

2022

Scituate, MA Hazard Mitigation Plan

DRAFT

Prepared by:



Town of Scituate Hazard Mitigation Plan
Scituate, Massachusetts

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**Formal Adoption Letter
(Board of Selectmen)
Comes after MEMA/FEMA approval of DRAFT**

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Table of Contents

<u>SECTION 1.0 - INTRODUCTION</u>	1
1.1 Overview	1
1.2 What Hazard Mitigation Can Do for Scituate	2
1.3 Scituate’s Mission Statement	2
1.4 Goals	2
1.5 Planning Process	3
1.6 Environmental Setting	10
1.7 History of Disaster Declarations	12
1.8 Recent Disaster Declarations	12
1.8.1 Severe Winter Storm/Snow – FEMA 4372	13
1.8.2 Covid-19 Pandemic – FEMA 4496	13
<u>SECTION 2.0 - RISK ASSESSMENT</u>	14
2.1 Introduction	14
2.2 Hazard Identification	14
2.3 Hazard Profiles	15
2.3.1 Flood-Related Hazards	21
2.3.2 Winter-Related Hazards	54
2.3.3 Wind-Related Hazards	59
2.3.4 Geologic-Related Hazards	79
2.3.5 Extreme Heat-Related Hazards	82
2.3.6 Drought-Related Hazards	85
2.3.7 Urban Fire/Wildfire-Related Hazards	88

2.3.8 Invasive Species-Related Hazards	90
2.4 Vulnerability	92
2.4.1 Development Trends.....	92
2.4.2 Economic Vulnerability	95
2.4.3 Social Vulnerability	104
2.4.4 Environmental Vulnerability.....	110
2.5 FEMA Disaster Grant Assistance.....	110
<u>SECTION 3.0 –CAPABILITY ASSESSMENT</u>	112
3.1 Introduction	112
3.2 Planning and Regulatory Capabilities	112
3.3 Administrative and Technical Capabilities.....	128
3.4 Financial Capabilities.....	137
3.5 National Flood Insurance Program.....	138
3.6 Community Rating System.....	139
3.7 Existing Protection Matrix	139
<u>SECTION 4.0 – MITIGATION STRATEGY</u>	146
4.1 Introduction	146
4.2 Mitigation Activities.....	146
4.3 Mitigation Action Plan.....	146
<u>SECTION 5.0 – PLAN IMPLEMENTATION AND MAINTENANCE</u>	188
5.1 Implementation, Evaluation and Revision of Plan.....	188
5.2 Continued Public Involvement	188

REFERENCES.....

APPENDICES.....

Appendix A: Maps

Appendix B: Public Information/Outreach and Local Plan Adoption

Appendix C: Correspondences

LIST OF FIGURES

2-1 Coastal Zone Evacuation Zone Map..... 15

2-2 Historic Shoreline Change Transect Series..... 30

2-3 Observed Sea Level Rise, Boston Tide Station..... 38

2-4 Storm Tide Pathways Scituate and Cohasset 41

2-5 Infiltration/Inflow High and Low Priority Areas 44

2-6 Wind Zones..... 61

2-7 Hurricane Eavcuation Zones, Scituate..... 70

2-8 National Weather Service Heat Index..... 83

2-9 Drought Occurrences Over the Last 100 Years..... 87

2-10 Wildland Urban Interface Zones 89

LIST OF TABLES

1-1 2016 Plan Report Card..... 5

1-2 Federal Emergency and Major Disaster Declarations 12

2-1 Risk Assessment Matrix 2018 Update..... 18

2-2 Hazard Index..... 19

2-3 Flood-Related Hazard Events 22

2-4 Precipitation Projections	26
2-5 Inventoried Dams	27
2-6 Town of Scituate Coastal Grants	39
2-7 Winter-Related Hazard Events	54
2-8 Extreme Cold Temperature Projections	58
2-9 Wind-Related Hazard Events	61
2-10 Saffir-Simpson Hurricane Wind Scale	67
2-11 Enhanced Fujita Scale	71
2-12 TORRO Hain Intensit Scale	73
2-13 Modified Mercalli Intensity Scale	80
2-14 Richter Magnitude Scale	81
2-15 Extreme Heat Related Events	83
2-16 Extreme Heat Temperature Projections	84
2-17 Drought-Related Hazard Events	86
2-18 Vulnerability Matrix 2022	92
2-19 NFIP Activity in Scituate	95
2-20 Total Vulnerability FEMA 100-Year Flood Zones Summary	95
2-21 Total Vulnerability FEMA 500-Year Flood Zones Summary	96
2-22 Total Vulnerability FEMA VE Flood Zones Summary	97
2-23 Total Vulnerability Sea Level Rise 1-Foot Scenario	98
2-24 Total Vulnerability Sea Level Rise 3-Foot Scenario	99
2-25 Total Vulnerability Hurricane Category 1	100
2-26 Total Vulnerability Hurricane Category 2	101

2-27 Total Vulnerability Hurricane Category 3	102
2-28 Total Vulnerability Hurricane Category 4	103
3-1 Actions for Continued Compliance with NFIP	138
3-2 Existing Protections Matrix	140
4-1 STAPLEE Review and Selection Criteria	148
4-2 STAPLEE Analysis	150
A-1 Critical Facilities	Appendix A
A-2 Vulnerable Populations	Appendix A

LIST OF MAPS

- 1-1 Location Map**
- 2-1 Flood Hazard Areas**
- 2-2 Earthquakes**
- 2-3 Hurricanes/Tornadoes**
- 2-4 Average Annual Snowfall**
- 2-5 Critical Facilities/Vulnerable Populations:**
 - 2-5.1 Critical Facilities NW Quadrant**
 - 2-5.2 Critical Facilities SW Quadrant**
 - 2-5.3 Critical Facilities NE Quadrant**
 - 2-5.4 Critical Facilities SE Quadrant**
 - 2-5.5 Vulnerable Populations NW Quadrant**
 - 2-5.6 Vulnerable Populations SW Quadrant**
 - 2-5.7 Vulnerable Populations NE Quadrant**

2-5.8 Vulnerable Populations SE Quadrant

2-6 Sea Level Rise Various Scenarios:

2-6.1 Sea Level Rise Various Scenarios NW Quadrant

2-6.2 Sea Level Rise Various Scenarios SW Quadrant

2-6.3 Sea Level Rise Various Scenarios NE Quadrant

2-6.4 Sea Level Rise Various Scenarios SE Quadrant

2-7 Sea Lake and Overland Surge:

2-7.1 SLOSH NW Quadrant

2-7.2 SLOSH SW Quadrant

2-7.3 SLOSH NE Quadrant

2-7.4 SLOSH SE Quadrant

Section 1 Introduction

1.1 Overview

Each year in the United States, disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters because additional expenses to insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many disasters are predictable, and much of the damage caused by these events can be alleviated or even eliminated.

Hazard mitigation is defined by the Federal Emergency Management Agency (FEMA) as “any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event.” The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of \$4 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council 2005).

Natural hazard mitigation planning is the process of determining how to reduce or eliminate the loss of life and property damage resulting from natural hazards such as floods, earthquakes and hurricanes. Hazard mitigation means to permanently reduce or alleviate the losses of life, injuries and property resulting from natural hazards through long-term strategies. These long-term strategies include planning, policy changes, programs, projects and other activities.

This plan update was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the *Federal Register* on February 26, 2002 (44 CFR §201.6) and finalized on October 31, 2007 (hereafter, these requirements and regulations will be referred to collectively as the Disaster Mitigation Act). While the act emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet in order for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). Because the Town of Scituate is subject to many kinds of hazards, access to these programs is vital.

Information in this plan update will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to the community and its property owners by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruption. The Town of Scituate has been affected by

hazards in the past and is thus committed to reducing future disaster impacts and maintaining eligibility for federal funding.

This 2022 plan update represents a local jurisdiction plan that will serve as a stand-alone document relative to the Town of Scituate (with references to the State Hazard Mitigation Plan for consistency). The Town received a FEMA grant to develop a local hazard mitigation plan (HMP) update.

1.2 What Hazard Mitigation Can Do for the Town of Scituate

A primary benefit of hazard mitigation is that preventative measures taken now can significantly reduce the cost of post-disaster cleanup tomorrow. In addition, mitigation actions conducted before hazards occur greatly reduces the impact and costs associated with the aftermath of a hazard event. By planning ahead, Scituate will minimize the economic and social disruption that can result from floods, snowstorms, and hurricanes and other natural disasters.

The adoption and implementation of this plan update will assist Scituate in remaining eligible to receive assistance from FEMA in both pre- and post-disaster assistance such as: FEMA's Community Rating System (CRS), FEMA's Building Resilient Infrastructure and Communities (BRIC), Flood Mitigation Assistance (FMA) Program, and FEMA's Post-Disaster Hazard Mitigation Grant Program (HMGP).

1.3 Scituate's Mission Statement

The purpose of the Scituate Hazard Mitigation Plan is to preserve and enhance the quality of life, property, and resources. By identifying all potential natural hazards impacting the community today and into the future, and implementing mitigation actions to protect Scituate's population, infrastructure, and historical, cultural, and natural resources, we will ensure a resilient community.

1.4 Goals

The Scituate Hazard Mitigation Planning Team (HMPT) met to evaluate the existing goals from the 2016 Plan and determined that with a few minor revisions, the general content of the goals continue to be relevant and applicable to the Town:

1. Prevent and reduce the loss of life, injury, and property damages resulting from all natural hazards.
2. Prevent and reduce damage to public infrastructure resulting from all hazards.
3. Educate the public regarding vulnerabilities to natural hazards and steps to take towards increased resiliency.
4. Facilitate regional coordination/collaboration for hazards affecting multiple communities.

5. Identify and seek funding for measures to mitigate or eliminate significant hazards.
6. Integrate hazard mitigation planning as an integral element in all relevant municipal departments, committees, boards and projects.

1.5 Planning Process

A hazard mitigation plan should be considered a living document that must grow and adapt, keeping pace with a community's growth and change. The DMA of 2000 places high priority on the continuation of the planning process after the initial submittal, requiring communities to seek and receive re-approval from FEMA in order to remain eligible for assistance. The evaluation, revision and update process are also a means to create an institutional awareness and involvement in hazard mitigation as part of daily activities.

