The Stonington Lighthouse Museum

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Scope of Work

- Evaluate impacts of climate change in the area of the Stonington Lighthouse Museum
- Determine if this area is at risk for future effects of climate change
- Project future impacts on accessibility of the museum
- Determine if the nearby roads/parking lots are at risk

History

- Built in 1840
- Actively in use 1840-1889
- Acquired by Stonington Historical Society in 1927
- Height 62 feet
- Constructed mostly of granite

Location

- Part of the Stonington Borough
- Stonington Point
- View from the top overlooks three states
- Located on this thin piece of land
- Was built here to intercept incoming ships

Significance to the Community Why save it

- Original use- general lighthouse, it served as a safety for incoming and passing ships
- When the lighthouse was acquired by the historical society in 1927 it was officially preserved as a museum
- Over the years it has been used for community celebration and events
- The museum offers a unique look at one of Connecticut's original lighthouses
- Listed on the National Register for Historic Places
- First lighthouse in the US to become a maritime museum
- Mentioned in various historic events for Stonington community
- Unique and irreplaceable
- Used in educational programs for students, community, and historians

Lighthouse Museum Campaign

- Mission: preservation, restoration, awareness, and community involvement with historic lighthouses
- Started to bring awareness to the importance of saving historic lighthouses for various reasons (financial reasons, preservation, climate change)
- This organization has a large influence at the Stonington Lighthouse museum and has helped them to carry out restoration projects as well as bring awareness and accessibility to the museum for the public

Research Findings

- Stonington has been concerned about this matter for some time now
- Research and various studies have been conducted in order to asses sea level rise, climate change, damages of storms, as well as potential mitigation/adaptation techniques
- There is media attention and public attention about the climate change impacts in this region. Public awareness is important.
- Stonington has begun to utilize some methods of adaptation and mitigation in order to protect the museum.

Historic Flooding

- Stonington has experienced flooding often in the past due to its location on the coast.
- Although, flooding has become more frequent and more severe in recent events. The flooding patterns, intensity, and damages are unlike historic records for the area.
- It is projected that future flooding will surpass the estimated and recorded flooding of the past.

Historic Flooding Continued

- One of the most recent examples of severe weather impacts: Hurricane Sandy in October 2012
- 48 properties were impacted by storm surge
- Repairs for this event were very expensive
- Government attention was brought to the issues property owners in Stonington were experiencing.

Hurricane Sandy Program

https://portal.ct.gov/DECD/Content/Historic-Preservation/01_Programs_Services/Hurricane-Sandy-Program/Resiliency-Planning

Government funds were allocated after Hurricane Sandy (2012). Some of these funds were used to compile records and information about shoreline communities. A resiliency plan was also introduced by this program.

Sea Level Rise and Flooding

- Due to its location the museum is greatly at risk of damages from storm surges, flooding, and sea level rise
- The museum has already experienced previous accounts of flooding and storm surges.
- As sea level rise continues and the intensity/frequency of storms increases, more damages are anticipated. This threatens the existence of the Lighthouse Museum.

Restoration done so far

- Some renovations have been done for basic maintenance and safety for the public/visitors, but more restoration has been done to repair damages from storm surges, weather events, and flooding.
- Environmental hazards have been monitored
- Protection of historical artifacts and structure
- New electrical system
- Structural support/fortification
- Barriers for moisture and harmful elements
- A climate controlled environment will be created (HVAC system)

Restoration

Proper gutters for roof drainage

Weatherized windows to protect from the elements

Instillation of new electrical systems

Projected Restoration

- With a projected increase in storm surges, flooding, and rising sea level more frequent restorations may need to occur in order to maintain and protect the historic lighthouse and its artifacts.
- Damages could come from flooding of the building, debris, and damage to the structure
- The museum is preserved as a historic site, this means that there are restrictions about what changes can be made to the building itself, so that they historical significance is not altered. Although it seems these restrictions may have to be eased in order to accommodate for an increase in global climate change if the museum is to be preserved at all.

