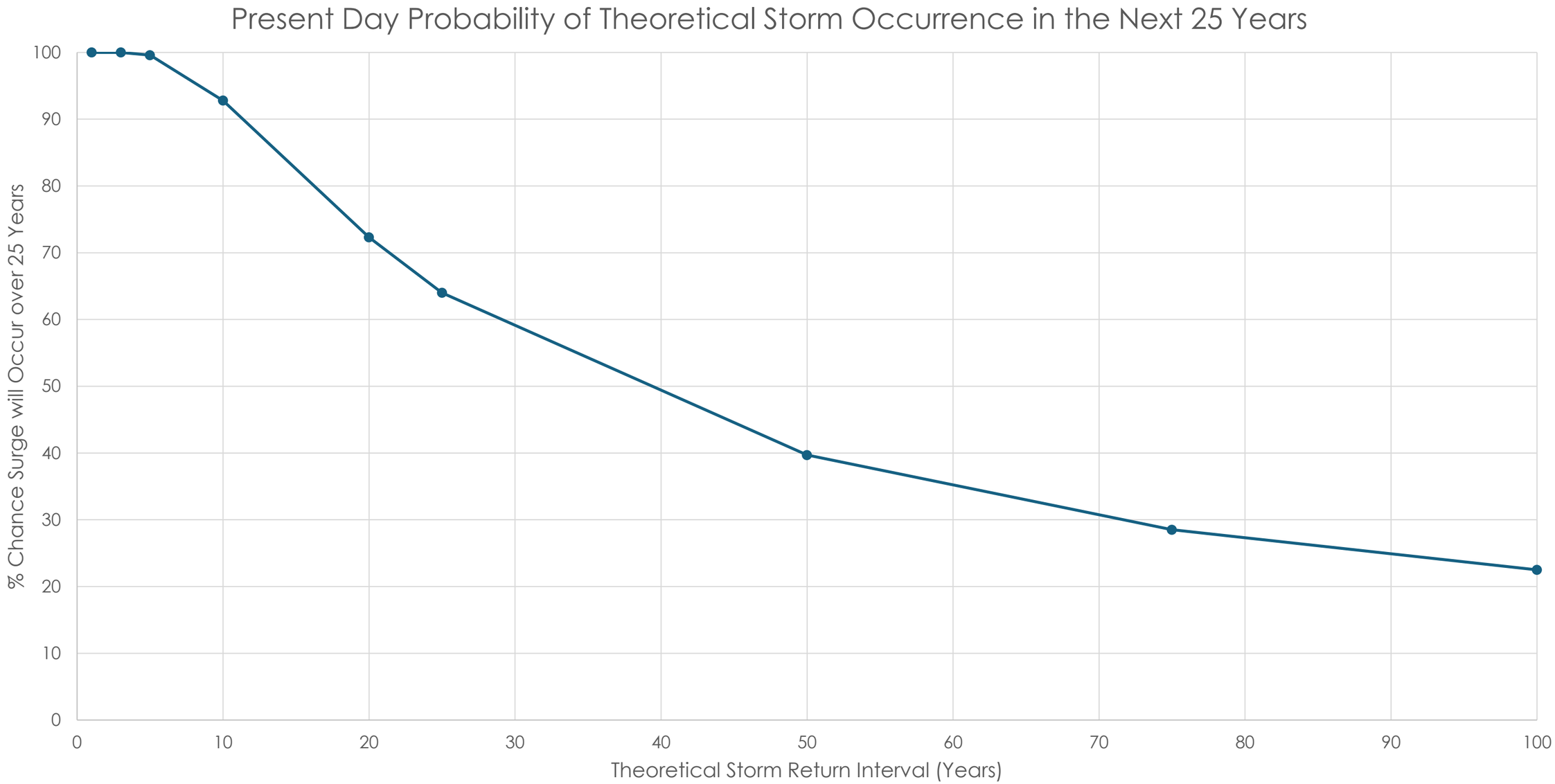
2050 – 2% Annual Exceedance Probability STORM SURGE



ESTIMATED PRESENT DAY WATER LEVELS



CUMULATIVE RISK



For Example:

- The probability of a 10-year storm occurring in the next 25 years is over 90%
- The probability of a 50-year storm occurring in the next 25 years is 40%
- The probability of a 100-year storm occurring in the next 25 years is over 20%