The Town of Scituate, with the assistance of the Horsley Witten Group, Inc. (HW) developed this plan update. The Scituate HMPT from the 2016 plan was again, re-energized and enhanced to provide a broad spectrum of local knowledge and experience to complete this 2022 plan update.

Members of the Scituate HMPT include:

- Kyle Boyd – Director of Planning and Development
- John Murphy – Fire Chief/Emergency Management Director
- Karen Joseph – Town Planner
- Sean McCarthy – Supervisor of Engineering/Public Works
- William Branton – Sewer Division Supervisor
- Amy Walkey – Conservation Agent/Natural Resources Officer
- Robert Vogel – Building Commissioner/Zoning Enforcement Officer
- Margaret Loughlin – Resident
- Ben Haskell – Environmental/NOAA
- James Canavan – Academia
- Mark Thompson – Police Chief
- Dan Smith – Engineering
- Andrews Scheele – Director, Board of Health
- Corey Miles – Coastal Management Officer
- Sara Grady – North and South River Watershed
- Lynda Ferguson – Business Owner
- Craig Pereira – Consultant, Horsley Witten Group, Inc.

The Horsley Witten Group, Inc. conducted a series of meetings from August 27, 2020 through March 2022 with the Scituate HMPT, municipal officials, the community, and representatives of MEMA. The public workshops were held in an open public forum and in accordance with M.A.G.L. c. 30A, Sections 18 - 25 in complying with the requirements of the Federal Disaster Mitigation Act of 2000 (DMA 2000). Due to the COVID-19 Pandemic, public workshops were held virtually.

A project webpage was designed and hosted on the Town's municipal website to announce the project, inform and engage the community before, during and after plan development, and to serve as a repository of project documents, presentations, and summaries. A PDF of the project webpage layout is included in Appendix B.

A series of Municipal Interviews (in-person, telephone and email correspondence) were conducted early in the update process for the development of the 2016 Plan Report Card (Table 1-1), identification of accomplishments since the 2016 Plan, and preliminary identification of mitigation measures for consideration in the plan update.

In-Person Interviews:

- William Branton – Sewer Division Supervisor
- Karen Joseph – Town Planner
- Amy Walkey – Conservation Agent
- Robert Vogel – Building Commissioner
- James Canavan - Academia

**Table 1-1
2016 Plan Report Card (2022 Update) Scituate, Massachusetts**

<i>Mitigation Measure</i>	<i>Location</i>	<i>Ownership</i>	<i>Natural Hazard</i>	<i>Primary Problem/Effect</i>	<i>Mitigation Objective</i>	<i>Risk H-Historical P- Potential</i>	<i>2021 Status</i>
Elevate repetitive/severe repetitive loss structures (homes and/or utilities)	Town-wide	Private	Flooding; Sea Level Rise; Storm Surge; Hurricanes	Damages to private property, secondary contamination potential	Reduced damages/costs to private property	H and P	Partially completed...remains ongoing, carry forward into update
Protect key roads, bridges and intersections (elevate/enhance drainage, roads, bridges and/or flood prevention structures to facilitate ingress/egress during storm events)	Town-wide	Public	Flooding; Sea Level Rise; Storm Surge; Hurricanes	Damages to public infrastructure/cost of cleanup/compromised public safety	Reduced damages/costs to public infrastructure/improved public safety	H and P	Partially Completed ... remains ongoing, carry forward into update
Foreshore protection (repair/replace seawalls and revetments to improve resilience from storm surge, coastal flooding and sea level rise)	Coastal areas	Public/Private	Flooding; Sea Level Rise; Storm Surge; Hurricanes	Damages to public/private property and infrastructure/cost of cleanup/compromised public safety	Reduced damages/costs to public/private property and infrastructure/improved public safety	H and P	Partially Completed ... remains ongoing, carry forward into update

**Table 1-1
2016 Plan Report Card (2022 Update) Scituate, Massachusetts**

<i>Mitigation Measure</i>	<i>Location</i>	<i>Ownership</i>	<i>Natural Hazard</i>	<i>Primary Problem/Effect</i>	<i>Mitigation Objective</i>	<i>Risk H-Historical P- Potential</i>	<i>2021 Status</i>
Drainage/Culvert repairs, improvements and upgrades (upgrade, repair and improve undersized culverts and drainage systems to reduce/eliminate stormwater related flooding)	Town-wide	Public	Flooding; Sea Level Rise; Storm Surge; Hurricanes	Damages to public infrastructure/cost of cleanup/compromised public safety	Reduced damages/costs to public infrastructure/improved public safety	H and P	Partially Completed ... remains ongoing, move to Capability Assessment
CRS participation/implementation of public information program (Implement PPI actions related to flood awareness and prevention to improve the current CRS rate)	Town-wide	Public	Flooding; Sea Level Rise; Storm Surge; Hurricanes	Resident's lack of knowledge regarding vulnerabilities	Improve the current CRS rating/increase resident's knowledge of vulnerabilities	H and P	Not Completed... Carry forward
Complete Coastal Assessment (prepare comprehensive coastal assessment of coastal erosion and engineering for flood protection measures along the coast)	Coastal areas	Public/Private	Flooding; Sea Level Rise; Storm Surge; Hurricanes	Damages to public/private property and infrastructure/cost of cleanup/compromised public safety	Reduced damages/costs to public/private property and infrastructure/improved public safety	H and P	Completed

**Table 1-1
2016 Plan Report Card (2022 Update) Scituate, Massachusetts**

<i>Mitigation Measure</i>	<i>Location</i>	<i>Ownership</i>	<i>Natural Hazard</i>	<i>Primary Problem/Effect</i>	<i>Mitigation Objective</i>	<i>Risk H-Historical P- Potential</i>	<i>2021 Status</i>
Implement recommendations of Coastal Assessment	Coastal areas	Public/Private	Flooding; Sea Level Rise; Storm Surge; Hurricanes	Damages to public/private property and infrastructure/cost of cleanup/compromised public safety	Reduced damages/costs to public/private property and infrastructure/ improved public safety	H and P	Not Completed... Carry forward
Beach/Berm nourishment and replenishment (design, develop and replenish beach and cobble berm protection measures)	Coastal areas	Public/Private	Flooding; Sea Level Rise; Storm Surge; Hurricanes	Damages to public/private property and infrastructure/cost of cleanup/compromised public safety	Reduced damages/costs to public/private property and infrastructure/ improved public safety	H and P	Partially Completed ... remains ongoing, carry forward into update
Install strategic power grid shutoffs (to isolate flood-prone and storm damage sensitive coastal areas)	Coastal areas	Public/Private	All hazards	Compromised level of services/compromised public safety	Continuity of services/improved public safety	H and P	Completed
Installation of generators (at critical municipal communications facilities)	Town-wide	Public	All hazards	Compromised level of services/compromised public safety	Continuity of services/improved public safety	H and P	Completed

The Scituate HMPT first met (virtually) on November 18, 2020 to kick off the HMP update. At this meeting, the HMPT confirmed its membership, reviewed the project scope and revised schedule, discussed project coordination, reviewed proposed revisions to the plan update's mitigation measures layout (utilization of hazard mitigation categories) and identification of risks content (to include climate change), initiated the completion of the 2016 plan report card, and discussed the logistics for the first Public Workshop. A complete set of meeting materials is included in Appendix B.

The Scituate HMPT met for a second time (virtually) on April 29, 2021 to discuss elements of Section 1 Introduction and a discussion of Section 2 Risk Assessment elements, including the hazard index, critical facilities, GIS mapping update, and NFIP property data update and FEMA grant assistance since the 2016 plan. A complete set of meeting materials is included in Appendix B.

The first Public Workshop was held on July 27, 2021 (virtually). Announcements were posted on the project webpage, and emailed to Scituate Boards, Commissions and interested citizens. The presentation included an overview of the mitigation process, goals and measures, followed by a review of the 2016 Plan Report Card, and preliminary revisions to the plan update (based on personal interviews with municipal officials, boards, and commissions). The Workshop agenda, PowerPoint Presentation and Sign-In Sheet are included in Appendix B.

The Scituate HMPT met for a third time on September 2, 2021 to conduct a follow up to content needed for the update, review and confirm the mission statement and goals for the update, review the updated risk maps and economic vulnerability analyses, and complete the actions for continued NFIP compliance table. A complete set of meeting materials is included in Appendix B.

The Scituate HMPT met for a fourth time on February 1, 2022 to conduct the Benefit Cost Analysis (BCA review). The Project Consultant reviewed the 2022 Mitigation Actions (Table 4-2) which identified those actions: Ongoing – initially addressed but requires ongoing maintenance/attention, therefore, carried forward from the 2016 plan; Not addressed/partially addressed - revised from the 2016 plan; and, New - completely new action items. The Scituate HMPT completed the BCA review to prioritize/rank the action items, assigned time frames and responsible parties, and agreed on the proposed methodology/schedule for plan maintenance and plan update (based on FEMA requirements). A complete set of meeting materials is included in Appendix B.

The second Public Workshop was held _____, 2020 at the _____. Announcements were posted on the project webpage, and emailed to Scituate Boards, Commissions and interested citizens, copies have been included in Appendix B. The presentation included list of accomplishments to date, overview of preliminary mitigation actions, questions from the audience,

and identification of next steps. The Workshop agenda, PowerPoint Presentation and Sign-In Sheet are included in Appendix B.

Online Survey

The survey link was opened and available July 2021 through mid-January 2022 included a total of 285 responses. A brief summary of responses collected is included below. The full Survey Summary is included in Appendix B.

- Most residents/businesses have experienced winter (92%), wind (87%), flood-related (57%), and temperature (40%) hazard events in the past 20 years;
- Just over 31% of respondents feel they are adequately prepared to deal with a natural hazard event, with most getting their information from local news/social media (84%) and/or personal experience (76%) with one or more natural hazards;
- Most respondents are 'Very Concerned' with flood-related hazards (51%) and climate change projections (50%), followed by wind-related hazards (49.5%);
- 90% of respondents know for sure whether or not their property is located in/near a FEMA –designated floodplain;
- Just over (70%) of respondents are interested in making their home, business or neighborhood more resilient, with 72% willing to spend their own money to do so; and
- The top four choices to reduce damage/destruction of natural hazards in Scituate include:
 - Work to improve utility resilience: electric; communications; water/wastewater facilities (82%)
 - Retrofit public infrastructure, such as elevating roadways and improving drainage systems (60%)
 - Install/improve protective structures (floodwalls, sea walls) (58%)
 - Inform property owners of ways they can reduce the damage caused by natural events (47%)

With this information, the project consultant prepared the draft Scituate, MA Hazard Mitigation Plan update which was available for public comment from _____ through _____ (online, on the Town's website and hard copies available at the Town Hall (see Appendix C for Notice of Availability of draft) with only several comments returned.

