

COASTAL FLOODING IN SHOREHAM: RESPONDING TO CLIMATE CHANGE RISKS

General Instructions

Shoreham, a 65,000-person coastal town in New England, is known as a great place to live. It boasts low unemployment, a strong working and middle-class, an educated workforce, and great beaches. It has weathered economic highs and lows because it has a diversified economy focused on healthcare, tourism, and professional services. While the town government has been recognized by the state for its exemplary budgeting practices, it has recently begun to confront the challenge of improving its aging infrastructure.

In recent years, Shoreham residents have been startled by the number of “freak” storms that have hit their town and region. Big rainstorms, snowstorms, and hurricanes are particularly dangerous because many businesses and homes are concentrated along the waterfront, where the town is most susceptible to flooding. Storm surges, which occur when strong winds create a sudden rise in ocean water levels, result in flooding along the shoreline where the town’s most profitable businesses and expensive homes are located. Coastal flooding and storm surges have damaged public and private property in recent years, and some businesses have experienced substantial losses. Luckily, no one has been seriously injured by storms or flooding so far.

When a storm rolled through a few months ago, a local TV station featured a story about local climate change risks. Dramatic footage depicted marinas, parking lots, and even homes under several feet of water as the sea surged over existing seawalls. Shoreham became a striking example for a local college professor’s claim that “Climate change may be caused by millions of irresponsible decisions around the globe, but it’s up to local communities to deal with the impacts.” Residents and business owners demanded that the town do *something* about changing coastal flooding risks, saying they want protection from the long-term effects of flooding, sea level rise, and climate change.

In response, **the Town Manager convened the Coastal Flooding Task Force to figure out how to reduce the town’s vulnerability and increase its capacity to respond to coastal flooding, particularly considering climate change.** The Task Force needs to come up with a proposal that is fiscally responsible and environmentally sound. Its members include the Assistant Town Manager, the Town Planner, the Director of the Association to Preserve Shoreham County, the Director of the Shoreham Chamber of Commerce, the owner of Shoreham Realty, and the President of the Shoreham Shores Civic Association.

About Today's Meeting

The Task Force has met four times over the past two months. At the first meeting the group was given a climate change risk assessment (see Appendix A), prepared by climate change experts at the nearby Brackley College. The climate projections in the risk assessment were created using well-established forecasting techniques and the best available scientific data.

At its second and third meetings, the group identified three basic approaches for addressing coastal flooding: “protecting” through flood protection infrastructure, “accommodating” through flood-proofing homes and businesses, and “retreating” by reducing development in flood-prone zones and moving people and buildings out of harm’s way. The Task Force then generated a variety of options for how they might undertake each approach.

At today’s meeting, **the Task Force must agree upon a specific recommendation for addressing current and future flooding risk. This recommendation will be presented** to Town Council members, who know that voters are watching. **The Town Council has agreed to implement any proposal put forth by the Task Force that has the support of at least five out of six voting members, although the Town Council would prefer a full consensus.**

Today, the group will have 60 minutes to reach agreement on how the town should approach each of the following three strategies for reducing flooding risk:

1. Flood protection infrastructure (“protecting”)
2. Flood-proofing (“accommodating”)
3. Land use management (“retreating”)

Issues for Today's Meeting

Flood Protection Infrastructure

Shoreham’s coastline is dotted with individual seawalls and bulkheads, commonly called armoring. These structures can provide a high level of flood and hurricane protection for the properties they protect, at least for some period of time. However, this type of armoring deflects storm surge onto—and thereby often exacerbates flooding on—nearby properties. In fact, some of the homes and public facilities that were most damaged during the last major storm were directly adjacent to armored properties. Armoring also causes beach erosion over time, erodes nearby wetlands, and prevents wetlands from migrating inland. It has become much harder to get permission to build seawalls or employ other armoring techniques in Shoreham in the past decade because of these ecological impacts.

The town could either reduce or increase the amount of armoring along its coast to respond to the changing coastal flooding risks. It could mandate the removal of all coastal armoring, offer funds for property owners who want to remove coastal armoring on their own (through an armoring “buyback” program), or allow additional properties to armor their coastlines.

Flood-proofing

To reduce coastal risks in Shoreham the town could require or subsidize flood-proofing of all the buildings in its 100-year or 500-year floodplains¹. Shoreham government officials expect that they could get some state and federal help with this, though they anticipate that they would still have to commit a large amount of local funds if they decide to subsidize flood-proofing.

There are three major types of flood-proofing. Elevating buildings by putting them on stilts is the most expensive option. “Dry” flood-proofing, which makes the underside of new buildings watertight to prevent floodwaters from entering, is a little cheaper. Finally, “wet” flood-proofing modifies the lower portion of existing buildings—crawlspaces or basements—to reduce flood damage when and if water enters.

