



CHAPTER 10: RESILIENCY & SEA LEVEL RISE ELEMENT

HOW WE RESPOND



RESILIENCY PLANNING...

- Collaboration
- Coordination
- Community engagement

Sustainability- “meeting the needs of the present without compromising the ability of future generations to meet their own needs.”

~Our Common Future

Community Resilience- “the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events.”

~Urban Land Institute



Hurricane Matthew 2016



Hurricane Irma 2017

RESILIENCE PLANNING AND ADAPTATION TO SEA-LEVEL RISE

Since the adoption of the 2008 Comprehensive Plan, Sullivan’s Island has taken great strides in promoting sustainable planning initiatives as a means of protecting its natural resources and the quality of life of residents and visitors. The Town began considering local impacts of sea level rise in the summer of 2010 by participating in a series of discussions to identify management challenges associated with adopting hazard mitigation policy. Although few local policy decisions were made, these discussions brought together a collaborative group of organizations and Town decision makers, including National Oceanic and Atmospheric Administration (NOAA), South Carolina Sea Grant, the Social Environmental Research Institute (SERI).

This section of the Comprehensive Plan is intended to revive a robust public engagement process to develop a series of adaptation actions that will produce two overarching goals: 1) develop mitigation strategies to prepare for future hazards associated with sea level rise; and, 2) align these strategies with existing local and regional plans to enable eligibility of future federal and state grant opportunities (for capital improvement projects: drainage, water/ sewer, renourishment, etc.).

It is important to note that these recommendations and actions are not intended to produce a complete vulnerability and risk assessment or contain an exhaustive list of all potential risks for Sullivan’s Island. Instead, it is geared toward providing an initial strategy and guiding framework for producing a future comprehensive sea-level rise adaptation plan. These recommendations will also provide a planning projection for accommodating a 2-foot sea level rise within the next fifty years and provide a process for prioritizing these mitigation actions.

LOCAL CHALLENGES

Sea level rise can impact not only homes and private property but also local streets, public utilities, beaches, wetlands, and community facilities, potentially increasing risk to the public’s health and safety. Since 2015, there have been several major weather events that have caused severe and prolonged island-wide flooding. Each of these events has served as a stark reminder of the low-lying topography of the Island and the imminent dangers of sea-level rise. These events include the extreme rain event from the remnants of Hurricane Juquin in October 2015; Hurricane Matthew in September 2016; and, Hurricane Irma in October 2017.

Damage assessments conducted after these events estimated private property impacts of just under \$3 million dollars. In addition to the impacts of private property owners, local roads, stormwater infrastructure, water and sewer utilities and public open spaces were affected. Some of these impacts included:



- Tidal backup of stormwater drainage systems in low-lying areas; saltwater intrusion and flooding of neighborhoods, roads and yards;
- Increased coastal erosion in the Marshall Boulevard area, however major erosion in all areas of the active beach;
- Hurricane Irma’s peak wind speeds occurred at high tide creating saltwater intrusion on the western portion of the Island from Station 18 and Thompson Avenue to Star of the West. Massive amounts of debris washed across the western 1/3 of the Island;
- Roads flooded and were impassable in areas most severely affected.

