



Chapter 7. Resiliency: Sea Level Rise and Coastal Flooding

7.1 Introduction

The Town of Fenwick Island is the southernmost municipality in Sussex County, DE. The average sea level calculation for the town is 7 feet above sea level. Most properties, especially on the west side of SR 1 are no higher than 5 feet above sea level and the lowest level on the bayside is just 1.7 feet above sea level. In contrast, the beach end parking areas, located on the ocean side of town are between 7 to 9 feet above sea level. SR 1, which bisects the town and is roughly the midpoint, averaging 4 feet above sea level.



Fenwick Island's proximity to both bodies of water makes it highly susceptible to tidal inundation and surges during storm events including Nor'easters and sunny day flooding. The town's low-lying topography, bayside lagoons, and canals, and stormwater infrastructure system are further strained by the effects of sea level rise (SLR) on the community.

7.2 Understanding Sea Level

Sea level is a measure of the average height of the surface of the sea. Like land, the surface of the ocean is not flat or uniform. Although SLR is thought to be a more current topic of discussion, records indicate since the late 1800's sea levels have continuously risen. For nearly 150 years, the Center for Operational Oceanographic Products and Services has measured SLR by utilizing tide stations along all U.S. coasts. Today, the global sea level is 5-8 inches higher on average than it was in the year 1900.

The two primary factors leading to rising global sea levels are thermal expansion and melting of large land-based formations such as glaciers and ice sheets due to warming atmospheric and water temperatures.

Sea level data and tidal information establish marine boundaries, from private property lines to the borders of our nation's territorial sea. National Oceanic and Atmospheric Administration (NOAA) uses sea level data to produce nautical charts and promote safe navigation⁹.

Sea level information also informs how we develop safe building codes, restore coastal habitats and site infrastructure. Together with storm surge information, it could advise floodplain maps and safe evacuation routes. However, it is important to understand that current FEMA floodmaps are based on historical flood data, not sea level rise projections.

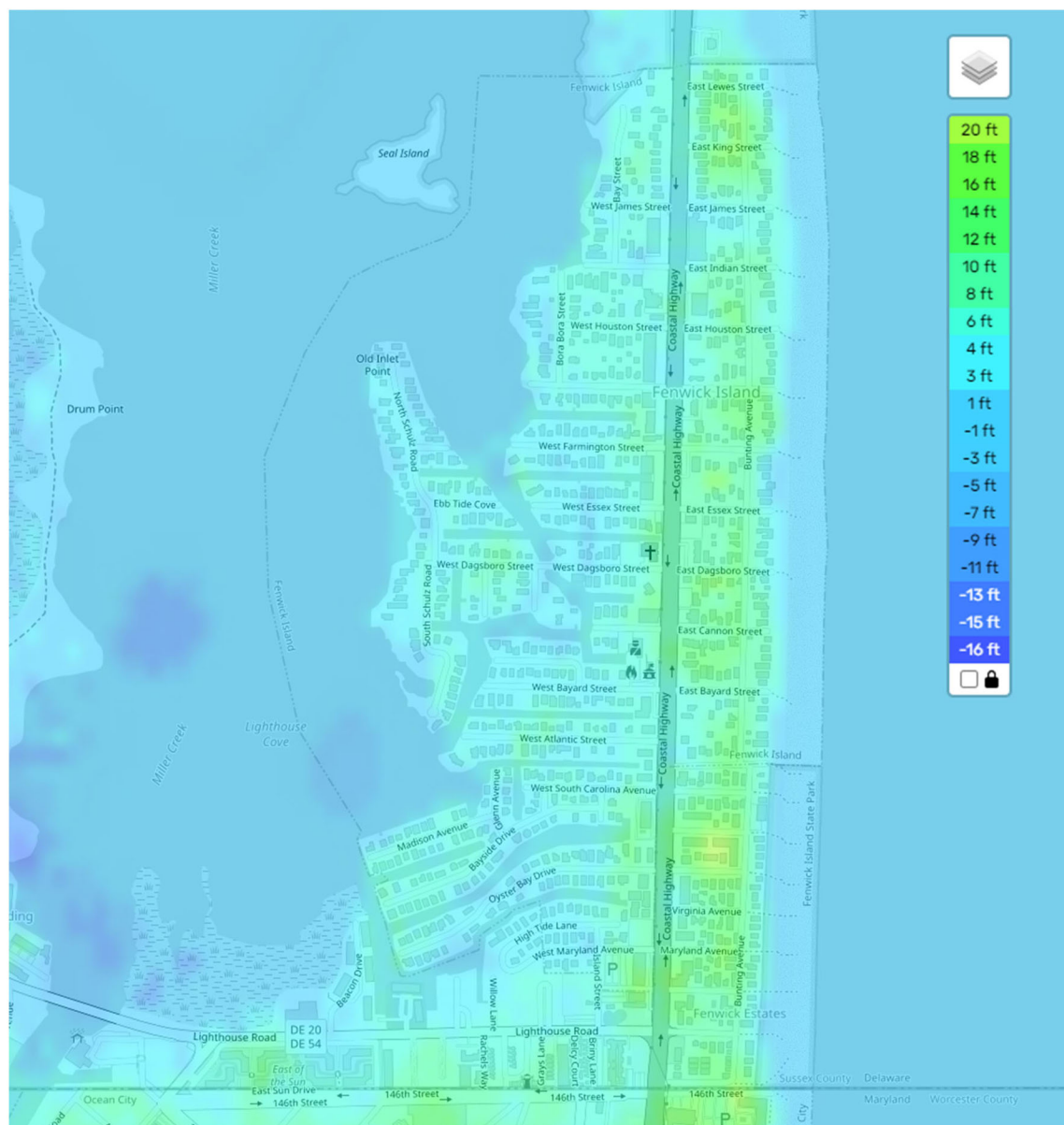
There is a certain level of unpredictability with understanding the full effects of sea level rise, however, advances in technology and further modeling resources will help vulnerable communities better prepare. With 40 percent of Americans living in densely populated coastal areas, including Fenwick Island, having a clear understanding of sea level trends is critical to our societal and economic wellbeing.^{10 11}

