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Climate Vulnerability Assessment of Latimer Point, Stonington CT

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Figure 1: *Image of the area of study*

Introduction

Latimer Point is a small community on the coast of Stonington, CT, that is extremely exposed to the impacts of climate change and sea level rise. Latimer Point is home to around 75 seasonal cottages, including approximately 20 of which are occupied year round. This town has been suffering impacts from flooding (especially pooling), king tides, and heavy precipitation from major storms. The area we determined most affected/ at risk was big beach, the entry road (Latimer Point Road), and the most southern part of E Shore Road along with the lower part of the recreational grass on the Point. During our site visits, we observed pooling in areas of lower elevation close to big beach and around the

common area, there was minimal pooling on the sides of the entry road as well. Pooling here occurs from precipitation, and floodwaters. This vulnerability assessment will investigate the impact climate change has taken on Latimer Point. It will focus on the sea level rise, erosion of the shoreline, changes in precipitation patterns, storms, and heat trends for this area.

Past and Current Climate Trends of Latimer Point

Being a peninsula on the Long Island Sound, Latimer Point is susceptible to sea level rise. From 1960 to present day, the sea levels of Connecticut have risen about 2.5 inches. According to the Connecticut Institute for Resilience and Climate Adaptation (CIRCA), Connecticut sea levels are projected to rise about 20 inches by 2050 (O' Donnell, 2019). Along the Connecticut shoreline sea level rise is rising faster than the global rate, at about 10-12 inches per century (Kunkel, K. E.)

Sea level rise on shorelines brings on many potential risks. The risks that Latimer Point is most susceptible to or is already seeing are coastal flooding, storm surges, saltwater intrusion to coastal wetlands, and salt marshes moving inland. This will specifically affect Latimer Point because the entry road to this community is surrounded by saltwater marshes, and sea level rise could potentially damage these ecosystems, causing them to flood, and marsh migration over time will force them closer to the road. Protecting these wetlands from sea level rise is necessary at all costs because these wetlands act as a buffer for incoming floods. Looking at the shoreline change analysis mapping data from CT ECO, we discovered that the Mystic side of Latimer Point is much more susceptible to shoreline change than the eastern side.