This plan update was also forwarded to the neighboring communities of Cohasset, Christopher G. Senior – Town Manager, Hingham, Chief Steve Murphy – Emergency Management Director, Norwell, Chief Dave Kean – Emergency Management Director, Marshfield, Greg Guimond – Town Planner who received notice of the draft update availability on the Town of Scituate's website, with no comments returned. The draft was submitted to the Scituate Select Board for approval to forward on up to MEMA, then forwarded to MEMA

for consideration. It is the intention of the Scituate HMPT that the Hazard Mitigation Plan update be an available and pertinent source of information to a wide variety of individuals and interests. The plan update also has a specific and pragmatic function. By identifying and prioritizing local mitigation needs, the plan update has already served, and will continue to serve, as a basis for amendments to local policies and regulations.

State authorities will incorporate information compiled in this document into the State Hazard Mitigation Plan, to strengthen the statewide knowledge and idea-base for mitigation planning. A well-prepared and locally adopted plan can demonstrate understanding and commitment, two important variables when vying for limited, high-demand resources.

1.6 Environmental Setting

Scituate was settled in 1627 and incorporated in 1636. The town name refers to the Wampanoag term for cold brook, *satuit*. Scituate is a mid-sized seacoast community located equidistant between Boston and Plymouth. The town has a total area of 31.8 square miles, including 17.6 square miles of land and 14.2 square miles of water. According to the 2020 US Census, there are 19,063 year-round residents. Scituate is bordered by Cohasset to the northwest, Norwell and Hingham to the west and Marshfield to the south. The Humarock portion of town is only accessible through the Town of Marshfield.

In the nearly 400 years since its incorporation, it has evolved from a summer colony to a residential community. Ocean-related recreational activities make it a very desirable place in which to live and to raise families. Its Town Pier accommodates a working fishing fleet and three business areas. Storms have had a profound impact on the nature of the town. In November of 1898, the shores of Scituate were struck by the Portland Gale, one of the most severe storms of the century. Continuous, intense wave action during this extreme storm breached the connection between a long peninsula of barrier beach to the south and the rest of the town. This resulted in the separation of Humarock, which has remained part of Scituate but is accessible only through the Town of Marshfield.

Scituate has the highest reimbursements in the state for claims paid by the National Flood Insurance Program (NFIP) : over \$70 million for 4,061 claims from 1978 to 2020. The next three communities on the list (Marshfield, Hull and Nantucket) together total \$59.2 million over the same period.¹

Demographics/Census

Based on the US Census, Scituate has seen an approximate five percent increase in population from 18,133 people in 2010 to 19,063 people in 2020. The median age is 46 years old. Twenty-two percent of the population is under 18. Sixty-eight percent of the population over 16 years of age reported that

¹ Scituate 2040 Master Plan.

they are employed. The median annual household income is estimated to be \$140,419 (2019).²

Land Use and Infrastructure³

The town Master Plan provides a blueprint for land use practices and goals for maintaining the character of the community while allowing development in a coordinated and managed process. Based on census data, in 2020 the estimated total number of dwelling units was 8,251 of which 7,163 are year-round units. According to the *Climate Vulnerability Assessment and Action Plan*, Scituate's land use contains over 48.8% forest and 20.7% open space and recreation land. The Town's infrastructure limits the amount of development, particularly the capacity and coverage of water and sewage services throughout the town, including areas suitable for development, such as North Scituate.

Historic and Natural Resource/Environmental Significance

Scituate was settled in 1627 and incorporated as a separate entity in 1636. In 1717 the western portion of town was separated and incorporated as the town of Hanover. In 1849 another western section of town was separated to form the current town of Norwell. Storm surge from the Portland Gale of 1898 breached the land connecting Humarock to Third Cliff, separating it from the rest of the town. There are over 1,000 resources listed on the National Register Historic Districts or properties, and properties listed with the State Register of historic places. As one of the original Plymouth Colony settlements, there are a number of sites of historic prominence. Four of the most important are the Scituate Lighthouse, Lawson Tower, the Old Oaken Bucket House, and the Maritime and Irish Mossing Museum.

Commerce, Industry, Academic⁴

Scituate's economy has evolved over time, from a hub of maritime businesses on its working waterfront to a largely service-based economy. Today, Scituate's economy consists largely of a small tourism sector, service and hospitality industries, small professional offices, healthcare, and other businesses that support the local residential population.

There are six public schools providing kindergarten through 12th grade. In addition, there is one private school providing programs from pre-kindergarten through grade 8. South Shore Regional Vocational Technical High School in Hanover provides vocational programs for grades 9 through 12.

² Census.gov.

³ Scituate 2040 Master Plan.

⁴ Ibid.

1.7 History of Disaster Declarations

Since 1953, FEMA Region 1 (the New England States) has endured more than 150 federal emergency (EM) and major disaster declarations (DR), 28 of which impacted Massachusetts. The following information (Table 1-2 below) gives an overview of the most significant past federal emergency and major disaster declarations for Massachusetts (and in particular Plymouth County, and including Scituate):

Table 1-2 Significant Federal Emergency and Major Disaster Declarations, Plymouth County

ID Number	Type	Date
DR-914	Hurricane Bob	August 1991
DR-920	Severe Coastal Storm	October 1991
DR-975	Winter Coastal Storm	December 1992
EM-3103	Blizzard/High Winds	March 1993
DR-1090	January Blizzard	January 1996
	May Windstorm	May 1996
DR-1142	Severe Storm/Flooding	October 1996
DR-1224	Heavy Rain/Flooding	June 1998
	March Flood	March 2001
DR-1364	Snow	February 2003
EM-3201	Snow	February 2005
EM-3252	Hurricane Katrina Evacuation	September 2005
DR 1614	Severe Storms/Flooding	May 2006
DR-1701	Severe Storms/Flooding	April 2007
EM-3296	Sever Winter Storm	December 2008
DR-1895	Severe Storms/Flooding	March 2010
EM-3315	Hurricane Earl	September 2010
EM-3330	Hurricane Irene	August 2011
EM-3350	Hurricane Sandy	October 2012
DR-4097	Hurricane Sandy	October 2012
DR-4110	Severe Winter Storm/Snow/Flooding	February 2013
DR-4214	Severe Winter Storm/Snow/Flooding	January 2015
DR-4372	Severe Winter Storm/Flooding	March 2018
DR-4496	Covid-19 Pandemic	March 27, 2020

Sources: 2019 Hazard Identification and Risk Assessment (HIRA), Commonwealth of Massachusetts, NOAA National Centers for Environmental Information, www.ncdc.noaa.gov.

1.8 Recent Disaster Declarations

The communities of Plymouth County (including Scituate) have experienced significant losses during several recent storms that have warranted FEMA to declare these storms as disasters. The following is a description of the one storm

since 2016 that has been declared as a disaster by FEMA and have affected the Town of Scituate.

1.8.1 Severe Winter Storm/Snow – March 2018 (FEMA DR-4372)

Low pressure moving out of the Ohio Valley passed south of Southern New England on the 2nd and moved out to sea on the 3rd. This storm brought heavy snow to northwest Massachusetts, heavy rain and strong winds to central and eastern Massachusetts, and coastal flooding to the coastline. Moderate to major coastal flooding took place over three tide cycles due to astronomically high tides and a persistent northeast wind. This built a storm surge of two to four feet along the Massachusetts East Coast.⁵

1.8.2 Covid-19 Pandemic – March 2020 (FEMA DR-4496)

The President declared a major disaster on March 27, 2020 as a result of COVID-19 that occurred from January 20, 2020 and continuing pursuant to his authority under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Pub. L. No. 93-288 (1974) (codified as amended at 42 U.S.C. § 5121 et seq.) ("Stafford Act"). This declaration, designated FEMA-4496-DR-MA, authorized Public Assistance Category B and the Crisis Counseling Program statewide. Authorized by Section 403 of the Stafford Act, FEMA may provide financial and/or direct assistance under Public Assistance Category B for emergency protective measures taken to respond to COVID-19 that are not authorized under other federal statutes. State, tribal, and local government entities and certain private nonprofit organizations throughout the entire state are eligible to apply for Public Assistance Category B. Authorized by Section 416 of the Stafford Act, FEMA may provide financial assistance under the Crisis Counseling Program to the state to provide professional counseling services or raining of disaster workers to victims of COVID-19 in order to relieve mental health problems caused or aggravated by COVID-19 or its aftermath.⁶

⁵ NOAA National Centers for Environmental Information, www.ncdc.noaa.gov.

⁶ <https://www.fema.gov/disaster-federal-register-notice/dr-4496-ma-public-notice-001>

Section 2 Risk Assessment

2.1 Introduction

The purpose of this section is to provide a comprehensive overview of how various natural hazards can impact Scituate. In this section natural hazards will be ranked in order of priority based on the frequency of occurrence and area of impact affected. Identifying the risk and vulnerability of Scituate to natural hazards is the primary factor in determining how to allocate finite resources to determine what mitigation actions are feasible and appropriate. The hazard analysis involves identifying the hazards that potentially threaten the town, and then analyzing them individually to determine the degree of threat that is posed by each natural hazard. Addressing risk and vulnerability through hazard mitigation measures will reduce societal, economic and environmental exposure to natural hazards impacts.