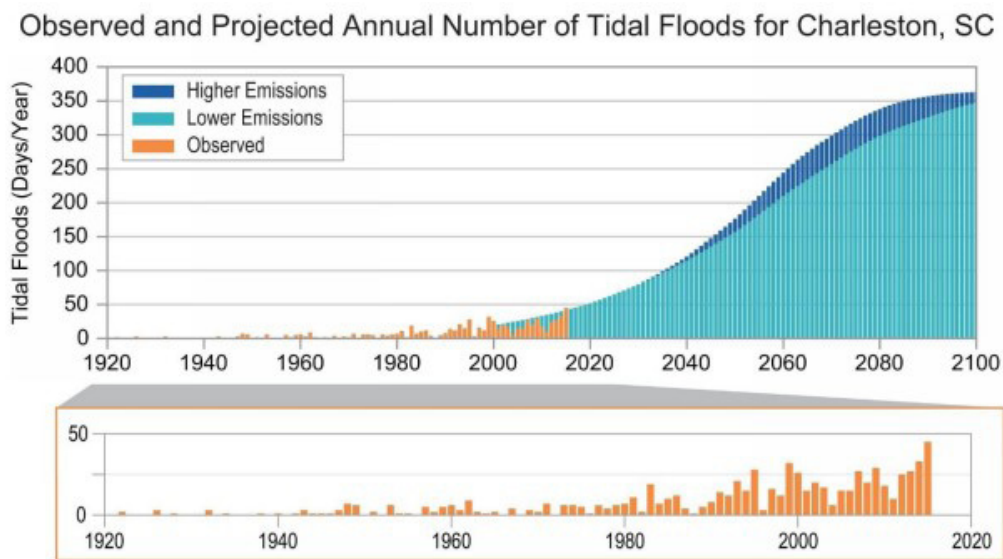
SULLIVAN'S ISLAND NEEDS ASSESSMENT

Table 10.1 reflects NOAA’s observed record from 1920 to 2015 (orange bars), and the projected exponential increase of these changes (blue bars) through 2100.¹

According to the City of Charleston Sea Level Rise Strategy, tidal flooding in the Charleston area averaged two (2) times per year in the 1970s and increased to eleven (11) times per year in the 2000s. This number has increased exponentially to 50 tidal floods in 2015. The NOAA report also describes that these observed and projected increases of nuisance flooding, are reliable indicators of local sea level rise.

NOAA also makes the startling projection that up to 180 tidal floods per year will occur within the Charleston area by 2045. Additionally, long-range scientific predictions indicate that “sea level may rise two (2) to seven (7) feet in the next 100 years.”²

TABLE 10.1



1. Folly Beach Sea Level Rise Adaptation Report, March 2017: 6. NOAA, Sea Level Rise and Nuisance Flood Frequency Changes around the US, Technical Report NOS CO-OPS 073. 2014

2. “City of Charleston Sea Level Rise Strategy” (2015): 1-5



MAPPING SEA LEVEL RISE

It is clear that sea level rise increases the potential damage to stormwater systems, the wastewater system, public streets and private property. Sullivan's Island maintains an average upland elevation of 7.9 feet (mean high water) with multiple manmade earthen structures that exceed well over 30 feet in height, according to current GIS topographical data.³ Because of the Island's low-lying elevation and its proximity to the ocean and marsh, homes and nonresidential structures of the Island have historically adapted to the rising waters of major storm events and king tides by elevating their first stories 2 to 4 feet from natural grade as depicted in the photographs.

Today, FEMA base flood elevation mapping regulations require homes to be elevated, on average, 6 to 10 feet from grade. However, a sole reliance on elevating homes cannot be the Town's only strategy for addressing sea level rise.

A multifaceted approach should be taken when preparing for long-term rising sea levels inclusive of home design (regulatory compliance), public and private stormwater improvements, and right-of-way improvements.

NOAA's Sea level Rise Viewer application allows the depiction of various scenarios of rising water levels, which can then be used to conduct a visual assessment of areas on the Island that may be impacted by king tides and localized flooding.

Figure 10.1 shows a potential tidal flood impact under a 2-foot sea level rise. This model would severely damage private properties, public roads, and pump stations on all marsh and fronting streets and along Marshall Boulevard. Severe saltwater inundation would also be felt across much of the western portion of the Island; from Middle Street to Osceola Avenue, from Star of the West to Station 13.



Historic homes were commonly elevated to avoid rising waters from king tides and storm events.



New construction is required to be elevated over the flood elevation.

**FIGURE 10.1
TWO (2) FOOT
SCENARIO**



3. FEMA's CRS Data: Provided in GIS format: <https://www.fema.gov/faq-details/GIS-Data>



ADAPTATION STRATEGY

Building a resilience framework for Sullivan’s Island should be coordinated, planned and integrated among all Town Departments and across other agencies, and communities in the region.⁴ A multifaceted strategy should include the following adaptation actions for addressing rising waters:

- **ACTION 1:** Stormwater infrastructure improvements
- **ACTION 2:** Drainage outfall improvements
- **ACTION 3:** Regulatory compliance with SI Floodplain Ordinance
 - × Residential stormwater plans (SWP)
 - × Deed restrictions – Non-conversion Agreements
- **ACTION 4:** Outreach and community engagement (Community Rating System)

Action 1: Stormwater Infrastructure Improvements

One of most effective strategies for community resilience will involve investment and planning for physical infrastructure improvements. In the next fifty years, the Town should commit to prioritizing stormwater drainage improvement projects to enhance drainage and protect against sea-level rise and flooding. The Town has begun the process of identifying where these island-wide stormwater collection deficiencies are located by working with a local engineering firm. This project is intended to identify critical areas of the Island that experience decreased stormwater drainage for lack of maintenance or a complete lack stormwater conveyance facilities. Major areas identified are the facilities and outfall of the Station 18 and Station 28 watershed basins. Map 10.1 and 10.2 depict the major watershed areas of the Island, which are now being considered under a FEMA grant.