Funding

- The museum receives funds through museum entry fees, donations, and other contributions of resources and money
- The Stonington Historical Society raises money for the museum (they raised $1.45 million in 2020 to build an addition the the museum for handicap accessibility and a ticketing area.
- The museum can qualify for federal grants, tax credits, and funds allocated by other organizations

Funding and Projects

The new handicap entrance and ticketing area

Restoration Projects

The Local Story- Laszlo Pozsonyi

- Has lived in the borough of Stonington for about 60 years
- Hungary ➡ Stonington. First generation American.
- Enthusiastic about sloop sailboats (Dotson Marina)
- Local electrician- has done work in many local homes, businesses, even in the Light House Museum and the University of Connecticut Puppetry Museum
- Avid gardener

The Local Story Continued

- I asked Laszlo what he has noticed over the years in regards to climate change…
- He told me that he’s noticed an intensity and frequency in storms in his hometown.
- This has impacted his sailing and boat storage.
- He also also noticed an increase in flooding, storm surges, and traffic jams, accidents, and other panic when storms occur.

In the news

Local newspaper, *The Day:*

https://www.theday.com/article/20171011/NWS01/171019837

This article discusses coverage about local concern regarding sea level rise and concern of increasing magnitude of storms. Local community members, local news, as well as local government has gotten involved.

- There has been more frequent discussion of climate related changes, flooding, storm surges, rising sea levels, and other concerns for the local community, therefore there has been more coverage in the local news and media. This is becoming a more seriously discussed topic due to the impacts of current changes as well and concern for the future of Stonington.
- Many news papers, digital outlets, local media sources, forums, etc have taken a look at these issues.

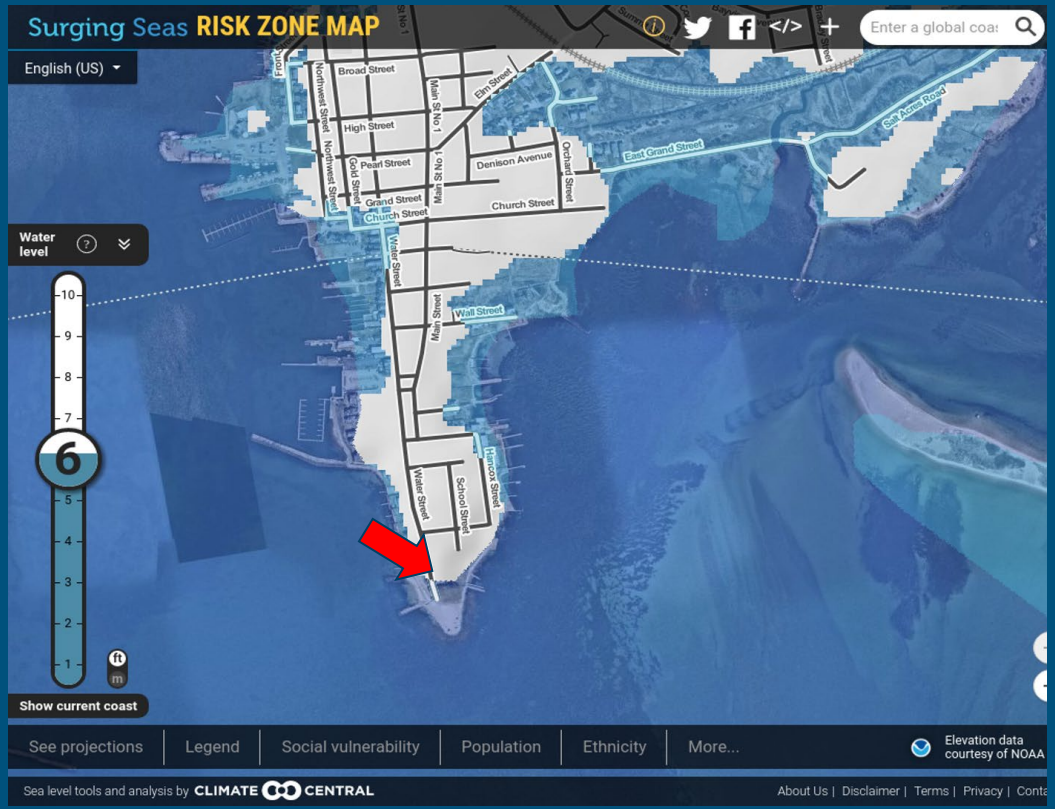
Projections for the Future

Riskfinder.climatecentral.org:

- “*Stonington area land below* 6 ft *is colored yellow through red to denote populations with low through high social vulnerability. Social vulnerability (e.g. from low income) can compound coastal risk. Maroon lines are levees. See full-feature map for legends and details. Switch to property value map layer”*

- The selected sea level scenario points to a 54% risk of at least one flood over 6 ft taking place between today and 2050 in the Stonington area

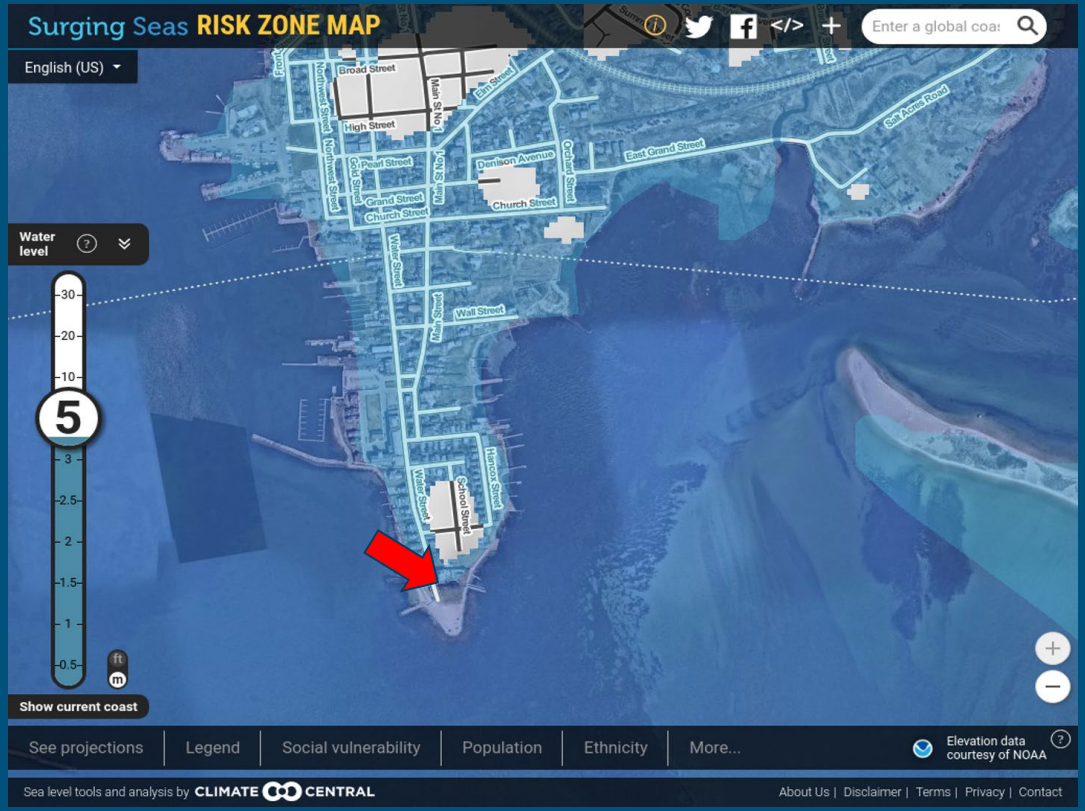
Projection: Six Feet of Sea Level Rise



At this point, the museum would be under extreme risk of flooding and damages to the property and roads nearby

This amount of sea level rise would allow for more sunny day flooding, severe impacts from storms, and more areas would be affected inland due to the change

Projection: Five meters of sea level rise



Worst case scenario projection:

With five meters of sea level rise, it is indicated that the musuem cite would be underwater (along with most of Stonington Point)

This would occur if global emissions and the CO2 concentration of the atmosphere continued to increase at a large magnitude

Interactive Map

https://ss2.climatecentral.org/#16/41.3337/-71.9016?show=satellite&projections=0-K14_RCP85-SLR&level=6&unit=feet&pois=hide