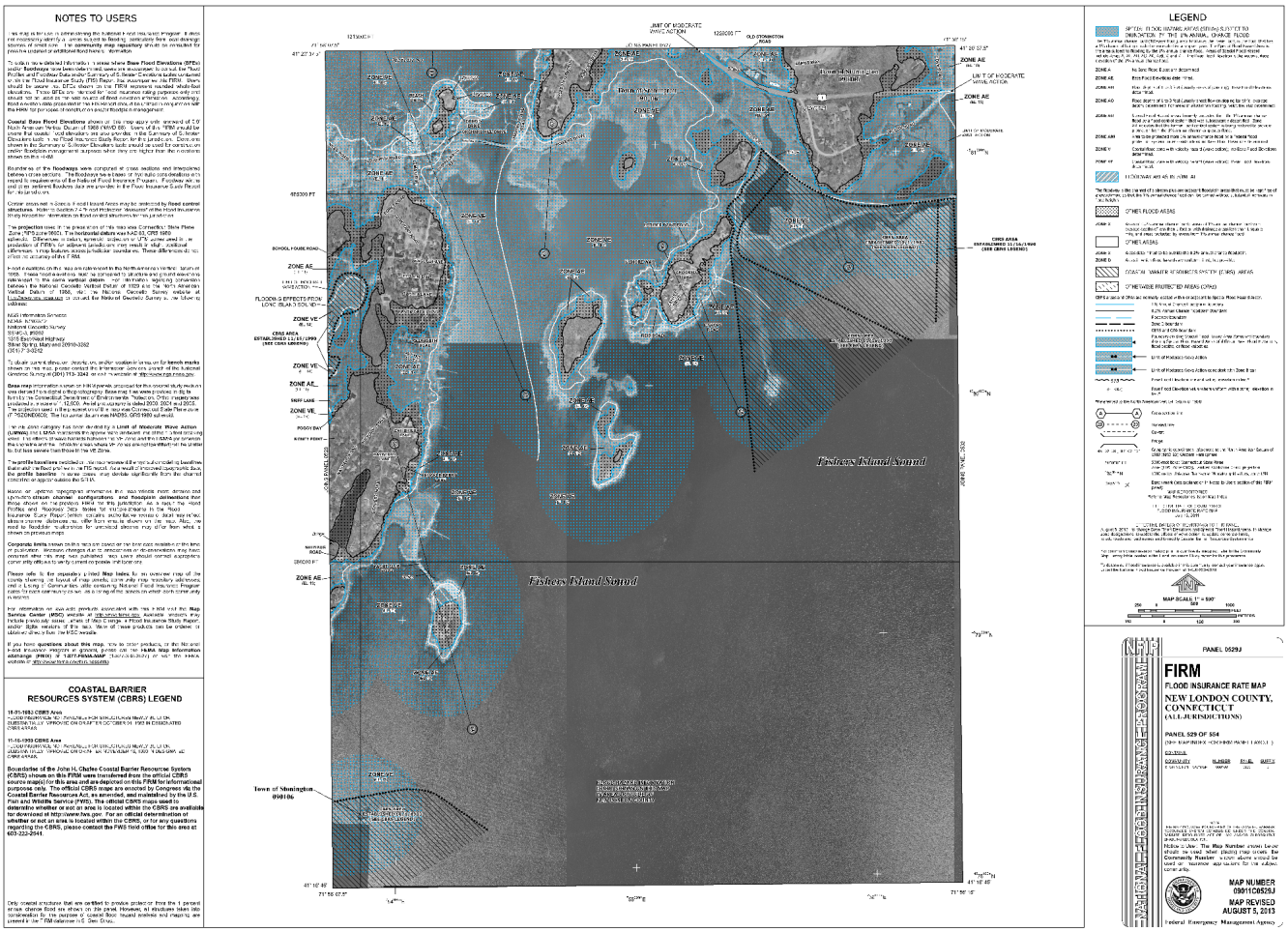

Figure 2: *FEMA Flood Map of Latimer Point and the Surrounding Area*

With sea level rise comes an increase in flooding. Latimer Point is very susceptible to flooding, especially from high/ king tides and surges. Sunny day flooding is also a potential vulnerability for Latimer Point, which is specifically concerning due to the drainage issues and pooling. Pooling is a big problem on Latimer Point, and is seen frequently after rainfall. Included above in figure 2 is a flood map from FEMA of Latimer Point. This map shows the different flood zones that the peninsula is in according to FEMA.

The shoreline of Latimer Point is also vulnerable to erosion. As sea level rises, erosion rates are likely to increase as well. Increases in erosion pose threats to waterfront properties, vegetation, and loss of other infrastructure located on the shoreline due to increased wave activity at higher elevations. Along with increases in sea level rise and erosion, climate change comes with drastic variability in precipitation patterns. It is

projected that precipitation will become more intense in the upcoming decades, and that single-day precipitation events will become more common. As global temperatures rise the atmosphere is able to hold more moisture, resulting in more significant precipitation levels. These single-day precipitation events are likely to cause heavy flooding, pooling, and harm to unprepared areas. At Latimer Point, NOAA Connecticut currently sees a 38% increase in the area's precipitation annually. New England is experiencing one of the highest overall increases in intense precipitation events in the United States (DEEP). This results in an increase among major storm events, which impact the coastline the hard. Tropical cyclones (including hurricanes) were once seen as infrequent, but now are becoming more regular to our spring/ summer weather patterns. These storms may potentially now move more slowly due to warmer air temperatures and changes in circulation patterns, allowing them to release/ dump more precipitation.

Looking into the shoreline change patterns on CT ECO, it is shown that the western or Mystic side of the shoreline of the peninsula has lost shoreline, while the eastern side has gained some shoreline. Figure 3 below shows that the highlighted area in blue on the eastern shoreline of Latimer Point has lost about 8.89 meters of shoreline between 1880 and 2006. Where this 8.89 meters has been lost there are residential properties and homes, and on this side of the peninsula there are homes being newly built. Homes along the western side of the peninsula should take caution of this, as the amount of shoreline lost is expected to only increase in a shorter amount of time. However on the eastern side (where “little beach” is located), according to CT ECO, the shoreline has increased in one area 5.12 meters. This is shown on the map in figure 4. It is possible that some of the shoreline change on the eastern side was artificial, but this side appears to be less vulnerable to shoreline erosion than the Mystic side of the peninsula. The shoreline change analysis provided by CT ECO only indicates the amount of change, but not the cause of the change.