2.2 Hazard Identification

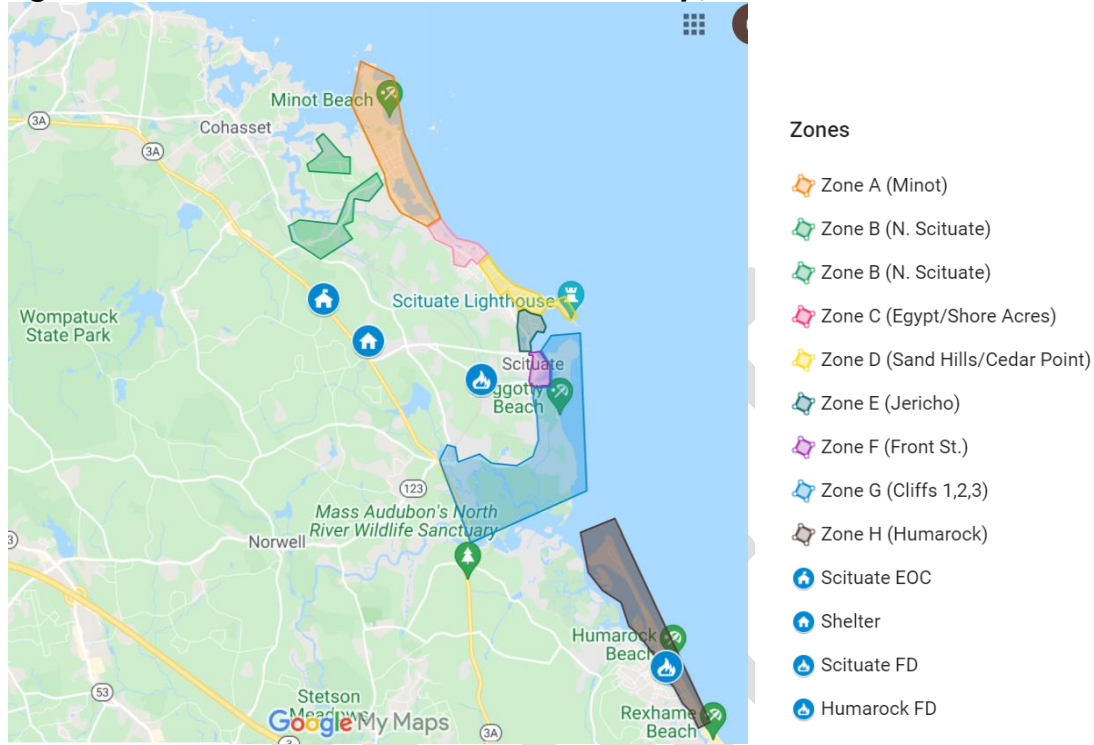
The Scituate HMPT evaluated each of the hazard types that may affect Scituate with the addition of Climate Change impacts on each hazard type. For the purposes of the 2022 plan update, and for consistency with the State Hazard Mitigation Plan, the Scituate HMPT decided to organize natural hazards into the following categories and listed in order of frequency and impact, beginning at the top of the list with the most frequently occurring natural hazards:

- Flood-Related Hazards
- Winter-Related Hazards
- Wind-Related Hazards
- Geologic-Related Hazards
- Drought/Extreme Heat-Related Hazards
- Urban Fire/Wildfire-Related Hazards
- Invasive Species-Related Hazards

The Horsley Witten Group, Inc. created new updated Town-wide Geographical Information Systems (GIS) mapping including Location Map (Map 1-1), Flood Hazard Areas Map (Map 2-1), Earthquakes Map (Map 2-2), Hurricanes/Tornadoes Map (Map 2-3), Average Annual Snowfall Map (Map 2-4), Critical Facilities and Vulnerable Populations separated into two topics then each topic further separated into four quadrants each for readability (Maps 2-5 through 2-5.8), Sea Level Rise Maps (Maps 2-6 through 2-6.4), and Hurricane Surge Inundation Maps (Maps 2-7 through 2-7.4). The Town's evacuation routes, and traffic control points are considered fluid dependent upon the event, location, and date/time of occurrence. The Town does maintain a coastal zone evacuation map (Figure 2-1) used for evacuation or emergency notification in case of a sea

wall breach or utility emergency and encourages utility companies serving Scituate to use the same.

Figure 2-1 Coastal Zone Evacuation Zone Map, Scituate MA



Source: Scituate Fire Department.

2.3 Hazard Profiles: Location, History and Probability of Future Occurrence

In assessing the hazards to a community, both the risk and the vulnerability must be taken into account. A hazard is the actual event that poses the danger to the community, (e.g. the hurricane, tornado, earthquake, etc. that threatens the Town). The term “risk” refers to the predicted impact that a hazard would have on people, services, specific facilities and structures in the community. The term “vulnerability” refers to the characteristics of the society or environment affected by the event that resulted in the costs from damages (Heinz Center Report, 1999, p. 105). The vulnerability of an area refers to its susceptibility to a hazard. The areas of the town affected by extreme natural events are identified by the hazard risk assessment. In determining the risk and vulnerability of the town, the likelihood, frequency and magnitude of damage from identified hazards are assessed.

In developing the Risk Assessment, the Scituate HMPT defined the risks that the Town could face and followed up with an assessment of the vulnerability of the at-risk areas, and the implications of experiencing natural disasters (e.g., loss of life, damage to the natural environment, property damage, and economic losses). Risk assessment is the determination of the likelihood of adverse impacts

associated with specific natural hazards, and vulnerability assessment is concerned with the qualitative or quantitative examination of the exposure of some societal component (i.e. economy, environment). The result of this process was the preparation of a Risk Assessment Matrix (Table 2-1 Risk Assessment Matrix 2022 Update) that lists the vulnerable areas and the primary effects from an event on these areas. The matrix was then used to establish mitigation benefits and develop mitigation strategies (Section 4).

Hazard Index

The Scituate HMPT evaluated each of the flood, winter, wind, fire, geologic, and invasive species-related hazards and collectively determined the likelihood of occurrence, locations affected, and potential impacts of each. This information was used to establish a Hazard Index (HI) value (HI=1 being lowest impact and HI=10 being highest impact) for each of the types of natural hazards and is presented in Table 2-2. The highest hazard index values were assigned to those natural hazards that were deemed to have the highest level of impact to the community. These hazards include winter-related hazards such as blizzards, snow and nor'easters (HI= 8), flood-related hazards such as inland/urban flooding and heavy rain, coastal flooding and coastal erosion/shoreline change (HI=7), and wind-related hazards such as hurricanes and high winds (HI=7).

The Hazard Index for this 2022 plan update utilizes language used in the FEMA State and Local Mitigation Planning How-to-Guide Series for frequency and severity categorization, including:

Criteria for Frequency Categorization:

Very low frequency: events that occur less frequently than once in 1,000 years (less than 0.1% per year).

Low frequency: events that occur from once in 100 years to once in 1,000 years (0.1% to 1% per year).

Medium frequency: events that occur from once in 10 years to once in 100 years (1% to 10% per year).

High frequency: events that occur more frequently than once in 10 years (greater than 10% per year).

The criteria used for severity categorization, based on past hazard events includes:

Criteria for Severity Categorization (based on past hazard events):

Minor: Limited and scattered property damage; no damage to public infrastructure; contained geographic area; essential services not interrupted; no injuries or fatalities.

Serious: Scattered major property damage; some minor infrastructure damage; wider geographic area; essential services are briefly interrupted; some injuries/fatalities.

Extensive: Consistent major property damage; major damage to public infrastructure; essential services are interrupted for several hours to several days; many injuries and fatalities.

Catastrophic: Property and public infrastructure destroyed; essential services stopped; thousands of injuries and fatalities.

DRAFT

Table 2-1
2022 Risk Assessment Matrix, Town of Scituate

Vulnerable Area	Location	Ownership	Natural Hazard	Primary Problems/Effects	Mitigation Benefits	Risk H-Historical P- Potential
Public Awareness/ Education	Town-wide	Public	Flooding; Sea Level Rise; Storm Surge; Hurricanes	Resident's lack of knowledge regarding vulnerabilities	Increased understanding of vulnerabilities; improved resilience	H and P
Repetitive Loss Properties	Town-wide	Public and Private	Flooding; Sea Level Rise; Storm Surge; Hurricanes	Damage to public and private property; Cost of cleanup; Compromised public safety	Reduced damages to public/private property; Minimized cleanup costs; Improved public safety	H and P
Municipally-owned Infrastructure	Town-wide	Public	Flooding; Sea Level Rise; Storm Surge; Hurricanes	Disruption to public services; Potential contamination threat	Continuity of public services; Reduced contamination threat	H and P
Private Property	Town-wide	Private	Flooding; Sea Level Rise; Storm Surge; Hurricanes	Damage to public and private property; Cost of cleanup; Compromised public safety	Reduced damages to public/private property; Minimized cleanup costs; Improved public safety	H and P
Coastal Areas	Town-wide	Public and Private	Flooding; Sea Level Rise; Storm Surge; Hurricanes	Damage to public and private property; Cost of cleanup; Compromised public safety	Reduced damages to public/private property; Minimized cleanup costs; Improved public safety	H and P
Municipally-owned Buildings (critical communications facilities)	Town-wide	Public	All Hazards	Compromised public safety/emergency management and response	Continuity of services, emergency management and response; improved public safety	H and P
Public Utilities	Town-wide	Public and Private	Wildfires	Compromised level of services; compromised public safety	Continuity of services; improved public safety	H and P

Table 2-2 Hazard Index Scituate, Massachusetts

<i>Natural Hazard</i>	<i>Frequency (i.e. Very Low, Low, Medium, High)</i>	<i>Location (i.e. small/local, medium/regional, large/multiple communities)</i>	<i>Severity (i.e. minor, serious, extensive, catastrophic)</i>	<i>Hazrd Index (i.e. ranked by combining frequency and severity; 10 - high, 1 - low)</i>
Flood-Related Hazards				
- Riverine/Flash Flooding	High	Medium/Regional	Serious	6
- Inland/Urban Flooding/Heavy Rain	High	Medium/Regional	Extensive	7
- Climate Change	Medium	Large/Multiple	Serious	5
- Dam Failure	Low	Small/Local	Serious	4
- Coastal Flooding	High	Medium/Regional	Extensive	7
- Sea Level Rise	High	Large/Multiple	Serious	6
- Storm Surge	High	Small/Local	Minor	5
- Coastal Erosion/Shoreline Change	High	Medium/Regional	Extensive	7
Winter-Related Hazards				
- Blizzards/Snow/Nor' easter	High	Large/Multiple	Extensive	8
- Ice	Very Low	Medium/Regional	Minor	2
- Extreme Cold	High	Small/Local	Minor	5
Wind-Related Hazards				
- Hurricanes	High	Large/Multiple	Extensive	7
- Tornadoes	High	Medium/Regional	Serious	6
- High Winds	High	Medium/Regional	Extensive	7
- Lightning/Thunderstorms	High	Medium/Regional	Serious	6
- Hail	High	Small/Local	Minor	5
- Tropical Storm	High	Large/Multiple	Serious	6
- Waterspout	Very Low	Small/Local	Minor	2
Geologic-Related Hazards				
- Earthquakes	Very Low	Medium/Regional	Serious	3
- Landslides	Very Low	Small/Local	Minor	2
Extreme Heat-Related Hazards				
- Extreme Heat	High	Small/Local	Minor	5
Drought				
- Drought	High	Medium/Regional	Minor	5
Urban Fire/Wildfire				
- Urban Fire/Wildfire	Low	Small/Local	Minor	2
Invasive Species				
- Multiple	Medium	Small/Local	Minor	4