⁹ [Tracking sea level rise ... and fall | National Oceanic and Atmospheric Administration \(noaa.gov\)](https://www.noaa.gov/education/outreach/tracking-sea-level-rise-and-fall)

¹⁰ <https://sealevel.nasa.gov/understanding-sea-level>

¹¹ [Our Globally Changing Climate - Climate Science Special Report \(globalchange.gov\)](https://www.globalchange.gov/report)

Figure 8. Fenwick Island Topography



7.3 Existing Conditions and Emerging Trends



Tidal flooding has become more common in Fenwick Island's bayside roadways, yards, and drainage ditches. The frequency and volume of floodwater has increased at a noticeable rate in the past two decades. Sunny day or nuisance flooding have become more prevalent and even mild storm surges are almost certain to produce at least moderate flooding throughout the low-lying areas of Fenwick Island west of SR 1.

It is important to note that flooding from rainfall events or "sunny day" tidally induced flooding occurrences must be considered within Fenwick Island's vulnerability analysis. As SLR continues to impact rainfall distribution in the mid-Atlantic, there is

potential for more frequent, shorter duration storms as well as greater intensity weather events contributing to increases in flooding. As sea level rises, frequent rainfall events causing flooding conditions and standing water will be considerably more notable in town because there will be less available "head" pressure in the drainage system to "push" runoff out through the pipes.

Another consideration of flooding conditions and increased standing water is the decrease in ground saturation. These conditions are physically evident during some high tides and with more frequent and severe coastal storms and Nor'easters in Fenwick Island.

Fenwick Island, with the State of Delaware and other coastal communities, began sustainability and resiliency studies over a decade ago and many are now beginning to discuss municipal resiliency options. Fenwick Island implemented the town's first SLR Vulnerability Study in 2015. The town has continued to support the need to recognize the severity of the effects of sea level rise represented by tidal flooding and the importance of communication with the property owners. Fenwick Island is utilizing numerous resources and coordinated efforts. Collaboration with the Town Council, Infrastructure Committee, Department of Public Works, civil engineers, Sussex County, DNREC, DelDOT, the State of Delaware, USACE, and other coastal municipalities to continue these supportive efforts as we address inundation issues as a community is imperative.

7.4 Current Planning for Sea Level Rise in Fenwick Island

In the Fall 2021, Fenwick Island's Infrastructure Committee initiated discussions addressing the need to conduct a current resiliency study with updated GIS (Geographic Information System) mapping. The town, in partnership with DNREC, contracted with an engineering firm to develop a current resiliency data bank to inform and discuss the data projections and options for SLR mitigation measures on Fenwick Island, thereby enhancing the community's overall resiliency.