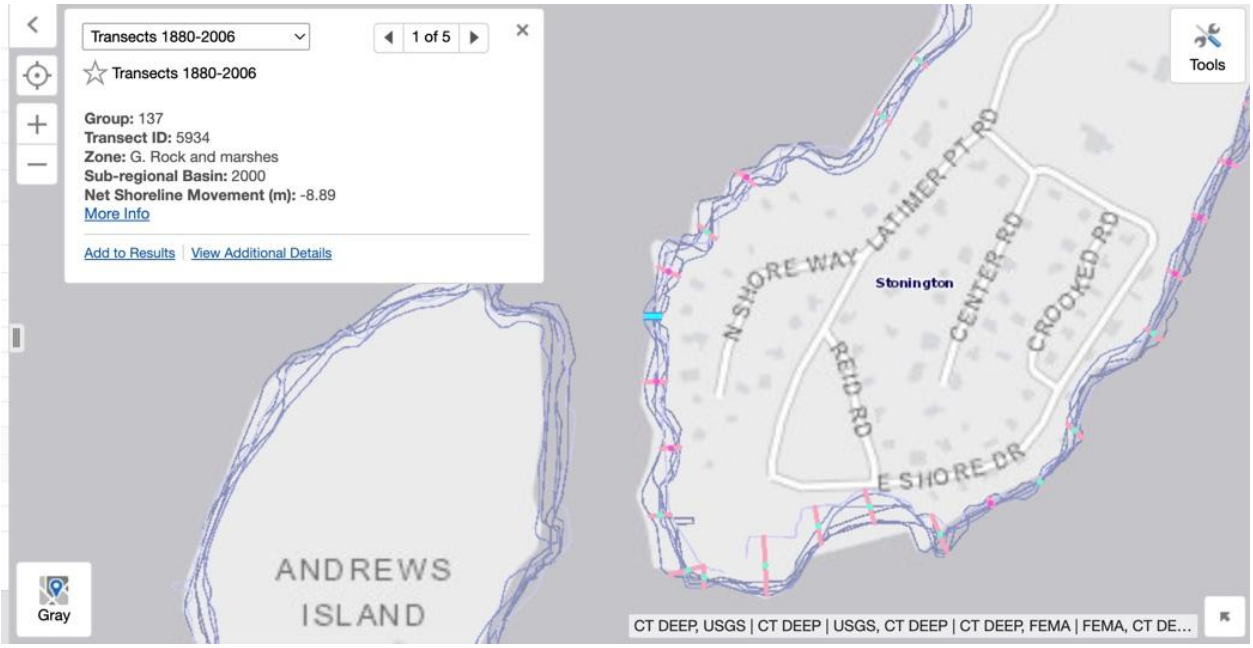

Figure 3: *CT ECO Shoreline Change Map of Latimer Point*

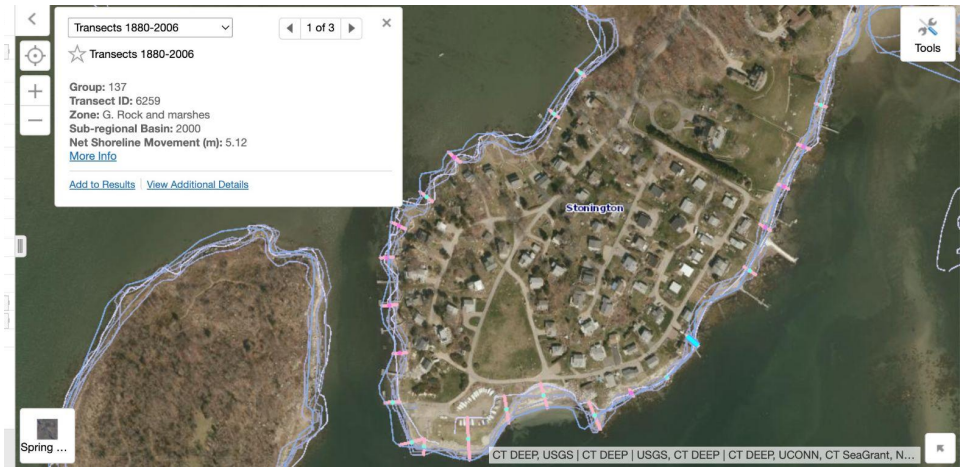

Figure 4: *CT ECO Shoreline Change Map of Latimer Point*

Another climate concern that Latimer Point is vulnerable to is storm events. As climate patterns change, coastal storms have become more frequent. As seen in the past, storms have been detrimental to Latimer Point.

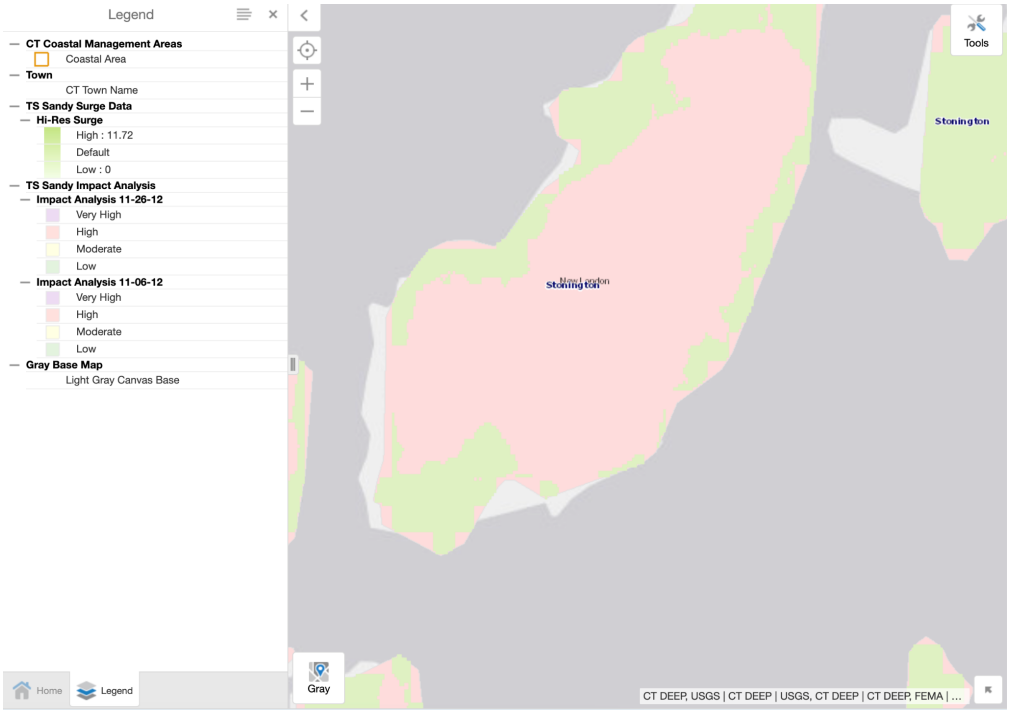

Figure 5: *Map of Hurricane Sandy Storm Surge Data and Impact Analysis Data on Latimer Point from CT ECO*

Figure 6: *Legend of SuperstormSandy Impact Analysis and Data from CT ECO*

Figure 7: *Depiction of Latimer Point Hurricane Evacuation Zone from CT ECO*

Figure 5 above shows how Superstorm Sandy impacted Latimer Point. The green pixel area highlighted in figure 5 is what was affected by the surge. Specifically the southern area, and eastern and western shorelines of the peninsula were vulnerable. The pink area

highlighted on the map is the area that had “high” impact. The statistics of the impact in New London are shown in figure 6 above. Latimer Point is very vulnerable to coastal storms, and precautions should be taken along with evacuation procedures in these events. Figure 7 shows that all of Latimer Point is in hurricane evacuation zone a, which is the zone that is most vulnerable. It is recommended that all residents are prepared for hurricanes and are familiar with evacuation protocols. A good resource for hurricane preparedness is: https://www.noaa.gov/hurricane-prep.