- Website used to make projections for sea level rise, it can produce various maps and projections for different input information and variables

Elevation

This image shows the elevation in relation to sea level of the Stonington area

The museum is located in an area at about 2-4 feet of elevation, which makes it a highly vulnerable location for sea level rise and storm surges

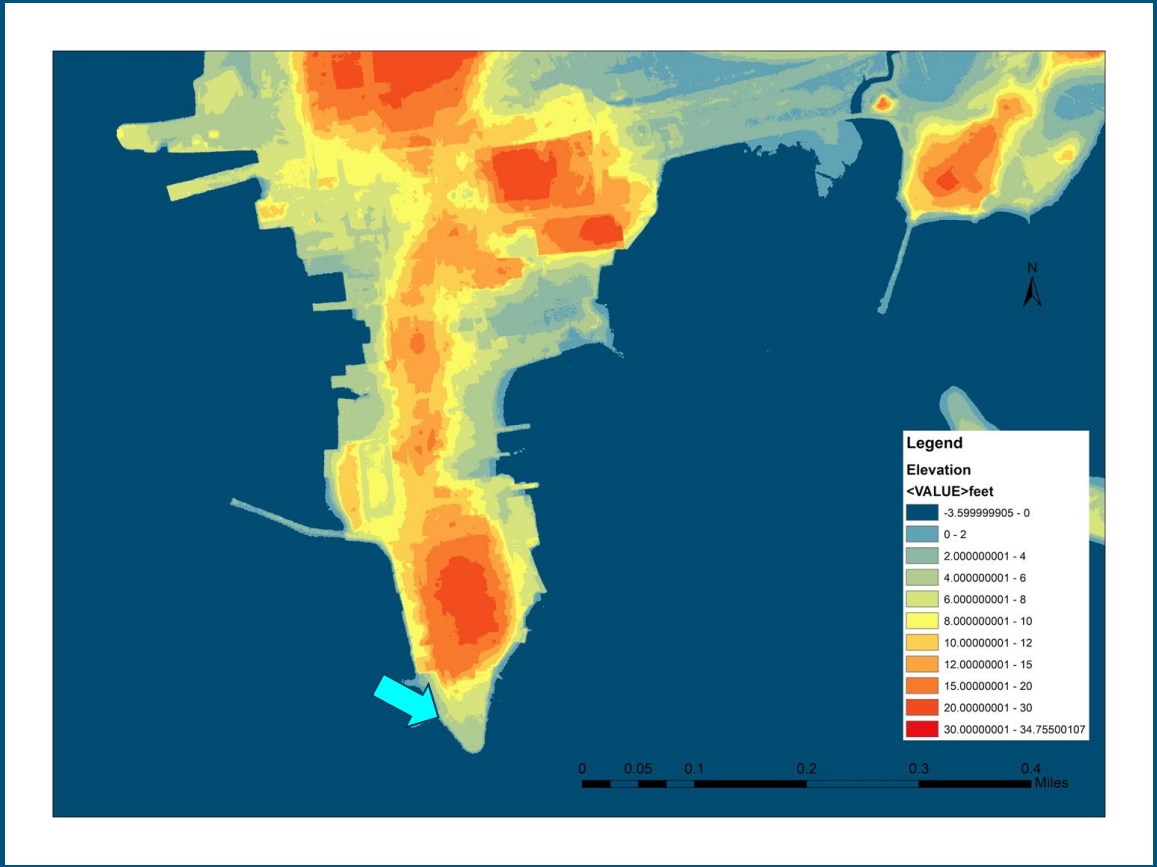


Image provided by Tao Wu

Roads & Buildings

The actual location of the museum, the parking lot, and road leading to the museum itself are all in low elevation areas, making them at risk of flooding, surges, and future sea level rise.

On a positive note, the portion of Stonington just above the museum and the roads that connect to the museum are in a higher elevation region (up to 30-34ft) meaning that they will be more protected from damages.