For the purposes of this 2022 update, based on the Hazard Index, the Scituate HMPT determined that the Town is most at risk to the following hazards (and has advanced the assessment of the vulnerability of the at-risk areas, and the implications of experiencing these natural disasters):

- ✓ Riverine/Flash Flooding
- ✓ Heavy Rain/Inland and Urban Flooding
- ✓ Climate Change
- ✓ Coastal Erosion/Shoreline Change
- ✓ Coastal Flooding
- ✓ Dam Failure
- ✓ Sea Level Rise
- ✓ Blizzards/Heavy Snow/Winter Weather/Nor'easters
- ✓ Ice Storms
- ✓ Extreme Cold
- ✓ Hurricanes
- ✓ Tornadoes/High Winds
- ✓ Lightning/Thunderstorms
- ✓ Hail
- ✓ Earthquakes
- ✓ Landslides
- ✓ Drought
- ✓ Extreme Heat
- ✓ Urban Fire/Wildfires
- ✓ Invasive Species

The Scituate HMPT formed the consensus that: winter-related hazards such as blizzards, snow and nor' easters; flood-related hazards such as inland/urban flooding and heavy rain, coastal flooding and coastal erosion/shoreline change; and wind-related hazards such as hurricanes and high winds are the major causes of risk to the community.

It should be noted that the above hazards are not a complete listing of hazards that may impact Scituate. The Scituate HMPT agreed that this listing accurately represents those hazards that impact the Town most frequently and have the potential to cause fatalities, injuries, property and infrastructure damage, agricultural loss, damage to the environment, interruption of business, or other types of harm of loss. The following hazards will not be addressed in this 2022 plan update:

- Avalanche
- Expansive Soils
- Land Subsidence
- Volcanoes
- Tsunamis

These hazards were considered and discussed during HMPT meetings, where it was determined these hazards would not be considered for the following reasons:

- Lack of frequency in which they occur;
- The minimal probability of their occurrence; and/or
- The lack of resources to devote any amount of time to further research the likelihood or potential occurrence or impact.

The hazard-specific tables that follow after each section represent the various significant natural hazard events that have occurred in and around the Town of Scituate, utilizing National Oceanic and Atmospheric Administration's (NOAA's) National Centers for Environmental Information (NCEI) (<http://www.ncdc.noaa.gov/>). All events are county wide (Plymouth), unless otherwise noted.

Climate Change

Climate change is one of the most pressing issues of our time and its effects are increasingly impacting Massachusetts. Since climate change has both direct and indirect impacts on the range of natural hazards that Scituate is vulnerable to, the HMPT determined it was most appropriate to include a 'climate change impacts on' section to each natural hazard profiled in this plan update.

Municipal Vulnerability Preparedness Program

In 2018, the Town of Scituate completed the Municipal Vulnerability Preparedness (MVP) program through a planning grant provided by the Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs. It is noted for precipitation and temperature projections, the Town of Scituate is located in the South Coastal Basins. The goal of the planning grant was to identify hazards that Scituate faces that are being exacerbated by climate change, and to prioritize actions the Town can take to prepare for identified hazards. The Town became an MVP-Designated community in 2018.

The Commonwealth of Massachusetts has established a Massachusetts-specific climate data clearing house, resilientma.org, to easily enable municipalities and stakeholders to access regional data for use in climate preparedness planning. Overall, an emphasis on future projections for temperature and precipitation served as the two primary focus areas under this program. Similar to the approach with incorporating climate change into this plan, projections for temperature and precipitation have also been incorporated into the appropriate hazard profiles in this plan update.

2.3.1 Flood-Related Hazards

Flooding is the accumulation of water within a water body and the overflow of excess water onto adjacent floodplain lands (FEMA, Multi Hazard Identification

and Risk Assessment, 1997). The floodplain is the land adjoining the river/stream channel, ocean or other watercourse or water body that is susceptible to flooding.

Flooding results from: large-scale weather systems generating prolonged rainfall; on-shore winds; locally intense thunderstorms; dam failures; or significant snow melt. Floods are capable of undermining buildings and bridges, eroding shorelines and stream banks, uprooting trees, washing out access roads, and causing loss of life and injuries. Also, flash floods (characterized by rapid onset and high velocity waters) carry large amounts of debris that further exacerbate conditions.

Under the NFIP, FEMA is required to develop flood risk data for use in both insurance rating and floodplain management. FEMA develops this data through Flood Insurance Studies (FIS). Detailed analyses are used to generate flood risk data only for developed or developing areas of communities. For undeveloped areas FEMA uses approximate analyses to generate flood risk data. Flood hazard areas are identified in the FEMA FIRMs. Flood hazard areas are divided into zones (V, X, AO, etc.) depending on the severity and type of flood threat. These zones are those areas subject to inundation (shallow or deep) by a flood (and/or velocity wave action) that has a 1 percent chance of occurring during any given year.

Floodplains in Scituate include 'AE,' 'VE,' and 'X' Zones (Map 2-1 Flood Hazard Areas). 'AE' Zones are areas that would be inundated by the 100-year flood. The 100-year flood is a regulatory standard used by federal agencies and most states to administer floodplain management programs and is also used by the NFIP as the basis for insurance requirements nationwide. 'VE' Zones are velocity zones that are subject to breaking wave action where waves greater than 2.9 feet are forecasted during a 100-year flood or storm surge. 'X' Zones are areas that would be inundated by the 500-year flood.

Table 2-3 below represents the various significant flood-related hazard events that have occurred in and around the Town of Scituate over time, utilizing NOAA's National Centers for Environmental Information (<http://www.ncdc.noaa.gov/>). All events are county wide (Plymouth County), unless otherwise noted.

Table 2-3 Significant Flood-Related Events, Plymouth County

Hazard Type	Date	Level/Description	Damages	Notes
<i>Riverine/Flash Flood</i>				
	10/21/1996			
<i>Inland/Urban Flood/Heavy Rain</i>				
	9/18/1996			Heavy rain
	10/8/1996			Heavy rain
	10/20/1996			Heavy rain

	12/7/1996			Heavy rain
	11/1/1997			Heavy rain
	1/23/1998			Heavy rain
	2/18/1998			Heavy rain
	2/23/1998			Heavy rain
	3/8/1998			Heavy rain
	5/9/1998			Heavy rain
	8/29/1998			Heavy rain
	9/16/1999			Heavy rain
	3/5/2001			Flood
	3/29/2003			Heavy rain
	3/28/2005			Flood
	10/15/2005		\$340K	Flood
	10/25/2005		\$35K	Flood
	5/13/2006			Flood
	6/7/2006		\$30K	Flood
	4/1/2017		\$5K	Flood
<i>Coastal Flooding</i>				
	1/29/1998		\$200K	
	1/31/2006		\$60K	
	4/15/2007		\$5K	
	4/16/2007		\$5K	
	4/17/2007		\$15K	1 injury
	10/18/2009			
	1/2/2010			
	2/25/2010			
	3/4/2010			
	3/15/2010			
	10/6/2010			
	11/8/2010		\$1K	
	12/27/2010		\$2.2 M	
	10/30/2011		\$10K	
	11/23/2011			
	6/3/2012		\$35K	1 injury
	6/4/2012			
	6/4/2012		\$40K	
	10/29/2012		\$645K	
	12/27/2012			
	2/9/2013		\$9.2 M	
	3/7/2013		\$500K	
	12/15/2013			
	1/2/2014			Cole Parkway was closed due to coastal flooding

	1/2/2014			Central Avenue closed
	1/3/2014			Road closure
	3/26/2014			Overwash and debris flooded onto Central Avenue and Cole Parkway
	10/22/2014		\$75K	
	10/23/2014			A few inches of minor coastal flooding inundated coastal roadways in the Sand Hills section
	11/2/2014			Intersection of Jericho Road and Rebecca Drive closed due to flooding and ocean spray on the roadway
	1/27/2015		\$1.5 M	1 injury, road closures
	2/15/2015			
	10/2/2015			Road closures
	1/23/2016			
	1/24/2016		\$3K	
	2/8/2016			Sections of Oceanside Drive flooded and impassable
	1/4/2018		\$500K	Road closures
	1/30/2018			Road closures
	3/2/2018			Road closures
	3/8/2018			
	10/27/2018			
	11/25/2018			
	1/20/2019			
	4/3/2020		\$2K	
Storm Surge				
	1/4/2003		\$100K	
	12/6/2003		\$10K	
	1/23/2005		\$200K	
	5/7/2005		\$10K	
	5/24/2005		\$10K	
	2/12/2006		\$40K	

Source: NOAA National Centers for Environmental Information, www.ncdc.noaa.gov.
Data current through June 2020.

Riverine/Flash Flooding

Riverine or inland flooding often occurs after heavy rain, particularly in areas of the state with high water tables. These areas are also particularly susceptible to flash flooding caused by rapid runoff occurring after heavy precipitation events,

and in combination with spring snowmelt. Frozen ground conditions can also contribute to low rainfall infiltration and high runoff events that sometimes result in river flooding.

Flood magnitude increases with increasing recurrence interval. The Town of Scituate can be uniformly affected by riverine/flash flooding events, dependent upon the location (amount of impervious surfaces within the area), existing/incoming weather conditions, and time of year (frozen ground conditions exacerbate flooding). Based on the high frequency and serious severity of riverine/flash flooding events as reported by the National Centers for Environmental Information and indicated in Table 2-3, also confirmed by the HMPT, the Town is considered at moderate risk for future riverine/flash flooding events.

Climate Change Impacts on Riverine/Flash Flooding

Riverine flooding will likely be exacerbated by increased storm intensity, as well as by increased precipitation. The Intergovernmental Panel on Climate Change (IPCC) identifies inland flooding in some urban regions as a “key risk” in North America, which may result disrupt people’s livelihood and result in severe health risks. It is also important to note that riverine flooding and coastal flooding due to SLR can have a coupling effect. Rising seas can set a new flood stage in riverine systems, thus increasing flood risk in inland areas adjacent to rivers.