Lastly, it is possible that Latimer Point is vulnerable to air temperature increases in the coming decades. In Connecticut, Since 2000, the temperature of Connecticut has increased by about 3.5 degrees fahrenheit (DEEP) Even though the residents of Latimer Point reside right on the coast, they should be prepared for heat waves. The CIRCA Connecticut Physical Climate Science Report found that large increases in temperature are expected to be seen in annual temperature changes. (“Connecticut Physical Climate Science Assessment Report”) Increase in heat trends affects the shoreline particularly because temperatures rising is a factor in decrease in water quality. When shoreline water quality decreases, this is directly associated with algae blooms. Toxic blue green algae thrive in water that is warm and slow- moving. Latimer Point is on the Long Island Sound, which is shallow, slow-moving water, the perfect conditions for algae blooms. Algae blooms limit the ability to swim in the water. (Environmental Protection Agency)

Areas of Vulnerability

Storms and severe weather take negative tolls on the residents of Latimer Point, with each large storm, they are forced to evacuate the peninsula. The entry road to the Point floods which could limit access into or out of the Point. This is critical as it is possible that no vehicles could enter in extreme circumstances. The small narrow road could be impossible for emergency vehicles to use if it was ever needed and the road was flooded. The main area of concern is where the land narrows near the entry road and floods occur due to this area being surrounded by saltwater marshes. This is the Rachel C. Gardner wildlife sanctuary, which is regulated by the Stonington Land Trust. (“Rachel C. Gardner Wildlife Sanctuary”) As seen in figure 8, CT ECO shows the flooding risks for this specific road by 2025. This whole area of the road is prone to flooding, but a small section is

projected to flood at least every 30 days. This projection is only 2 years away, and is a major concern for the safety of all residents in this area for any kind of storm. It would be recommended that residents are very familiar with evacuation protocols because this has the potential to be dangerous.

Out of the two beaches Little Beach is on the cove side, allowing for minimal impact regarding damages from weathering events. Big Beach is much more vulnerable. This area floods during major storms aligning with the tides. The sea would rise as far up as to the top of the sea wall at Big Beach, which is a major concern as some waves would flow onto the main road in this area. This area is also often covered in seaweed from the high tides. The open grass area near Big Beach is also of major concern as these areas pool with any rainstorm, and/or flood with any severe storm. The elevation of this area slopes downward into the sea, however, the lawn area lays flat with a slight tilt in elevation towards the center of the peninsula. The lawn also has dips within its flat land, allowing for pooling to occur with almost every weather event.

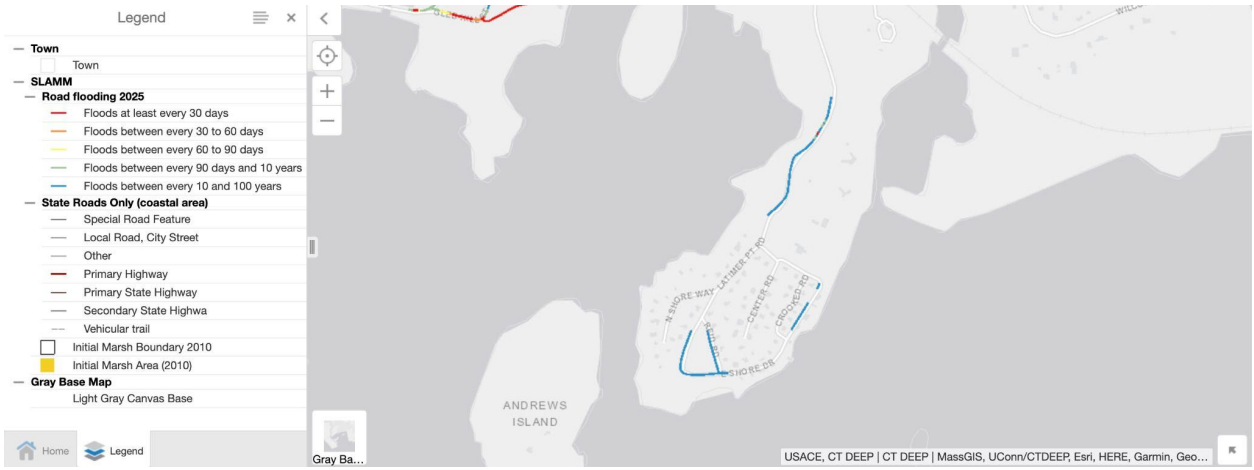

Figure 8: *CT ECO Sea Level Rise Effects on Roads and Marshes Map Viewer of Latimer Point Road*

