



Coastal Resilience Advisory Committee (CRAC) recommendation to Select Board

2022 update to supersede the July 28th, 2020 recommendation accepted by Select Board.

Recommendation

Since the Select Board adopted our recommendation on incorporating sea level rise projections in the decision-making process, the Coastal Resilience Advisory Committee has noted the release of updated sea level scenarios from NOAA and a new model of local climate change impact from Massachusetts Department of Transportation, as well as the adoption of the Coastal Resilience Plan. Accordingly, the CRAC has reviewed the recommendation and is providing updated references to support the recommendation. The recommendation itself is unchanged, as follows:

“The CRAC recommends all Town Departments, Boards, Commissions and Committees and any service providers, contracted engineers and consultants need to be aware of and need to use the NOAA “High” scenario to accommodate current storm surge as well as Sea Level Rise in their decisions, deliberations and planning. These data are periodically updated by NOAA and will be posted on the CRAC page on the Town’s website.”

Intent

The purpose of the recommendation is to supplement FEMA flood elevations as FEMA flood elevations does not include sea level rise. The CRAC will continue to evaluate new data as it is released and update the recommendation and supporting information. This recommendation is based on the best currently available data. Projections include some measure of uncertainty, however the trend is for greater confidence in worsening scenarios for sea level rise.

Supporting information

In November 2021 the Coastal Resilience Advisory Committee finalized and approved the Nantucket Coastal Resilience Plan (CRP). The CRP was then endorsed by the Select Board in January 2022.

<https://www.nantucket-ma.gov/DocumentCenter/View/40278/Nantucket-Coastal-Resilience-Plan-PDF>

This is now a guiding document for CRAC and is a reference for all Town staff and vendors to make public infrastructure and private construction & development projects more resilient to Sea Level Rise and coastal flooding. Projects should look at the Sea Level Rise scenarios and risk tolerance that is appropriate for the expected service life of the project.

Nantucket Sea Level Rise Scenarios – MC-FRM & NOAA

The CRP uses the Massachusetts Coastal Flood Risk Model (MC-FRM) as the primary source of sea level rise preparedness projections. In February 2022, after the adoption of the CRP, NOAA released updated sea level rise projections.

MC-FRM

Massachusetts Coastal Flood Risk Model is a probabilistic model that shows mapped areas percentage changes of flooding in three timeframes – Present (2020), 2050 and 2070. This was developed by Massachusetts Department of Transportation through University of Massachusetts Boston and Woods hole Group. This is a more precise model with significantly higher resolution (to 10 foot intervals, where

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most models are 100-1000 foot intervals) and includes wave runoff and wash areas. Overview of MC-FRM in Downtown & surrounding areas is shown in Appendix 1. The Natural Resources Department has added the MC-FRM layers to the Town’s GIS system so that the public may view the overlays at the scale of individual buildings.

<https://www.nantucket-ma.gov/151/GIS-Maps>

After entering the mapping system MC-FRM is available in the Themes tab under the heading Emergency Preparedness.

NOAA

NOAA has developed Sea Level Rise (SLR) scenarios specific to Nantucket. Due to the orientation of the harbor, and the position of the island off the Northeast coast, the island is projected to experience higher levels of Sea Level Rise than the global average.

NOAA (2022) SLR scenarios are presented in **Table 1**. The relative sea level rise (RSL) scenarios shown in this table are derived from the 2022 NOAA SLR maps. The Report “Global and regional sea level rise scenarios for the United States” and uses the same methods as the USACE Sea Level Rise Calculator. 2022 NOAA report available here

<https://aambpublicoceanservice.blob.core.windows.net/oceanserviceprod/hazards/sealevelrise/noaa-nos-techrpt01-global-regional-SLR-scenarios-US.pdf>

[The 2017 NOAA report used 2000 as the base year, as previous NOAA reports also did. The updated 2022 NOAA report still uses 2000 as the base year, and shows that Nantucket has experienced 0.43 feet \(5.16 inches\) of sea level rise to 2020. The is an update to the 2017 report and offers improved SLR scenarios and timelines out to 2150.](#)

The CRAC recommends following the “High” NOAA scenario to accommodate current storm surge as well as Sea Level Rise. (See **Storm frequency and impact on SLR** section on the next page). The upward trend in sea level rise also worsens the impact of storm surge, high tides and wave action. Use the table as a guide for selecting the elevations that are appropriate for the lifespan of the project, project risk tolerance and the project’s adaptive capability.

Table 1. NOAA SLR scenarios. All elevations are in feet local mean sea level (LMSL) and relative to year 2000. Sea level rise of XX” was observed from 1965 to 2000.

	(purple line)	(red line)	(orange line)	(yellow line)	
Year	Inter Low	Intermediate	Inter High	High	High Scenario Decadal SLR Change (feet)
2000					
2010					
2020 (observed sea level change 2000-2020)	0.43	0.43	0.43	0.43	-
Projected 2000-2030	0.69	0.72	0.75	0.75	+.32
Projected 2000-2040	0.95	1.02	1.12	1.15	+.40

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Projected 2000-2050	1.25	1.38	1.54	1.67	+0.52
Projected 2000-2060	1.54	1.74	2.07	2.36	+0.69
Projected 2000-2070	1.77	2.20	2.72	3.28	+0.92
Projected 2000-2080	2.03	2.69	3.48	4.36	+1.08
Projected 2000-2090	2.26	3.35	4.33	5.54	+1.18
Projected 2000-2100	2.49	4.04	5.25	6.66	+1.12