Heavy Rain/Inland and Urban Flooding

Heavy rains that cause inland and urban flooding are often exacerbated by stormwater-related issues. Thunderstorms, winter storms, coastal storms and nor’easters, and hurricanes all contribute to interior flood related hazards due to the large amounts of precipitation associated with them. Development often compounds the magnitude and frequency of urban flooding by increasing impervious surfaces, also increasing the rate of drainage collection, reducing the carrying capacity of the land, and often overwhelming sewer system infrastructure. Based on the high frequency and extensive severity of heavy rain and inland/urban flooding events since the last plan, as reported by the National Centers for Environmental Information as indicated in Table 2-3, also confirmed by the HMPT, the Town is considered at considerable risk for future heavy rain/inland and urban flooding events.

Climate Change Impacts on Heavy Rain/Inland and Urban Flooding

Heavy precipitation events are becoming more frequent and intense. Whether a hurricane, tropical storm, or extra-tropical storm (e.g. a nor’easter), there has been a global increase in both the frequency and the intensity of heavy precipitation events. This trend is consistent with physical responses to a warming climate, such as an increased amount of moisture in the atmosphere.

MVP Climate Change Projections on Heavy Rain

The average annual precipitation in Scituate is projected to increase up to 8% (South Coastal Basin) by 2030s, and 11% (South Coastal Basin) by 2050s. The

largest increases in precipitation are projected to occur during winter months (South Coastal Basin). Table 2-4 below includes precipitation projections beginning with a Baseline (1971 – 2000) through the 2050s for the South Coastal Basin.

Table 2-4 Precipitation Projections, South Coastal Basin

Climate Parameter	Baseline 1970 - 2000	Projected Change in 2030s	Mid-Century 2050s
Total Precipitation:			
Annual - Inches <i>South Coastal Basin</i>	47.5	47.3 – 51.4	47.5 – 52.5
Winter - Inches <i>South Coastal Basin</i>	12.5	12.2 – 14.0	12.6 – 14.4
Spring - Inches <i>South Coastal Basin</i>	12.1	12.0 – 14.0	12.0 – 14.3
Summer - Inches <i>South Coastal Basin</i>	10.4	9.7 – 11.5	9.7 – 12.2
Fall - Inches <i>South Coastal Basin</i>	12.5	11.6 – 13.6	11.4 – 13.5
Annual Days with Precipitation over 1 inch <i>South Coastal Basin</i>	9	9 – 11	9
Annual Days with Precipitation over 2 inches <i>South Coastal Basin</i>	1	1 – 2	1 – 2
Annual Days with Precipitation over 4 inches <i>South Coastal Basin</i>	<1	<1	<1

Source: MVP Program, www.resilientma.org.

Dam Failure

A dam is any artificial barrier with the ability to impound water, wastewater, or any liquid-borne material for the purpose of storage or water control. Dam failure can be a catastrophic type of failure characterized by the sudden, immediate, and uncontrolled release of impounded water, or the likelihood of such an uncontrolled release with secondary impacts to downstream structures within the inundation zone.

The Department of Conservation & Recreation (DCR), Office of Dam Safety (ODS) is responsible for monitoring the condition of the state’s dams. There are a number of dams identified in Scituate (Table 2-5), three of which are rated as non-jurisdictional (Tack Factory Pond Dam, Satuit Meadow Dam, and Picture Pond Dam), one is rated as a significant hazard (Old Oaken Bucket Pond Dam), and one is rated as high hazard (First Herring Brook Dam).

Inventoried, jurisdictional dams are classified by the hazard, which relates to the probable consequences of failure or mis-operation of the dam; it does not relate

to the current condition or the likelihood of failure of the dam. A three-tiered hazard classification rates each dam based upon the probable consequences of failure or miss operation of the dam. This system includes:

- **High Hazard** – means a dam where failure or miss operation will result in a probable loss of human life.
- **Significant Hazard** – means a dam where failure or miss operation results in no probable loss of human life but can cause major economic loss, disruption of lifeline facilities, or impact other concerns detrimental to the public’s health, safety, or welfare. Examples of major economic loss include but are not limited to washout of a state of federal highway, washout of two or more municipal roads, loss of vehicular access to residences (e.g. a dead-end road whereby emergency personnel could no longer access residences beyond the washout area), or damage to a few structures.
- **Low Hazard** – means a dam where failure or miss operation results in no probable loss of human life and low economic losses.

On February 10, 2017 Massachusetts Dam Safety Regulations were modified to require owners of significant hazard dams to prepare Emergency Action Plans (EAP) for their dams. This requirement became effective on February 10, 2017 when the DCR, ODS promulgated regulatory changes mandated by amended General Laws Part 1-Title II, Chapter 21, Section 65 (b)-Emergency Action Plans for high and significant hazard dams.

In 2017, The Town of Scituate obtained a Fishway Construction Permit from the MA Division of Marine Fisheries for the removal of the Hunter’s Pond Dam (Mordecai Lincoln Road Dam) located on Bound Brook. The project included the repair of a corroded culvert located under Mordecai Lincoln Road, removal of the existing dam and replacement of an existing aging watermain. The purpose of the project was to decommission and repair aging infrastructure, restore access to 5 miles of river and 200 acres of spawning habitat for migratory fish, reduce local flooding and improve coastal resiliency.

Table 2-5 Inventoried Dams in Scituate, MA

Name	MA ID #	Ownership	Regulatory Authority	Hazard
<i>Dams</i>				
First Herring Brook Reservoir Dam	00478	Town of Scituate	ODS	High
Old Oaken Bucket Pond Dam	01041	Town of Scituate	ODS	Significant
Picture Pond Dam		DCR	Non-jurisdictional	Low
Satuit Meadow Dam		Town of Scituate	Non-jurisdictional	Low
Tack Factory Pond Dam		Town of Scituate	Non-jurisdictional	Low

Source: *Building a Resilient Scituate: Climate Vulnerability Assessment and Action Plan, March, 2018, Town of Scituate.*

First Herring Brook Reservoir Dam

Constructed in 1969, the dam impounds First Herring Brook Reservoir, a storage reservoir for public water supply for the Town of Scituate.

The Town of Scituate has been working for several years on the evaluation of the existing reservoir dam and fish passage. The studies have included altering the spillway to meet the Office of Dam Safety recommendations and determine if greater storage capacities associated with higher reservoir levels would aid in the Towns' water supply and provide adequate flows for fish passage. The Town is currently in the permitting phase of the project to increase the elevation of the dam spillway by 18" (28 days of additional storage), improve the existing fish passage to provide adequate flows during spawning season and evaluate the impacts to abutters, existing infrastructure and wetland resource areas.

Owner: Town of Scituate
NID #: MA00478
Type: Earthen Embankment
Tributary: First Herring Brook
Height: 21.5 feet
Storage Capacity: 500 acres/feet
Last Inspection: December 1, 2020
Hazard Classification: High Hazard
EAP: Yes
O & M: Yes

The Town had an inspection and evaluation done December 1, 2020. The inspection rated the overall physical condition of the dam as good, meaning that no existing or potential deficiencies have been recognized. Safe performance is expected under all loading including spillway design flood.

The Department of Public Works – Engineering Division performed the inspection and determined that no yearly, remedial, or alternative recommendations were necessary.

Old Oaken Bucket Pond Dam

The dam was constructed in 1640 originally to power a sawmill. Around 1650 John Stockbridge converted it to a grist mill and is now an historic Scituate landmark. It is currently used as a water supply impoundment for the town's filtration plant.

Owner: Town of Scituate
NID #: 001041
Type: Earthen Embankment

Tributary: First Herring Brook River
Height: 6.0 feet
Storage Capacity: 35 acres/feet
Last Inspection: August 16, 2012
Hazard Classification: Significant Hazard
EAP: Phase 1 references February 1994 by Gale Associates, nothing more recent available
O & M: No

The Town had an inspection and evaluation done August 16, 2012. The inspection rated the overall physical condition of the dam as good, meaning that no existing or potential deficiencies were recognized, and safe performance is expected under all loading including SDF.

The Scituate Water Dept. and DPW staff completed the inspection and identified the following deficiencies:

- Repair leak in fish ladder wall at end near stone training wall.
- Repair loose stones in upstream spillway embankment and stones that have fallen out of training walls.
- Remove all trees and brush including roots from spillway and upstream embankment.
- Install weed control fabric and rip-rap on spillway between primary and auxiliary weirs.
- Remove large boulders from streambed inside the culvert.

There have been no dam failures recorded in Scituate since the 2016 plan. Based on the medium frequency and serious severity of the potential for future dam failures, exacerbated by observed increases in heavy precipitation events, and input by the Scituate HMPT, the Town is considered at moderate risk for future dam failure events.

Climate Change Impacts on Dams

The increase in precipitation and frequency of intense rainfall events, which will cause an increase in river discharge and peak flows, may also lead to overtopping and damage of aging dams or structures in need of repair and maintenance. The Town is also concerned that heavy precipitation events may impact local.

Coastal Erosion/Shoreline Change

Coastal erosion is another hazard that occurs during large coastal storm events and through natural processes. Shorelines change constantly in response to wind, waves, tides, sea level fluctuation, seasonal and climatic variations, human interaction, and other factors that move sand and material within a coastal shoreline system. Coastal erosion is expected to increase due to the increase in storm intensity and associated flooding. The IPCC found that coastal and low-lying areas have been experiencing increased erosion, and will continue to do so,

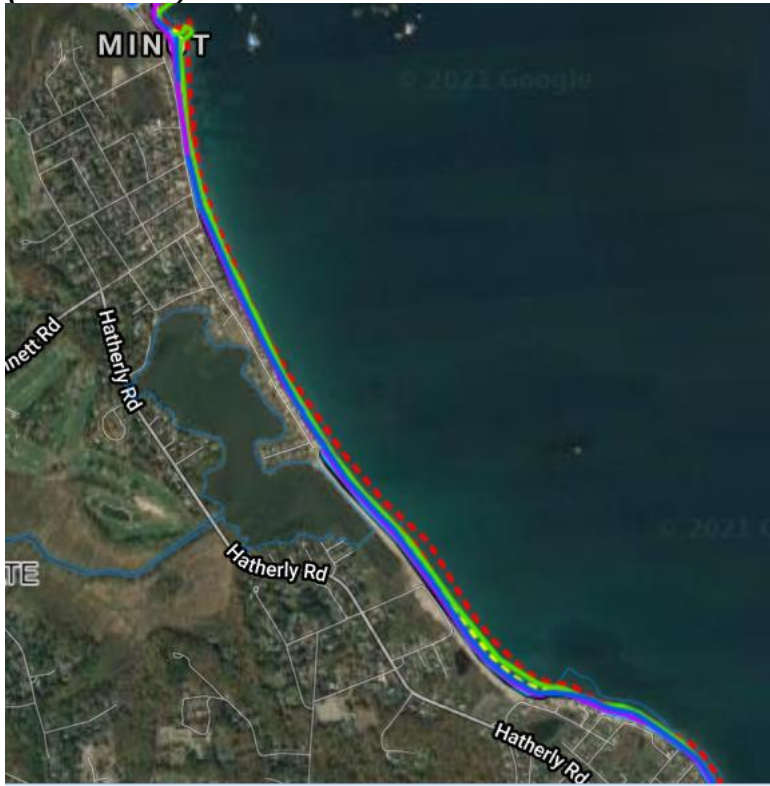
due to SLR, in North America and throughout the world. Erosion has been noted to be of concern in the northeastern U.S. and in their study of climate change impacts in the northeastern U.S., Horton et al. (2014) noted that increased rates of coastal erosion are likely to compromise aging coastal infrastructure, including transportation, communications, and energy infrastructure.