3. PRELIMINARY DESIGN CONSIDERATIONS

Natural Resource Impacts
Drainage and Utility Impacts
Road Raising to 9.0' NAVD88 – Plan and Profile
Representative Cross Section of Road Raising to Elevation 9.0

NATURAL RESOURCE IMPACTS

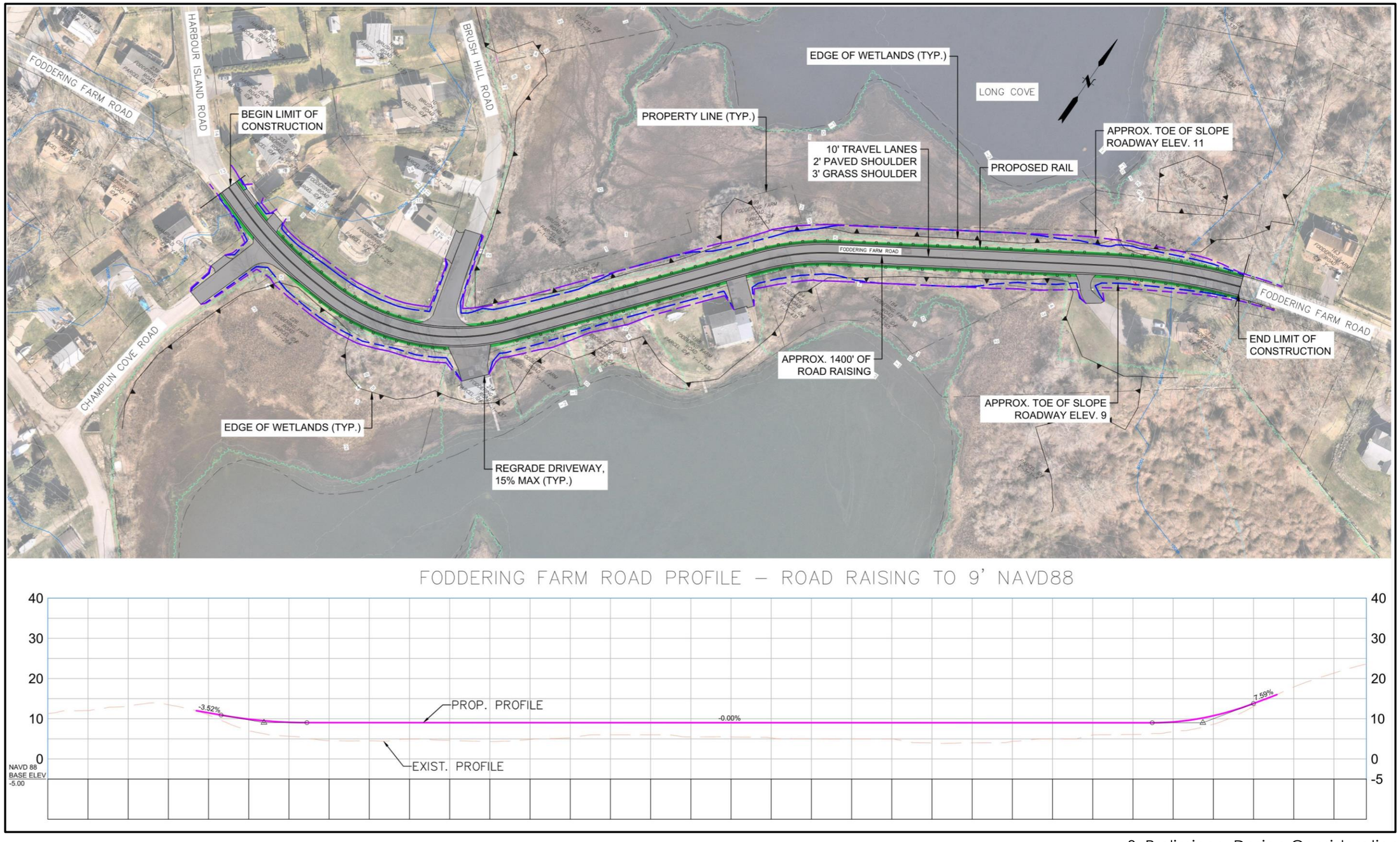
One of the project goals is to minimize impacts to natural resources