8449130 Nantucket Island

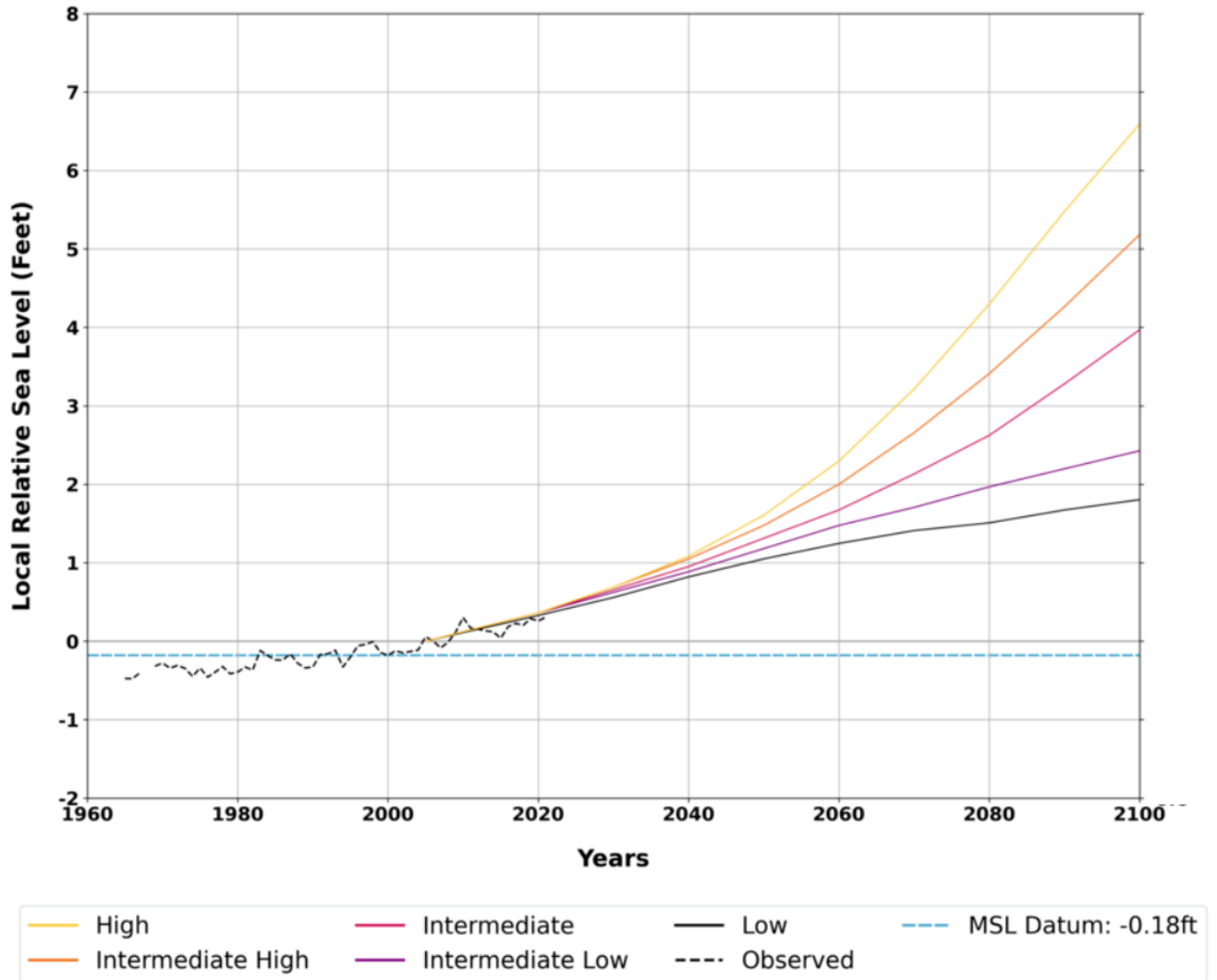


Figure 1. NOAA Sea Level Rise scenarios for Nantucket, based on tide gauge. Also includes observed sea levels from 1965 to 2021.



Storm frequency and impact on SLR

Critical infrastructure, high value infrastructure, infrastructure with long life expectancy, infrastructure that would not tolerate flooding, or other infrastructure that is currently not in a flood zone but is near a flood zone may need to be designed to resist the combination of SLR and storm impacts.

The U.S. Army Corp of Engineers (USACE) commissioned a report published in 2014 called “North Atlantic Coast Comprehensive Study”. Phase 1 of the report, “Statistical Analysis of Historical Extreme Water levels with Sea Level Change”, looks at historical water levels and combines that data with storm surge modeling. This differs from many other SLR projections that are limited to increases in mean sea level and do not estimate high water elevations during future storms. The report projects to the year 2114, looking out 100 years from the report’s baseline year. This data is for the North Atlantic area, and not Nantucket specific.

The USACE report is available on the Town website <https://nantucket-ma.gov/DocumentCenter/View/36719/North-Atlantic-Coast-Comprehensive-Study-Phase-1-Report-Statistical-Analysis-of-Historical-Extreme-Water-levels-with-Sea-Level-Change-PDF>

Storm Surge

Storm events, particularly from the Northeast, have the potential to temporarily increase the water level in Nantucket Harbor and cause flooding. Stormtide stacking may also occur when the wind does not allow the low tide to release high tide waters from the harbor. Subsequent high tides can “stack” more water in the harbor and compound flooding. Stormtide pathways were studied and added to the Town of Nantucket GIS online mapping system, which can be accessed here to evaluate potential risk to developments and projects: <https://www.nantucket-ma.gov/151/GIS-Maps>