At the Massachusetts Office of Coastal Zone Management (CZM), through the Shoreline Change Project, ocean-facing shorelines along the Massachusetts coast were delineated and analyzed to illustrate trends from the mid-1800s to 2009. Offered for the general public's use through the Massachusetts Ocean Resource Information System (MORIS), the U.S. Geological Survey (USGS), the Woods Hole Oceanographic Institution Sea Grant Program, and Cape Cod Cooperative Extension calculated shoreline change rates, then CZM incorporated the shorelines and shore-perpendicular transects with the change rates. Figure 2-2 shows the entire coastline of Scituate in a series of transects from north to south, as vulnerable to shoreline change represented by a series of transects: 1897 – dashed red; 1938 – dashed orange; 1969 – dashed yellow; 1982 – solid green; 1994 – solid cyan; 2000 – solid blue; 2001 – solid purple; and 2009 – solid black.

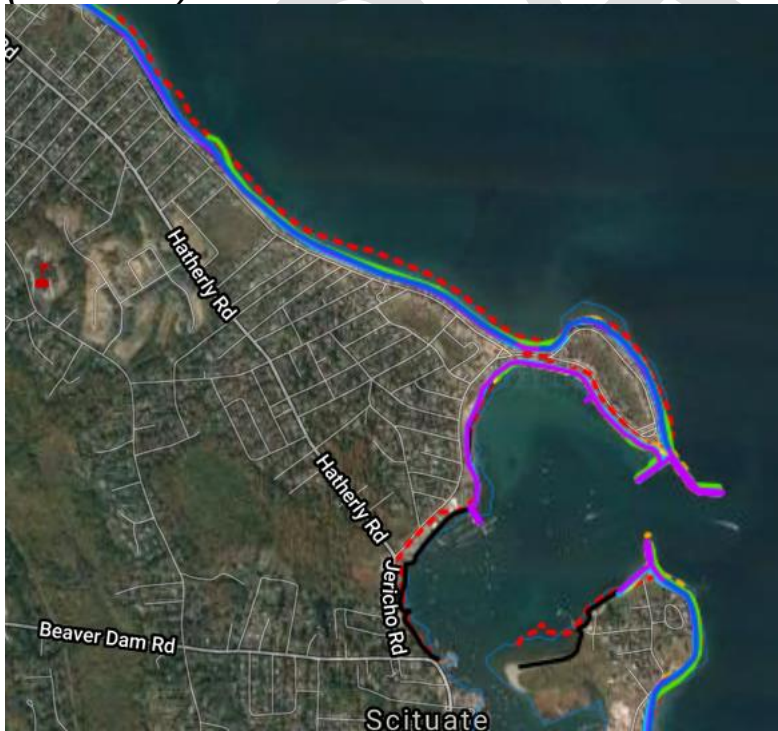
Figure 2-2 Historic Shoreline Change Transect Series (Transect 1)



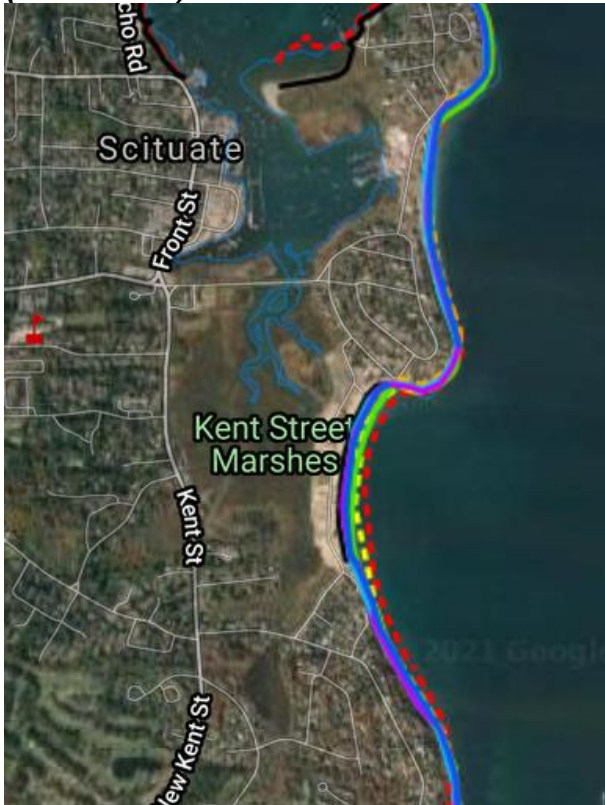
(Transect 2)



(Transect 3)



(Transect 4)



(Transect 5)



(Transect 6)



(Transect 7)



Source: MORIS.

Scituate contains several important barrier beaches, important not only for their recreational amenities but also for building and maintaining coastal resilience. Beaches in Scituate include Minot Beach, North Scituate Beach to Egypt Beach,

the barrier beach between First and Second Cliff, Peggotty Beach, The Spit, Fourth Cliff, and Humarock, one of the largest barrier beaches in Massachusetts.

Applied Coastal Research and Engineering, Inc. in 2016 provided an important assessment of horizontal and vertical migration and loss to many of these barrier beaches as well as recommendations for stabilization and management strategies for shoreline protection. Barrier beaches are a critical first line of defense for storm surge providing wave attenuation and energy dissipation, thereby protecting critical infrastructure. However, many of the natural features of Scituate's beaches and barriers effectuating critical stabilization of the shore have been minimized or lost to development. Scituate's hardened shoreline from sea walls and revetments alters coastal geomorphology and is influencing the migration of sediments, lowering beaches substantially over the last 60 years.⁷

As a requirement of this study, future shore protection planning required that a sustainable outcome be achieved based on a 50-year planning horizon. Although in some cases, managed retreat is the most viable alternative, recommended approaches have been identified based on need and economic drivers. For all study areas, elevating homes and buildings in high hazard flood areas above base flood elevations is recommended but has not been listed specifically.⁸

- 1) Minot Beach: Nourishment in the form of a perched cobble beach and sea wall improvements in the north portion of the beach.
- 2) North Scituate Beach/Surfside Road: Large-scale beach nourishment.
- 3) Mann Hill Beach: Managed retreat facilitated through buyouts or moving homes landward.
- 4) Egypt Beach: Construction of a boulder dike and implementation of improvements to the Egypt Beach pump station.
- 5) Oceanside Drive: Rehabilitation of the seawall and revetments, improving drainage of the basins, and improving the protection to the Sand Hills pump station.
- 6) Cedar Point: Rehabilitation of the seawall and revetments, placement of cobble nourishment along the narrow section of Lighthouse Road, and construction of a boulder dike.
- 7) First Cliff: Continue to maintain the existing revetment.
- 8) Edward Foster Road: Rehabilitation of the seawall and revetment.
- 9) Second Cliff: Continue to maintain the existing revetment.
- 10) Peggotty Beach: Managed retreat facilitated through buyouts or moving homes landward.
- 11) Third Cliff: Continue to maintain the existing revetment.
- 12) Fourth Cliff: Continue to maintain the existing revetment.

⁷ Coastal Erosion, Sediment Transport, and Prioritization Management Strategy Assessment for Shoreline Protection, Applied Coastal Research and Engineering, Inc., August 2016.

⁸ Ibid.

- 13) Humarock North: Elevation of Central Avenue, construction of dunes along Humarock North, and beach nourishment along Humarock North and South.
- 14) Humarock South: Beach nourishment along Humarock North and South.

Based on the high frequency and extensive severity of coastal erosion/shoreline reflected in the number of storm surge and coastal flooding events since the last plan, as reported by the National Centers for Environmental Information and indicated in Table 2-3, coupled with the shoreline change transects provided by the Massachusetts Shoreline Change Project confirmed by the HMPT, the Town is considered at high risk for continued shoreline erosion/change.

Sea Level Rise

Sea level is the level of the sea's surface relative to the land. Sea level changes can be caused by absolute changes of the sea level and/or by absolute movements of the land either through post glacial isostatic re-adjustment of the lithosphere, the rigid upper layers of the earth, or by extraction of water or other resources that cause the land to sink.

The IPCC continues to better understand the science and implications of climate change and SLR. Rising sea levels, as a direct result of warmer temperatures and glacial ice melt, threaten low-lying coastal areas through coastal flooding, coastal erosion, wetland inundation and saltwater intrusion. Localized land subsidence, also on the rise, also contributes to accelerated impacts of SLR. Over the last 100 years, sea levels have risen 0.56 feet globally. The average rate of rise between 1961 and 2003 was 0.07 inches per year; however, that rate nearly doubled to 0.12 inches per year between 1993 and 2003.⁹ Although the rate of SLR is accelerating, it is not expected to be globally uniform, where some areas will be more substantially inundated than others.