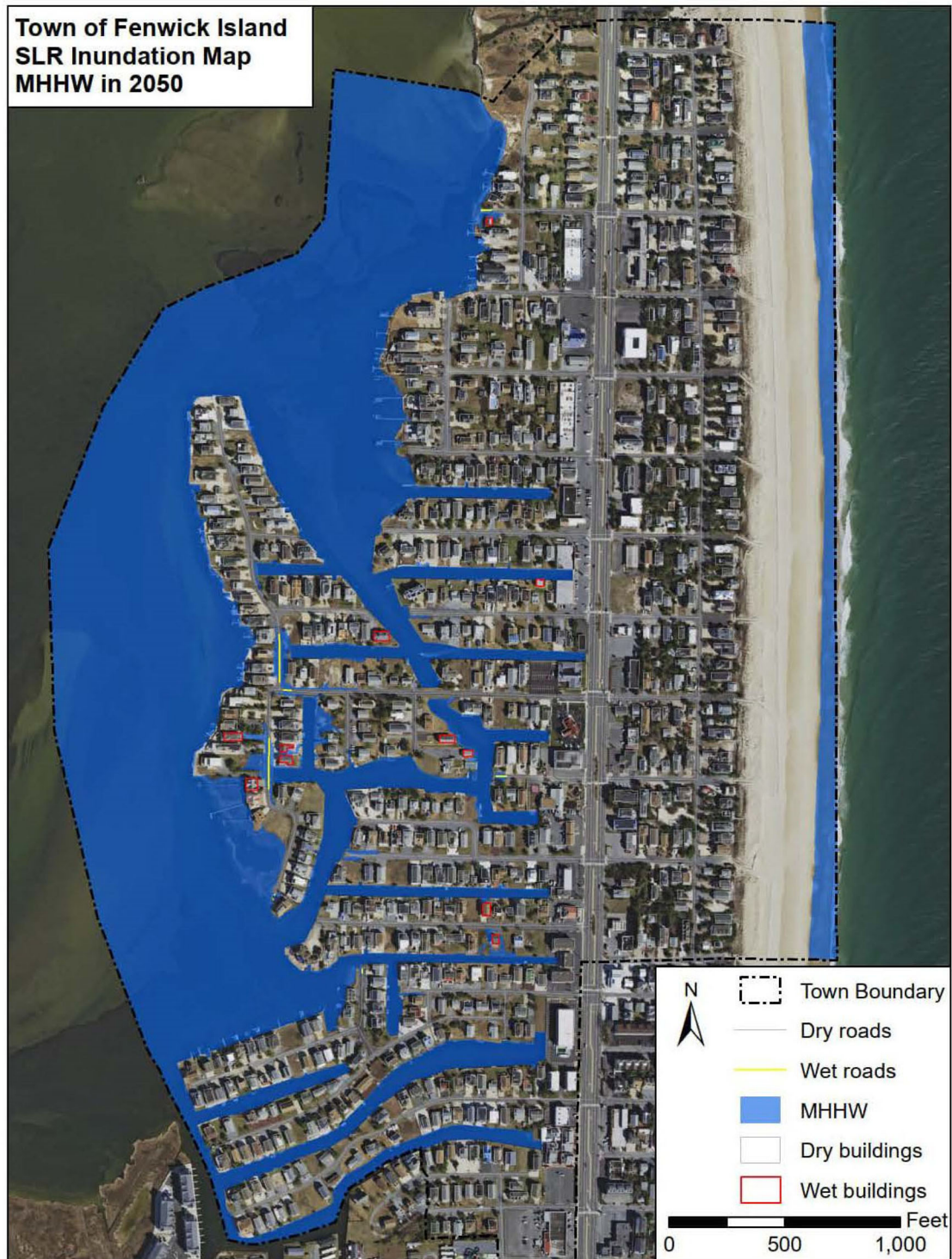
The study focused on providing updated mapping and data which can serve as the basis for engaging residents and businesses to forge well-informed decisions, prioritize at-risk areas of the town and discuss suggested implementable action items as the town adapts to SLR.

In March 2023, AECOM delivered the SLR Resiliency Study, updated SLR maps and presented recommendations to improve sustainability to the Infrastructure Committee. In summary the study defined the following steps:

1. Identify appropriate SLR projections
2. Identify potential impacts
3. Risk assessment and vulnerability
4. Development of suggested recommendations and adaptation measures
5. Implementation
6. Monitor and Evaluate

A total of 6 scenarios were mapped by AECOM, representing the timeframe of 2030 through 2080 at 10-year intervals. The map for 2050 is shown in Figure 9. Each map illustrates the extent of inundation and highlights buildings and roads that are projected to be affected. Inundation is expected to primarily affect buildings and roads west of SR 1 which is characterized by flat, low-lying topography.

Figure 9. Estimated SLR Inundation Map, 2050



Source: 2023 Fenwick Island Resiliency Plan, AECOM

Study recommendations are categorized into short, medium and long-term impacts:

- **Short term:** those areas expected to start to experience inundation impacts by 2050 and greatly expand by 2060.