The most significant areas would have to be the grass area where it connects to the sea wall, and alongside the western shoreline of the peninsula. This is a critical space as floods would impact a major road through the point, along with rising tides bringing in sand and weeds from the ocean, impacting the vegetation. The grass in this area pools significantly, thus allowing for this space to rarely be used as it is constantly wet and

puddled. As discussed above, the western side of the peninsula has experienced a decrease in shoreline, making the residential homes here vulnerable as well. Big beach is another area of concern for flooding and surges. Little beach would be third in the list of concern as this area is exposed to open water from the sound, however it is exposed to a small cove providing some resilience to wave action. In addition, little beach sits at the bottom of a large hill posing a minimal risk of flooding, but still possible to some erosion. However as we have seen from previous storm data, almost the entirety of Latimer Point is vulnerable to coastal storms which will only become more frequent with our changing climate.

Adaptation options

After looking at maps of the area and visiting Latimer Point, we took interest in the open lawn area close to the boat dock (area one), and the lawn area south of the boat dock (area two). These areas can be seen below marked on figure 9.This area is a small grass lawn, one of the only areas on Latimer Point that is not residential housing or private property. It also should be mentioned that it is believed that this area is not an obstruction of view. These areas are at risk for flooding, erosion, and intrusion of sediment and other materials during major weathering events, and experience pooling very often. We believe that these two areas are a perfect place to implement a low impact development (LID) rain garden.

Figure 9: *Areas proposed for the addition of rain gardens/ plantings*

Rain gardens are green infrastructures that mitigate flooding, but are also aesthetically and visually appealing to the eye. We felt that implementing a heavy gray infrastructure would not be a good fit for Latimer Point because of how valued natural beauty is within the community. Rain gardens hold an attractive visual appeal to the already built landscape. This addition would be highly valued as it would compliment the beautiful scenery of Latimer Point. Rain gardens take in rainwater as it comes down, this helps reduce stormwater runoff and prevent pools of water from forming. By absorbing rainwater, a rain garden will mitigate flooding and pooling in this area, as well as aiding in preventing further erosion and destruction of vegetative plants.

This implementation near the boat docks would be useful and provide a common area of aesthetic values for residents, while having purposeful vegetation to mitigate these floods. We propose that a walking path through the middle of the proposed rain garden in area two should have a walking path for residents through the middle of it. This will allow

them to have a beautiful path with a view of the water, as well as potential picnic benches or a bench in this area as well. The rain garden will add to the natural beauty of Latimer Point, and will attract people to this scenic area. This rain garden would be made up of a variety of local native plants that will thrive in the climate conditions of Latimer Point. Having a garden dedicated to native plants will create a natural habitat for local insects and animals to find sanctuary. This will additionally bring more biodiversity to Latimer Point, which is beneficial to the ecosystem.

Other benefits of the addition of a rain garden to this area include a probable decrease in the geese population of Latimer Point. It has been expressed by residents that there is a geese problem around the dock and in the green areas where there are no residential homes. This is evident by the constant congregating of geese, and everything that they leave behind. The addition of a rain garden would also benefit the residents of Latimer Point by helping to get rid of the geese population in these areas. Without an open space for them to wander and congregate, the geese on Latimer Point will dwindle.