Land Use Management

Shoreham’s Planning Department is considering new zoning regulations that would limit new development or move buildings out of harm’s way. This could involve restricting new development in the town’s 100-year or 500-year floodplain. While these options would not have any revenue impacts up front, they would eventually reduce the property taxes the town receives and could impact the expansion of existing businesses or construction of new ones.

The town could also commit some funding to apply for state and federal matching grants. Grant money would be used to buy out severely impacted property owners, remove existing buildings, and restore beachfronts that have been destroyed in the 100-year floodplain.

Members of the Task Force

Assistant Town Manager

The Assistant Town Manager oversees budgeting and finances in the town. The Town Manager has been concerned about covering the cost of much-needed improvements for aging infrastructure while keeping taxes as low as possible.

Town Planner

The Town Planner is in charge of long-range planning through the Planning Department, which oversees implementation of Shoreham’s Master Plan and enforces zoning requirements. The Town Planner is very concerned about coastal flooding and is excited to have help from climate change advisors from nearby Brackley College.

Association to Protect Shoreham County, Executive Director

The Association to Protect Shoreham County is a well-known environmental group that has worked hard to improve water quality in the region’s rivers and ponds and to conserve wetlands. Recently, the Association has raised opposition to coastal armoring in neighboring towns.

¹ The 100-year floodplain refers to an area that has a 1% chance of flooding in any given year. The 500-year floodplain refers to an area that has a 0.2% chance of flooding in a given year. These floodplains are based on previous climate data, and are subject to change based on changes in climatic conditions, such as sea level rise and more frequent severe storms.

Shoreham Chamber of Commerce, Executive Director

The Shoreham Chamber of Commerce represents over 300 businesses, about a third of which are tourism-related. Quite a few are located on the water, and even more are located in Shoreham's downtown business district, about half of which is in the 500-year floodplain. The director owns a private marina and boat repair shop in Shoreham Harbor. The marina suffered some damage in the most recent storm, yet the director remains skeptical of Brackley College's climate change projections.

Shoreham Realty, Owner

The owner of Shoreham Realty focuses on high-value residential property along the town's waterfront. Only a few of these property owners are active in town government, and Shoreham Realty often finds itself representing their interests (as a sizeable portion of the town's tax base) in town politics.

Shoreham Shores Civic Association, President

Shoreham Shores is a middle-class neighborhood made up of single-family homes, over half of them located on or near the waterfront. The Civic Association has been quite vocal in its opposition to property tax increases, though some of its members have become increasingly worried about damage to their homes as a result of coastal flooding.

Facilitator, Brackley College

For this final meeting, the Assistant Town Manager invited a trained facilitator—someone entirely neutral—to help with the discussion and keep the parties engaged. Everyone has agreed that having a facilitator from the local college will be beneficial to the group's discussion.

Summary of Options with Estimated Costs to the Town

Flood Protection Infrastructure

- 1.1: Do nothing. (0)
- 1.2: Create a town-wide buy back program for coastal armoring. (\$\$)
- 1.3: Mandate that all armored properties remove armoring within two years. (0)
- 1.4: Allow properties in vulnerable zones to armor their coastline. (0)

Flood-proofing

- 2.1: Do nothing. (0)
- 2.2: Require homes and businesses in the 100-year floodplain to flood-proof. (0)
- 2.3: Offer flood-proofing subsidies to homes and businesses in the 100-year floodplain. (\$\$)
- 2.4: Require homes and businesses in the 500-year floodplain to flood-proof. (0)
- 2.5: Offer flood-proofing subsidies to homes and businesses in the 500-year floodplain. (\$\$\$\$)

Land Use Management

- 3.1: Do nothing. (0)
- 3.2: Reduce future development in the 100-year floodplain through new zoning regulations. (\$)
- 3.3: Reduce future development in the 500-year floodplain through new zoning regulations. (\$\$)
- 3.4: Apply for state/federal funds to buy back impacted properties in the 100-year floodplain. (\$)

Appendix A: Climate Change Risk Assessment Memo

From: Brackley College Science Advisory Committee
To: Shoreham Coastal Flooding Task Force
Re: **Summary of Climate Risks Facing Shoreham**

This memo provides key information about climate change risks facing Shoreham. The Risk Assessment is based on a careful review of detailed climate forecasts and modeling results produced by the federal agencies and Brackley College climate change scientists.

The following key impacts were identified for Shoreham:

- **The number of extreme rain and snowstorms** is expected to increase. This will result in more coastal storms, thus more coastal flooding.
- **Sea level will rise.** This will increase the intensity of coastal flooding, especially during high tides and as a result of storm surges.