The streets expected to experience inundation by 2050 include North and South Schulz Road, W. Dagsboro Street, McWilliams Street, Bora Bora Street, W. Houston Street, W. Georgetown Street, West Essex Street, Madison Avenue, Glenn Avenue, W. James Street, Cannon Street Park. The municipal buildings and facilities included in this list are mentioned earlier as Critical Facilities and infrastructure: Town Hall, Fenwick Island Police Department, Fire department building, town-owned bayside road ends, and municipal drainage infrastructure.

- **Mid-term:** Residential streets and municipal areas considered in the mid-term timeframe start to experience inundation in 2060.

Mid-term locations include W. Indian Street, W. Farmington Street, W. Cannon Street, W. Bayard Street, W. Atlantic Street, W. South Carolina Avenue, Mermaid Street, and the Town Hall Playground and Gazebo.

- **Long term:** By 2070, approximately 90% of streets on the bayside are expected to experience two daily cycles of inundation.

The streets included in the long-term assessment include Wright Street, Bay Street, Winward Way, Ebb Tide Cove, Bayard Street Extension, Bay Side Drive, Surf Avenue, Oyster Bay Drive, High Tide Lane, W. Maryland Avenue, Island Street, and the beachside road ends.

7.5 Resiliency Goal

To study and make available best practice mitigation data, suggestions, recommendations, and procedures to reduce inundation and tidal flooding risks in coordination with all of Fenwick Island property owners

7.6 Recommended Direction for the Town

- **Work with the Fenwick Island community to determine how to move forward with the recommendations from the 2023 resiliency study**

It is imperative that the property owners of Fenwick Island take a community-wide approach in the decision making and application of mitigation strategies for this issue. A parcel-by-parcel approach will produce “quick fixes” to solve immediate problems but will be less effective in the long-term. Success will come from the town and its property owners working together to implement a series of collective mitigation strategies.

Though the projections are sobering, there is time for proper planning, community education and implementation to mitigate flooding and to provide for a sustainable community.

- **b. Establish and maintain public engagement on SLR, climate change and the town's approach**

It is of the utmost importance to keep property owners involved in conversations regarding climate change and SLR as the town continues to study and make available, best practice mitigation data, suggestions, recommendations, and procedures to reduce inundation and tidal flooding risks.

- **Improve Drainage**

The town should continue evaluating and making improvements to the stormwater infrastructure. In 2013, the town conducted a stormwater infrastructure inventory which identified gaps in the existing system and needed improvements.

- **Continue to participate in future studies such as the Delaware Inland Bay, Delaware Bay Coast Coastal Storm Risk Management Feasibility Study**

The town participated in the initial charrette on April 13, 2023, and is participating in the newly initiated Inland Bays Sustainability Study being undertaken by the USACE and DNREC

- **Continue Beach Replenishment efforts**

Beach restoration and replenishment projects in collaboration with the State of Delaware and USACE will continue to be important to the long-term resiliency for the Town of Fenwick Island. This practice which has and continues to occur will assist in protecting the dunes that protect the oceanside of town.

- **Prepare for and seek out Grant Funding**

Being aware of available grants is a valuable tool in continuing municipal resiliency planning. It is important to emphasize that working closely with the Delaware Coastal Program on resiliency projects will unlock opportunities for future assistance from the state.

- **Consider Resiliency Funding**

Resiliency planning is becoming a priority for many towns, and some communities are considering establishing a resiliency fund to help pay for future projects and grant funding geared towards adaptation projects.

- **Assess potential Code updates**

For mitigation strategies to be successful, the town should consider codifying requirements such as elevated dwellings, incorporating greater use of permeable surfaces, and ensuring properties drain to streets and not to adjacent properties. Codifying requirements will ensure all property owners are following the same standards as part of the community-wide approach.

- **Sea Level Rise Design Guidelines or Standards**

Developing and adopting resilient design guidelines or standards would be an appropriate action for the town to consider pursuant to AECOM recommendations. Specific regulations tailored to address the impacts of SLR on both commercial and residential development would facilitate resiliency through adequate building and infrastructure design. Design measures to be considered for inclusion as part of the regulatory document could include elevation requirements, building materials, and landscaping requirements.

By requiring all future development and existing structures to be retrofitted to meet design requirements, buildings will be able to withstand the harsh impacts and challenges brought forth by rising sea levels. Buildings and infrastructure that are designed in a manner consistent with a changing environment will enable residents and tourists alike to ensure their continued enjoyment of the town.