MAP 10.1



4. City of Charleston, Sea Level Rise Strategy December 2015



MAP 10.2



South Basin Improvement: Station 17 to 20 watershed: This project will study the available conveyance system from Station 17 to 20, and between Middle Street and Atlantic Avenue. Severe flooding frequently occurs between Atlantic Avenue and Middle Street during all major flooding events since 2015.

North Basin Drainage Improvement: This project will capture the Station 28 ½ to Station 32 water shed, which falls between Middle Street and Marshall Boulevard. Severe flooding has occurred in this area for each of the above-mentioned storm events and very little drainage is currently available.

Action 2: Drainage Outfall Improvements:

Most of the Island's surface drainage has long relied upon the major outfalls adjacent to the marsh. The two major watershed basins drain water from highland areas through reinforced concrete pipes (RCP), open ditches, and surface sheet-flow. The Town should encourage SCDOT and Charleston County to improve all pipes, ditches, and outfall junction devices to prevent leakages; and, retrofit pipes with backflow prevention devices to prevent the counter flow of stormwater drainage during king tides, storm surge and rising sea levels.

Action 3: Enforcement of Local Regulations

Non-conversion Agreements: Non-conversion agreements are a Town strategy for ensuring newly constructed projects remain in compliance with local regulations. Each agreement is considered mandatory prior to allowing the use of a new facility. The agreement serves as a deed restriction on the property that confirms no modifications or conversion of enclosed space will occur below the FEMA Base Flood Elevation.

Stormwater plans: In 2016 the Town began requiring property-wide stormwater management plans for any new development proposing an impervious surface of 625 square feet or more. Most new home construction projects and additions select from a variety of best management practices which may be designed as part of their overall building-permit application. A professional civil engineer or registered landscape architect must certify that these plans are constructed correctly and maintained.



MAP 10.3



Action 4: Community Outreach Strategies (Community Rating System)

In addition to taking action on Island-wide drainage projects, the Town participates in the National Flood Insurance Program (NFIP). As part of its longtime participation, the Town enforces regulations and building codes that require flood resistant construction and requirements for stormwater quality and control.

The Town has adopted a “freeboard” requirement that mandates all new structures or substantial improvements be built an additional one foot above the designated base flood elevation (BFE). Nearly the entire Island is located within the floodplain or Special Flood Hazard Area (SFHA), so compliance with these standards is of the utmost importance. The Town is also a member of the NFIP Community Rating System (CRS). This program recognizes community outreach practices that make properties more resistant to flood damage and aware of the impacts of sea level rise. The Town recently received an improvement in its ISO flood class rating from a 6 to a 5. This class 5 rating lowers the cost of flood insurance for all citizens and businesses by 25%. In June 2016, FEMA released a draft of the new FIRM data indicating substantial changes to the Island’s SFHAs. Town staff anticipates adoption of this new data in early 2019.



As described in the City of Charleston Sea Level Rise Strategy, “Part of resilience is knowing one can’t plan for everything that may occur but instead being able to deal with and adapt to unexpected situations.” The above noted actions will improve the Town’s “response to, communication during, and management of flooding and related events to minimize service disruptions and to ensure public safety and quality of life. The adaptation actions presented in this chapter will help improve the Town’s response to, communication during, and management of flooding and related events to minimize service disruptions and to ensure public safety and quality of life. The Town anticipates adoption of new FIRM data which will result in lower flood zones island-wide. This will not only ⁵reduce the number of substantial improvement elevations required but also protect historic structures from damaging the character of their surrounding districts through incompatible alterations.



*Stormwater outfalls:
A damaged and cracked pipe on the right is located well below the water level creating problems with drainage.*



*Open ditches:
Unmaintained ditches can obstruct water flow and overall functionality of the storm drainage system.*

5. City of Charleston, Sea Level Rise Strategy December 2015