DRAINAGE AND UTILITY IMPACTS

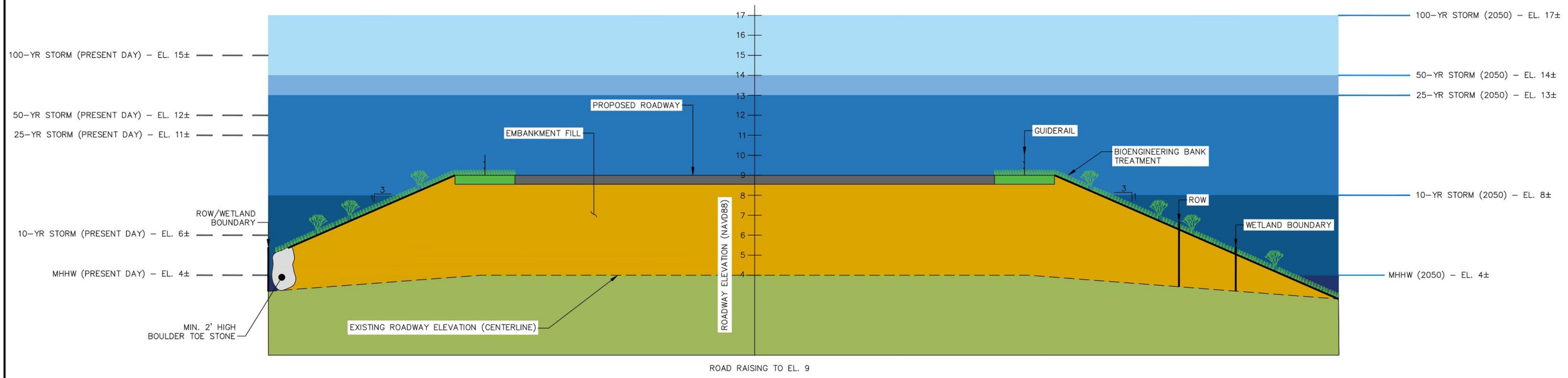
Both road raising alternatives would result in replacing and/or relocating:

- Two utility poles
- Three catch basins

ROAD RAISING TO 9’ NAVD88 – PLAN AND PROFILE

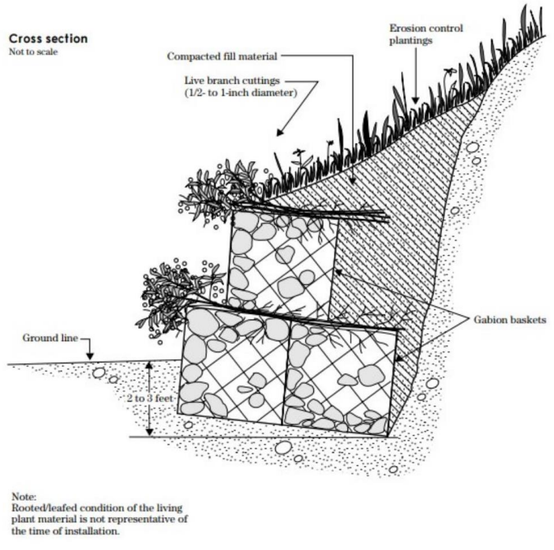


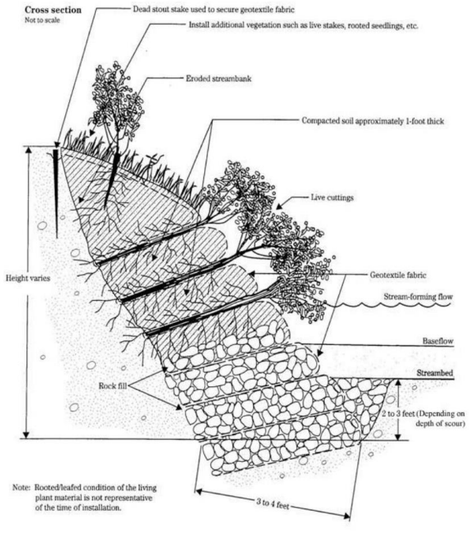
REPRESENTATIVE CROSS SECTION OF ROAD RAISING TO ELEVATION 9.0



Slopes above Mean High Water (MHW)

- Vegetated slope
- Vegetated slope with toe protection
  - Coir logs
  - Rock toe
  - Vegetated rock gabion toe
- Vegetated slope with engineered core
- Vegetated geogrid





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