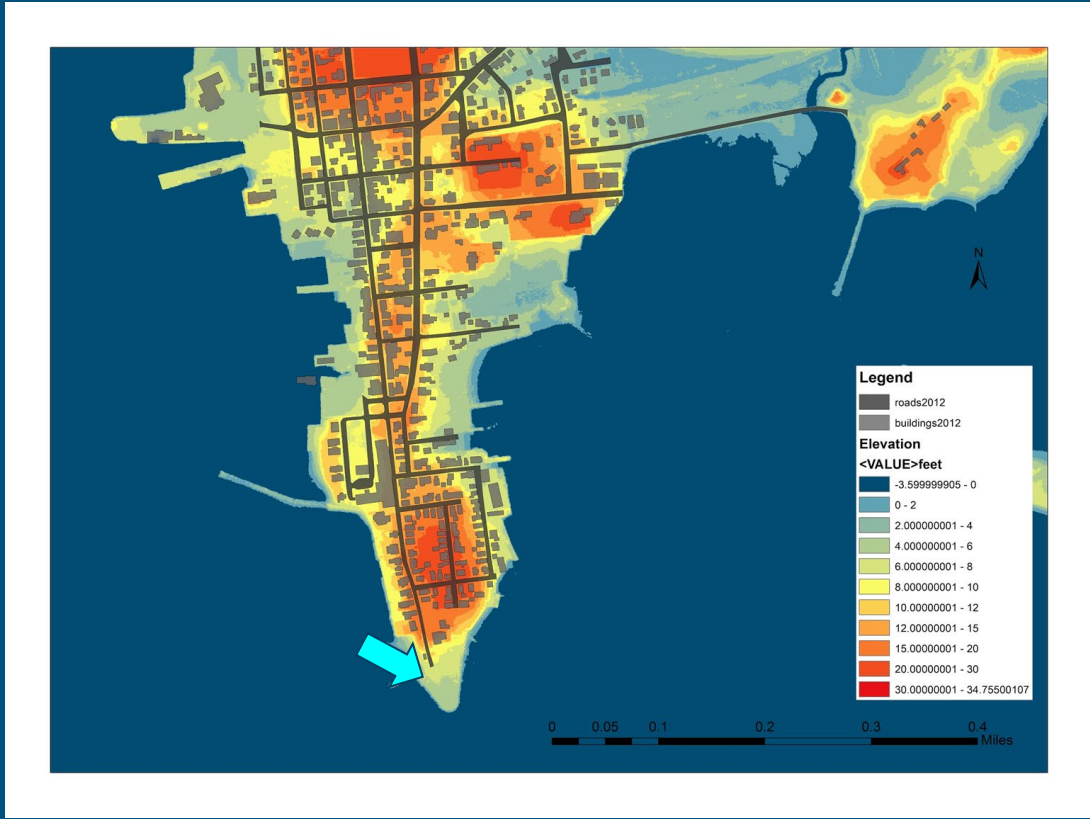


Image provided by Tao Wu

Hurricane Surges

Category 1: The area surrounding the museum location would be impacted by surges. Part of the property would suffer from the surges.

Category 2 and 3: The museum would take direct impacts from surges. This would likely result in flooding and other damages.

Category 4: The Stonington region would be heavily impacted. The museum would suffer damages.