The area recommended is already at a slight depression, which is perfect for the rain garden to be effective. Rain gardens are easy to create with the proper planning, and require low maintenance. To put in a rain garden, it is recommended to follow the instructions on the CT NEMO website. It is important to note that because this area is exposed to saltwater, it is critical that the plants in the rain garden are salt tolerant. (CT Nemo)

In addition to a rain garden, it would be recommended that more native plants be planted on Latimer Point, and no more are cut down. The number of trees on the point is already limited, and this is hurting the Point's natural ecosystem and increasing its vulnerability to climate change as well. The root systems of trees and other plants absorb the water through their roots and retain it, helping to mitigate flooding and pooling during heavy storms or major precipitation events as well as potentially providing a wind break. Trees prevent soil erosion and add moisture to the soil making them an asset to the landscape. Ideal vegetation for this landscape would be salt tolerant plants. These plants must coincide with Latimer Points vegetation rule, being under the height of four feet, to ensure no obstruction of views. Finding vegetation that naturally grows to be under four feet would be ideal as this would get rid of the need for pruning plants to fit the standard. These native vegetation choices would allow for more native biodiversity and ecosystems

to be present among the Point, providing for a higher quality of life for other residents and already present wildlife.

For this area, we recommend salt tolerant, native plants that thrive in a range of soil types. For area 2 the soil is partially sandy, highly exposed to sun, dry, and slightly acidic. However, it is susceptible to flooding and potential surges from coastal storms. In area 1 this area is highly vulnerable to pooling, so plants here should be able to thrive in soil that is more saturated.

Specific examples of plants that are salt tolerant and native that we recommend are the following:

1. Solidago sempervirens: This is also known as seaside goldenrod, which blooms yellow flowers. The seaside goldenrod is a herbaceous perennial that has a height range of about 1-8 ft above the ground. This plant thrives in a full sun, and sandy soils. These flowers attract butterflies, and other pollinators.
2. Rosa carolina: This is also known as the Carolina rose, which blooms pink flowers. The Carolina rose is a shrub that has a height range of about 1-3 ft above the ground. This plant thrives in a light range from partial shade to full sun, and soils that range from moist to dry to sandy. These flowers attract native bees, butterflies, and other beneficial insects.
3. Sorghastrum nutans: This is also known as Indiangrass, which is a perennial clumped grass. Indiangrass has a height range of about 3-5 ft above the ground. This plant thrives in a light range from partial shade to full sun, and many soil types. The cover that this grass provides can attract small mammals.
4. Limonium carolinianum: This is also known as the Carolina sea lavender, which blooms pale purple flowers. The Carolina rose is a herbaceous perennial that has a height range of about 1-2 ft above the ground. This plant thrives in a light range from partial shade to full sun, and soils that range from moist to wet soils. These flowers attract butterflies, and other pollinators.
5. Arctostaphylos uva-ursi: This is also known as red bearberry. The red bearberry is a shrub that has a height range of about 0.5- 1 ft above the ground. This plant thrives in a light range from shade to full sun, and soils that are rocky/ sandy or acidic. It is also drought tolerant. This plant attracts butterflies, hummingbirds, and native bees. (Barrett and Sellars, 2021)

The plants recommended are all salt tolerant, native to coastal Connecticut, aesthetically pleasing, and would require little maintenance. Of the plants listed above, only one would potentially grow above four feet, but we believe this area is not an obstruction to anyone's view. It is recommended that the seaside goldenrods would be one of the dominant plantings. Plantings in this area would help to control potential floods from high tides or storm surges, prevent flooding and pooling, trap sediment and seaweed that is potentially brought in from the water, and help to bring more of a natural ecosystem to Latimer Point.

Recommended Priorities

The priorities of this climate vulnerability assessment are to implement a rain garden, one in the area by the boat dock. These priorities fit the social and economical values residents on Latimer Point have expressed. Aesthetics are highly valued to residents of this area. They would like to have more areas to walk around in that capture the beauty of this peninsula. Residents have expressed wanting a garden near big beach and the rock wall, where they can walk around and view the ocean. Providing a rain garden in this area would economically help in mitigating flood and pooling, and socially help in the aesthetics and priorities the residents value. In addition, residents have mentioned that the large grassland area in the back has not been used and feel as if it is a waste of space, thus implementing a garden in that area would adhere to their requests. This garden would be beneficial through mitigating pooling and preventing excess water from further eroding the land.