As long as records have been kept, Shoreham has experienced an average of about five **major storms** (two inches of rain in 48 hours) every year. Such events are likely to increase by:

- 1 - 1.5 additional events per year by 2030
- 1 - 2 additional events per year by 2050
- 2 - 5 additional events per year by 2080

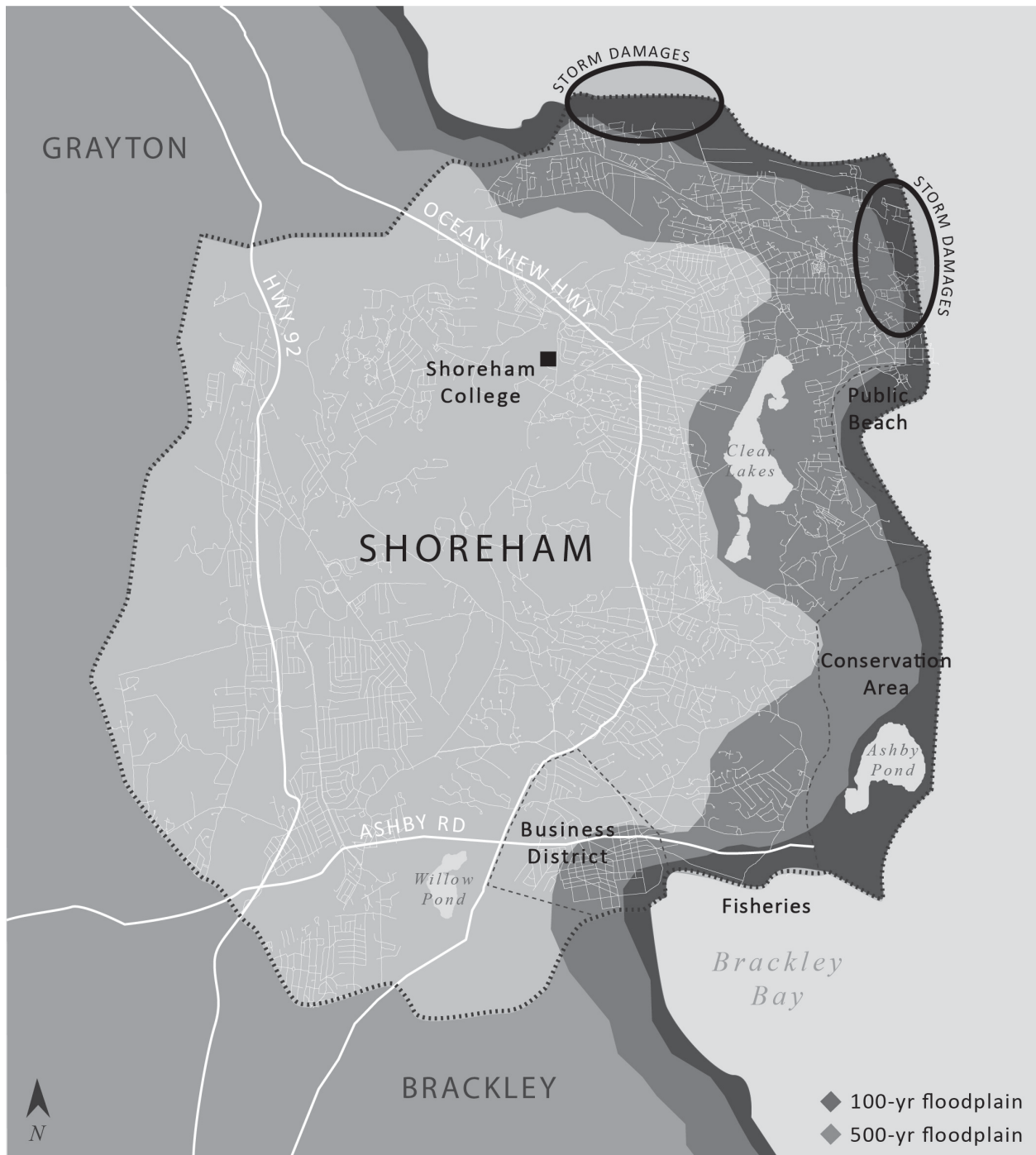
Given the increasing frequency of storms, the coastal floodplain area will be reshaped. By 2050, it's likely that the 500-year floodplain (the area that currently has a 0.2% chance of flooding every year) will become the 100-year floodplain (the area that currently has a 1% chance of flooding every year). This means that the most serious floods will be five times more likely to happen.

Sea level is expected to rise by:

- 0.6 - 0.9 ft by 2030
- 1.1 - 1.8 ft by 2050
- 2.2 - 4.9 ft by 2080

The more vulnerable parts of Shoreham are only affected by flooding during Category 3, 4, or 5 hurricanes, when storm surges push water from the ocean into vulnerable zones. If sea level rises two feet, flooding could be much more serious during Category 1 or 2 hurricanes. With four feet of sea level rise, flooding could become a problem during every normal storm. **Without more complex modeling work, it is difficult to know exactly how the coastal floodplain will change, but Brackley College scientists can say with near certainty that sea level rise will increase the probability and intensity of flooding.**

Appendix B: Map of Shoreham



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