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CIRCA
Connecticut Institute for Resilience and Climate Adaptation

MUNICIPAL STORM SURGE AND SIGNIFICANT WAVE HEIGHT LEVEL WORKSHEET

Municipality Name ____

This worksheet is a guide to navigate using CIRCA Connecticut Coastal Towns Storm Surge Return Interval Viewer to decide the minimum design levels to resist flood-related damages. Annual exceedance probability refers to the likelihood of a flood event occurring in any given year. A return period, also known as recurrence interval, is based on the probability that a given water level will be equaled or exceeded in any given year.

1. Decide the annual exceedance probability of the storm event that the design to withstand. ___% or ___ years

For example, a storm surge event that has a 1% chance of occurring in any given year, is described as the 1% annual exceedance probability of occurrence or flood with a 100-year return period or "100-year storm."

2. Fill out the storm surge level and significant wave height level that the town has for the chosen annual exceedance probability or return period in question 1. To fill out the values, go to https://resilientconnecticut.uconn.edu/resources/data-viewers/returnintervalviewer, select the town from the dropdown menu. The values given in the website measures the height from NAVD88 vertical datum.

Return period (years)	Annual exceedance probability, (%)	Storm surge level (ft)	Significant wave height level (ft)
2	50		
5	20		
10	10		
30	3.3		
50	2		
100	1		
500	0.2		

3. What is the expected lifespan for the project? ____years.

The expected lifespan of the project depends on the project design.

4. Assess the sea-level rise scenario that your project should consider
   a. Adding the number of years that you identified in question 3 to the current year. Year_____

For example, if you are completing this form in the year 2020, and the lifespan of your project is 30 years, your design life year will be 2050.

   b. Chose the sea-level rise scenario based on the likely range recommended for Connecticut, given in the figure below. _____ ft

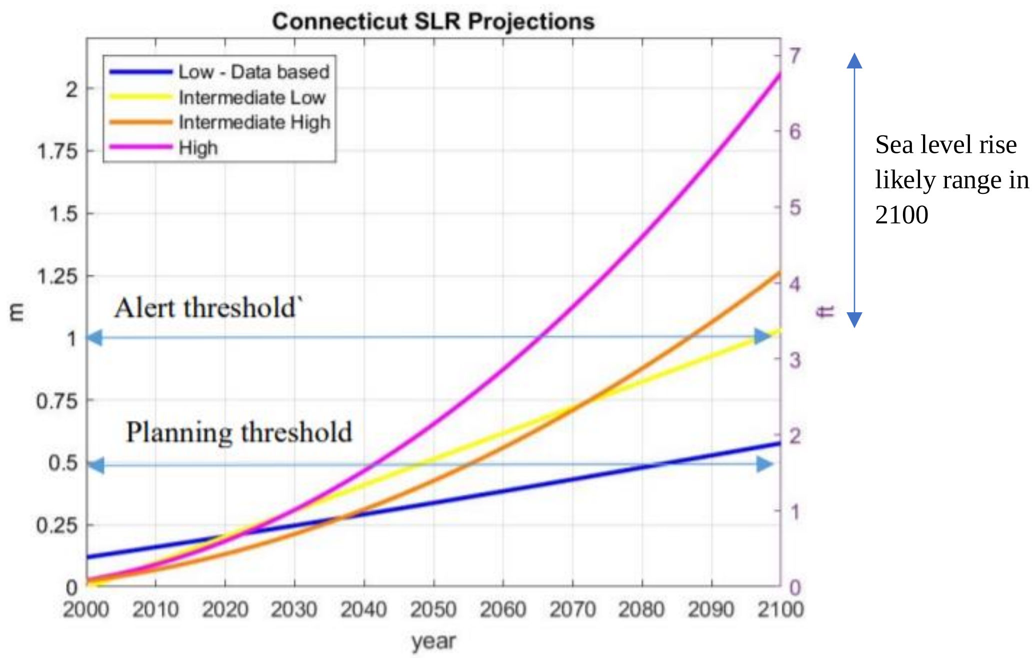

Figure 1: Sea level rise projections for Connecticut based on local tide gauge observations (blue), the IPCC (2013) RPC 4.5 model simulations near Long Island Sound (yellow line), the semi-empirical models (orange line) and ice budgets (magenta line) as in CPO-1. [1]

Sea-level is rising in Connecticut and will continue to rise to 20 inches by 2050.[1] Looking beyond 2050 has higher uncertainty depending on how much the greenhouse gas emissions continue to grow, as well as our understanding of feedback loops in the earth's climate system. Long term planning for communities, infrastructure, and human health, should consider the time horizon, acceptable levels of risk, and no regrets strategies that reduce the exposure of community infrastructure and investment to flooding.

5. Decide on the project design level.

The design level given below is based on the NAVD88 vertical datum. To decide on the design elevation of the project, please consider the elevation of the land, first flood elevation (FFE), and freeboard regulation recommended for the project site.

- CIRCA suggests 2016 LIDAR topographic data decide on the elevation of the project site according to NAVD88.[2]
- First-floor elevation (FFE) is the bottom of the lowest horizontal structural member of the building that includes the base flood elevation (BFE) and freeboard.[3]
- Base flood elevation refers to the elevation associated with 100-year flood.[4]
- Freeboard suggested from Public Act No 18-82 is not less than an additional two feet of freeboard above base flood and any additional freeboard necessary to account for the most recent sea-level change scenario updated.[5]
    a. Storm surge water level marked in question 2 + sea level rise scenario planning estimate in question 4b = Project level for storm surge based on NAVD88

    ___________ft + ___________ft = _______________ft

[1] http://www.cteco.uconn.edu/data/lidar/index.htm
[2] https://circa.uconn.edu/wp-content/uploads/sites/1618/2019/10/Sea-Level-Rise-Connecticut-Final-Report-Feb-2019.pdf
[3] https://www.fema.gov/media-library-data/20130726-1537-20490-8154/fema499_1_4.pdf
[4] https://www.fema.gov/media-library-data/20130726-1535-20490-5549/unit4.pdf
[5] https://www.cga.ct.gov/2018/act/pa/pdf/2018PA-00082-R00SB-00007-PA.pdf

For example: You would like to design a project for Branford and decide your project to withstand 100-year flood (question 2) and in 30 years (question 3), your design life year is 2050 (question 4a). The minimum sea level rise scenario by 2050 is 20 inches.

8.32 ft + 1.67ft (20 inc) = 10 ft Storm surge level with respect to NAVD88

b. Significant wave height marked in question 2 + sea level rise scenario planned in 4b = project significant wave height level based on NAVD88.

____________ft + ____________ft = __________________ft

Similarly in Branford example, 100-year flood wave height is 14.5 ft (question 2) and in 30 years (question 3), your design life year is 2050 (question 4a). The minimum sea level rise scenario by 2050 is 20 inches.

14.5ft + 1.67ft (20 inch) = ~16 ft wave height above NAVD88.