These rain gardens would economically benefit the Point in the long run. By having native salt tolerant plants made to absorb overflow from the ocean along with pooling from weathering events, this allows the gardens to be efficient in preserving the land. The use of native vegetation allows for the groundskeepers to provide minimal work on the rain garden as these plants will provide for themselves and the area. Given the height limitations, the chosen plants shall not grow taller than four feet in order to not prevent obstruction of residents' views. This requirement is helpful when deciding on the native vegetation as no trimming is necessary if the correct plants are chosen.

Conclusion

The findings of the climate vulnerability assessment are clear, the lawn areas next to and across from Big Beach are in critical condition. These areas required new foundations to aid in the mitigation of flooding and pooling along with the preservation of the land. LID rain gardens are the perfect choice of adaptation for this area, they promote resilience and aesthetic value. These gardens will aid in the prevention of overflow onto the main road on the Point, along with mitigating flooding throughout the grassland, allowing for a new use of space of native vegetation throughout.

These gardens and other residential areas on the Point will ensure the prevention of minimal land erosion. Not only will the new vegetation preserve the land areas, it will allow for more native biodiversity and ecosystems to be implemented on this peninsula. The increase of birds and other species will only provide a higher value to this already beautiful landscape

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References

Barrett, J., & Sellars, K. (2021, March). *Connecticut Coastal Planting Guide - University of Connecticut*. Retrieved April 25, 2023, from https://seagrant.uconn.edu/wp-content/uploads/sites/1985/2021/03/CONNECTICUT-COASTAL-PLANTING-GUIDE_2021.pdf

Connecticut Environmental Conditions Online. CT ECO Viewers. (n.d.). Retrieved April 28, 2023, from https://www.cteco.uconn.edu/viewers/index.htm

Connecticut Physical Climate Science Assessment Report. (2019, August). Retrieved April 25, 2023, from https://circa.uconn.edu/wp-content/uploads/sites/1618/2019/08/CTPCSAR-Aug2019.pdf

Environmental Protection Agency. (n.d.). *Climate Change and Harmful Algal Blooms*. EPA. Retrieved April 24, 2023, from https://www.epa.gov/nutrientpollution/climate-change-and-harmful-algal-blooms

Flood maps. FEMA.gov. (n.d.). Retrieved April 28, 2023, from https://www.fema.gov/flood-maps

Kunkel, K. E., Frankson, R., Runkle, J., Champion, S. M., Stevens, L. E., Easterling, D. R., Stewart, B. C., McCarrick, A., & Lemery, C. R. (Eds.). (2022). State Climate Summaries for the United States 2022 (NOAA Technical Report NESDIS 150). NOAA/NESDIS. https://statesummaries.ncics.org/chapter/ct/

O' Donnell, J. (2019, February). *Sea level rise in Connecticut - University of Connecticut*. Connecticut Institute for Resilience and Climate Adaptation. Retrieved April 18, 2023, from https://circa.uconn.edu/wp-content/uploads/sites/1618/2019/02/SeaLevelRiseConnecticut-Final-Report-1.pdf

National Hurricane Preparedness. National Oceanic and Atmospheric Administration. (n.d.). Retrieved April 24, 2023, from https://www.noaa.gov/hurricane-prep

Quincy, S., Pryzbek, A., Pritchard, K., & Kubik, E. (2020, August). *Changing climate booklet - CT*. Retrieved April 18, 2023, from https://portal.ct.gov/-/media/DEEP/education/kellogg/CT-Changing-Climate-Booklet.pdf

Rachel C. Gardner Wildlife sanctuary. STONINGTON LAND TRUST. (n.d.). Retrieved April 25, 2023, from https://www.stoningtonlandtrust.org/rachel-c-gardner-wildlife-sanctuary

Rain gardens. CT NEMO Program. (2022, January 1). Retrieved April 18, 2023, from https://nemo.uconn.edu/raingardens/

Sea level rise new home: Connecticut Institute for Resilience & Climate Adaptation (circa). Connecticut Institute for Resilience Climate Adaptation CIRCA. (2018, May 30) Retrieved April 18, 2023, from https://circa.uconn.edu/sea-level-rise/