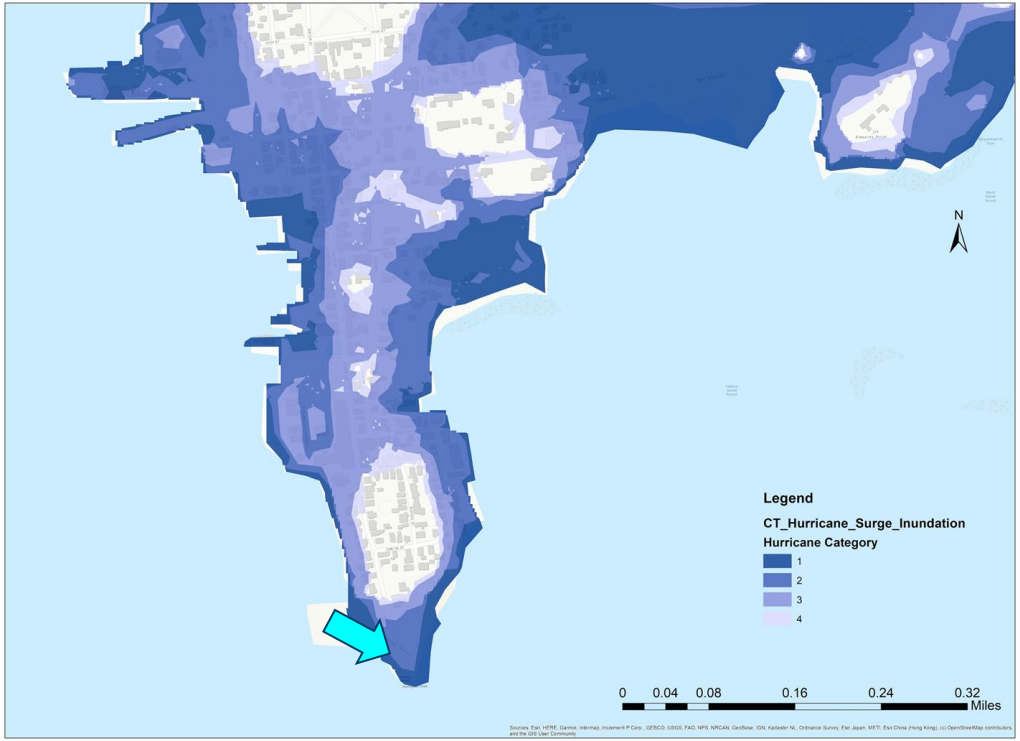


Image provided by Tao Wu

FEMA Flood Hazard

The FEMA flood hazard map indicates that the property of the Stonington Lighthouse Museum and the surrounding land to be in zones that are highly vulnerable to flooding events

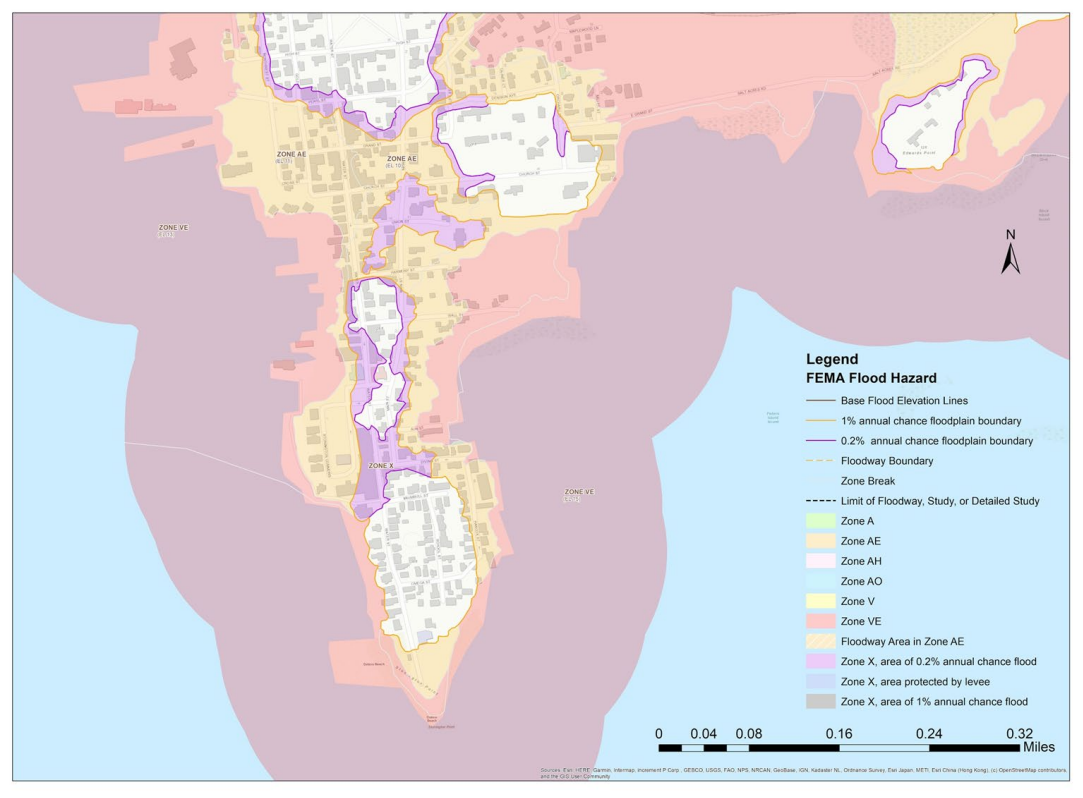


Image provided by Tao Wu

Land Use

The land where the museum is built upon is deemed impervious while the surrounding property is deemed bareland. Just next to it there is a patch of mixed/forested land.

A majority of the town is considered impervious, which means that flood water and storm water would more severely impact the region because the water cannot be absorbed or slowed down.

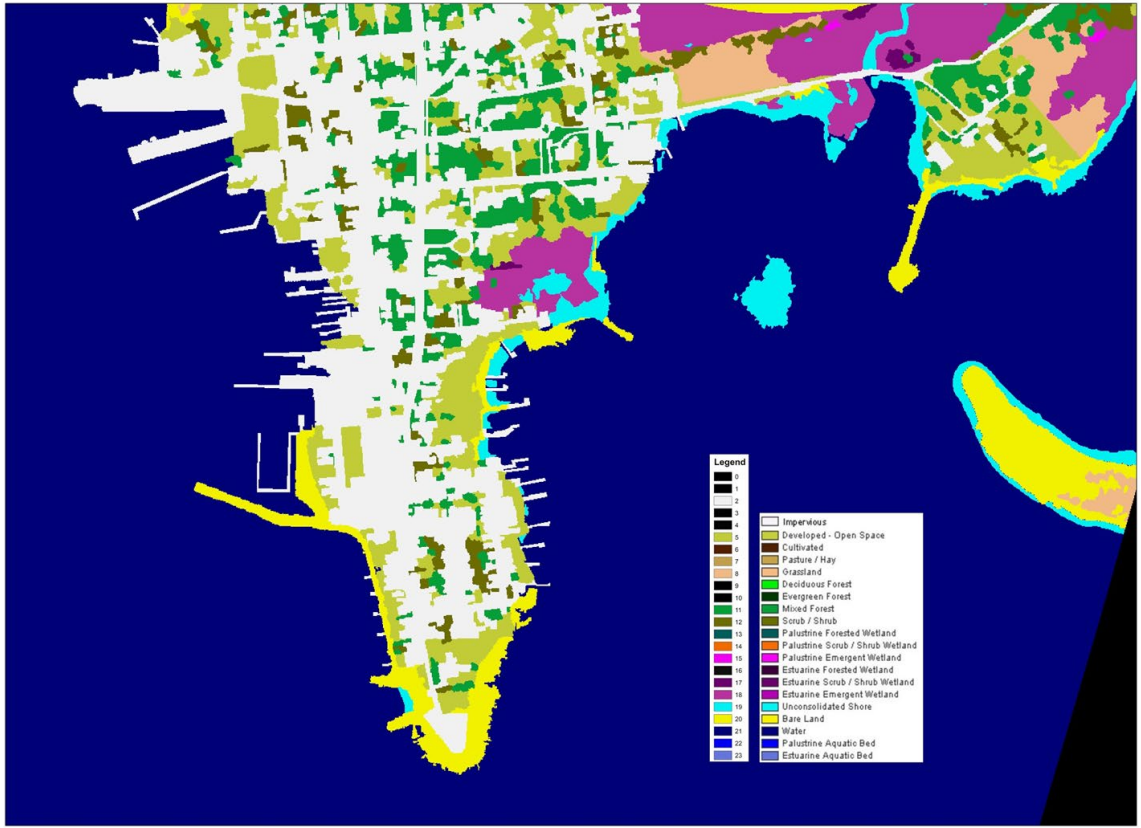


Image provided by Tao Wu

Shoreline Erosion and Risk

- The shoreline surrounding the museum property is not protected by a traditional stone barrier.
- This makes the shoreline surrounding the museum property more vulnerable to damages from flooding, surges, and sea level rise.
- Very little research has been done about shoreline erosion for this location.
- There is also limited records and information about changes to the shoreline and erosion over the years. This is certainly an area of research that could greatly help preserve the museum and understand the changes that are taking place.

Mystic Coastal Resilience Solutions

- Local government, groups, and citizens have come together to research and devise resiliency solutions for the area.
- Here are reports from the town planning department and the local government organizations.

https://www.stonington-ct.gov/sites/g/files/vyhlif3851/f/file/file/shoreline_interventions_for_coastal_resilience_final_report.pdf

https://www.stonington-ct.gov/planning-department/pages/mystic-coastal-resilience-solutions

What does this mean for the museum?

- There has been growing risk for the museum due to its location
- Projections suggest that the Stonington Point is at risk for future flooding due to sea level rise and effects of flooding from severe storms
- If there is no change to global emissions, it is projected that by 2050 there will be 6 feet of sea level rise for the region

Possible solutions: What can be done?

Aside from cutting global emissions:

- Shoreline resilience planning
- Structural improvements/reinforcements to the museum itself
- Drainage to divert water away from the structure/out of the structure (pervious pavement in the parking lot)
- Protection from storms (sand bags, boarding windows,etc)
- Reinforced shoreline/sea wall

Coastal Resilience

Coastal resilience is defined by NOAA as, “building the ability for a community to ‘bounce back’ after hazardous events such as hurricanes, coastal storms, and flooding- rather than simply reacting to impacts”. Coastal resilience allows for the protection and preservation of communities through planning and projects to better accommodate impacts of weather events.

There are many strategies to achieve coastal resilience. There are various methods that can be used for different situations.

Coastal Resilience Methods for the Museum

- Repairs and rebuilding after storm damages that can withstand more severe damages than it initially could.
- Planning and strategy to divert storm water, flooding, and hazards during severe weather events.
- Introduction of projects such as sea walls, permeable pavement, drainage, and raised buildings can help ensure a community’s ability to “bounce back” after weather events and flooding.

Coastal Flooding in Stonington

- Since 1978, Stonington residents have received $4.5 million in flood insurance payouts
- Global mean sea level rise since 1880 is about 8.5 inches
- Major flood events occurred July 2009 and March 2010
- Currently 4057 properties are at risk (including the museum)- $1.8 billion in worth
- By 2050 it is estimated that 4226 properties will be at risk- $2 billion in worth

Stonington’s Current Flood Protection Actions

- Restrict development in the 100-year floodplain
- Require the elevation of new construction above base flood elevation
- Participation in Community rating System
- Construction, maintenance, and improvements to flood control structures

One solution

- Implementation of pervious pavement on the asphalt surfaces in the area in order to lessen the severity of flood water build up on the property.
- Continue to weatherize, reinforce, and adapt the museum within the regulations and guidelines for maintaining historical significance. These limitations may need to be reconsidered and more significant modifications may need to occur to preserve the building at all. This is a sacrifice that may need to be made for the future.
- Measures could be taken to reinforce the shoreline by introducing a rock barrier to break the severity of storm surges and flooding without taking away from the visual appeal, being overly expensive, and it could also provide habitat for coastal animals and plants.

Stonington Town Report 2017

- The Stonington Historic District is listed on the 25 highest risk assets for the town
- The location of the lighthouse is at high risk according to their reports

https://www.stonington-ct.gov/sites/g/files/vyhlif3851/f/file/file/presentation_7.19.17_v3.pdf

Adaptations and Historic Property

Limitations:

- A historic building is deemed “altered” if it has undergone“changes, modified, rebuilt, removed, demolished, ... P.A. 03-6 and P.A. 04-20 replaced the Connecticut Historical Commission with the ... may include stipulations requiring design modifications and limitations on the location..”-Chapter 97A Historic District and Properties

Risk Assessment

Risk= Hazard x Exposure x Vulnerability

- Hazard: storm event
- Exposure: depth of flooding
- Vulnerability: as assessment of impact on community, replacement costs, economic impact on tourism (historic resources)

Goal

Ultimately the goal is to preserve this historical property and to ensure it’s existence and accessibility for the public to learn about and appreciate its historic value.

Stonington Point is a very vulnerable region in relation to climate change, sea level rise, and storms

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