Building A Resilient Scituate: Climate Vulnerability Assessment and Actions Plan, March 2018¹⁰

Scituate has approximately 1,600 acres of salt marshes, the most extensive occurring within the sheltered bay (Cohasset Harbor) landward of Strawberry Point. Other marshes include the salt marsh at the North/South River and Kent Street Marshes. Salt marshes and estuaries are complex and highly productive ecosystems generally resilient to wide variations in temperature, salinity, and inundation. Ecological benefits of salt marshes include floodwater storage, storm surge protection, carbon sequestration, nutrient removal and water quality improvements. Healthy marshes also support important commercial fish and shellfish habitat. The sustainability of the system is a delicate balance of complex coastal processes. Salt marshes are typically found in low energy

⁹ IPCC. (2007). *Climate Change 2007: The Physical Science Basis. Summary for Policymakers. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Geneva, Switzerland: UNEP.

¹⁰ Building A Resilient Scituate: Climate Vulnerability Assessment and Actions Plan, March 2018.

coastal areas; they require consistent tidal inundation but cannot survive if submerged. Salt marshes today are already threatened by several factors: nutrient loading/non-point pollution from stormwater runoff, extreme precipitation events, loss of tidal flow due to insufficient culverts, invasive species and persistent salt water inundation. Salt marshes are protected by the Wetlands Protection Act with a 100-foot buffer and no disturbance regulation. However, historic development has created hardened shorelines that affect the horizontal migration and vertical migration of the salt marsh. With climate change, the deteriorated conditions of many of Massachusetts' salt marshes will be exacerbated with sea level rise, lack of migration area from hardened shores, and extreme precipitation events flushing the salt marsh and creating an environment conducive to invasive species.

In Scituate, there is already evidence of marsh deterioration from sea level rise. Mass Bays is an EPA National Estuary Program that facilitates research and partnerships to create more resilient and sustainable estuarine ecosystems. They performed an evaluation of salt marsh grasses/vegetation in the South Shore including North River salt marshes, tested at Driftway Park and Scituate Conservation Area in Scituate. At Driftway Park in 2014, there has been an 81% increase in biomass of *Spartina alterniflora* (short saltmarsh cordgrass) in comparison to 2000. At Scituate Conservation, there was a decrease in three different types of high marsh species *Spartina patens* (-3%), *Distichlis spicata* (-11%), and *Iva frutescens* (-3%). The study suggests that salt water intrusion from frequent inundation may be causing the shift in species composition where high marsh salt grasses are less tolerant of high levels of salinity. In this circumstance, the loss of marsh elevation prohibits optimal plant growth, and the salt marsh converts to a tidal mudflat or subtidal open water.

Some studies indicate that allowing for salt marsh migration, horizontal and vertical, can help build resilience when thin layer deposition occurs at a rate consistent with sea level rise to enable sustainable ecosystem function. Coastal natural buffers for horizontal migration sustain the ecosystem balance of tall (*Spartina alterniflora*) and short (*Spartina patens*) marsh grass habitats. The MassDEP has listed Cohasset Harbor and North River as impaired waters which can further detrimentally impair salt marsh health. Shellfish growing areas are limited in Scituate Harbor and only conditionally approved at the Kent Street Marshes and around Cohasset Harbor. Healthy salt marshes support healthy shellfish growing areas, and the combined interaction of these systems ensures greater resilience and shoreline protection for Scituate in the face of rising seas and warmer temperatures.

Scituate 2040 Master Plan, June 2021¹¹

While it is easy to map the inundation areas given the various sea level rise projections, understanding the timeline of how often flooding will occur and in which year we will reach daily inundation of a certain level depends on how

¹¹ Scituate 2040 Master Plan Update, June 2021.

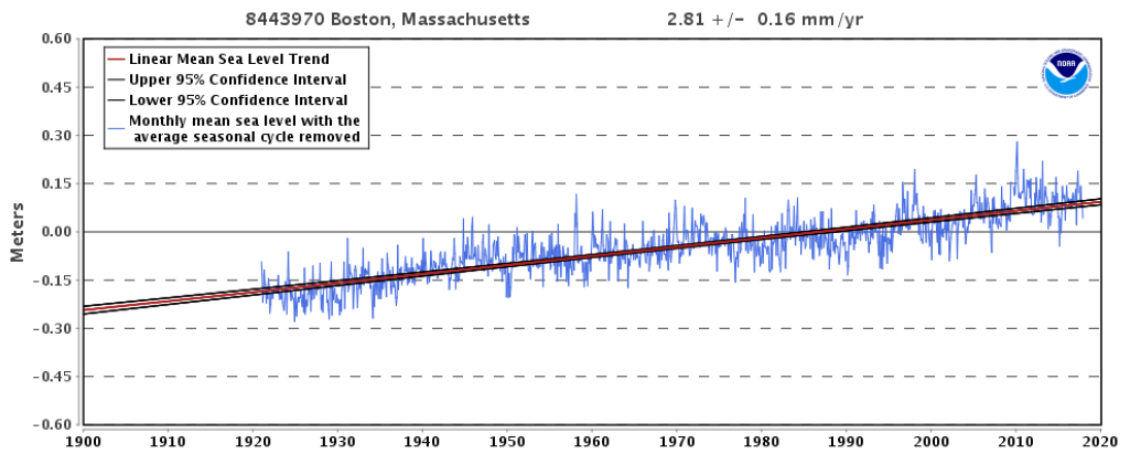
successfully and how quickly local, state, national, and global communities are able to take actions toward a common goal of carbon reduction and resilience. NOAA offers three different timelines based on three different scenarios: Scenario 1: unchecked pollution; Scenario 2: moderate carbon cuts; and Scenario 3: extreme carbon cuts. In Scenario 1, 1 foot of sea level rise has already occurred, daily inundation levels of 5 feet will be achieved by 2060, and 10 feet of daily inundation will occur by 2090. In Scenario 2, 1 foot, 5 feet, and 10 feet will be the daily norm by 2030, 2080, and 2140, respectively. If society is able to make drastic changes, Scenario 3 suggests we can extend that timeline to 2050, 2120, and 2200.

Sea Level Rise Study: Towns of Marshfield, Duxbury, Scituate, MA July 2013
SLR projections for the three towns were determined for three forecasting periods: 25, 50, and 75 years corresponding to the years 2038, 2063, and 2088. The SLR projections were based on projections in both Global Mean Sea Level (GMSL) change and Local Mean Sea Level (LMSL) change. At any location, the relative mean sea level change is determined by considering the combined effects of both global and local mean sea level change.

Global Mean Sea Level Change: The primary contributors to global sea level rise are thermal expansion as a result of increased sea surface temperature and contribution of fresh water from melting of glacier ice. The relative contribution of these two factors in increasing global mean sea level is uncertain. The choice of appropriate sea level rise scenario was discussed by the Project Team and the NOAA “Highest” sea level rise scenario was chosen based on consensus among the towns, compatibility with other studies in the region (e.g., City of Cambridge, MASSPORT, Massachusetts Climate Adaptation Report, etc.), and considering scientific evidence that suggests sea level is rising at a substantially higher rate than older historical records. The “Highest” NOAA sea level rise scenario is based on a combination of estimated ocean warming and maximum anticipated glacier and ice sheet loss by the end of the century.

Local Mean Sea Level Change: The primary source of local mean sea level change is attributed to geologic factors which cause vertical land movement due to tectonics, such as land subsidence or uplift. Local mean sea level change is estimated by considering local, historic tide gage records combined with models or actual measurements of Earth’s local tectonic movement. The NOAA tidal gage at Boston Harbor (station ID 8443970) has recorded an increase in relative mean sea level of 2.63 mm (+/- 0.18 mm) annually based on monthly data from 1921 to 2006 (Figure 2-3). Over that same period, the global rate of sea level rise was about 1.7 mm annually. This implies that there is about 1 mm per year local land subsidence (or sinking) in the relative sea level record for the Boston area (MA Adaptation report 2011). The team factored this rate of subsidence for local mean sea level change and added this to the global mean sea level change to determine the relative sea level rise for the project area.

Figure 2-3 Observed Sea Level Rise, Boston Tide Station 1921 - 2016



Based on planning horizons of 25, 50 and 75 years, the following SLR projections have been provided based on global SLR estimates and local subsidence effects.

Planning Horizon:	25 Years	50 Years	75 Years
Year:	2038	2063	2088
Total Relative SLR (feet):	1.08	2.80	5.16

This report also identified various impacts to natural resources, infrastructure, transportation systems and emergency access, detailed later in Section 2.4 Vulnerability.

The *Building A Resilient Scituate: Climate Vulnerability Assessment and Actions Plan*, March 2018 (MVP Report) utilized the 2013 Kleinfelder model to analyze vulnerability in response to SLR and storm surge. NOAA’s Office of Coastal Zone Management – Digital Coast developed a series of sea level rise data layers under various scenarios. For this update, the Horsley Witten Group developed Maps 2-6 – 2-6.4 Sea Level Rise – Various Scenarios which depicts projected SLR increases for both one-foot and three-feet, consistent with the 25 year and 50-year SLR estimates from the Kleinfelder report.

Based on the high frequency and serious severity of sea level rise projections, also reflected in the number of coastal flooding/storm surge events since the last plan, as reported by the National Centers for Environmental Information and indicated in Table 2-3, also confirmed by the HMPT, the Town is considered at moderate risk for continued rises in sea level.

Coastal Flooding

Scituate continues to experience direct impacts of climate change, and thus the Town has been aggressive in efforts to anticipate and mitigate activities along high hazard coastal areas and inland floodways over the past few years. The Town continues to pursue funding through Federal, state and local opportunities,

including utilization of the capital budget and grant applications for drainage projects, to rebuild seawalls, nourish eroded beaches, and retrofit structures vulnerable to storm damage as a means of preserving and protecting public and private property in flood zones. Table 2-6 provides information on coastal grants the Town has pursued from 2015 – 2019.

Table 2-6 Town of Scituate Coastal Grants 2015 – 2019

Coastal Grant	Project	Funding	Status
Executive Office of Energy and Environmental Affairs & Coastal Zone Management Resiliency Grant	Engineer and study for beach nourishment on N. Scituate Beach	\$118,000	Completed
FEMA FMA 13-01 Elevation Grant	Elevation of 14 properties in the floodplain	\$2,100,000	Completed
Executive Office of Energy and Environmental Affairs & Coastal Zone Management Resiliency Grant	Engineer, design and permit for beach nourishment on N. Scituate Beach	\$241,163	Completed
Executive Office of Energy and Environmental Affairs Dam, Levee and Seawall Grant	Repairs to 760' of seawall along Oceanside Drive	\$4,000,000	Completed
Environmental Protection Agency Resiliency Grant	Technical Assistance for flood resiliency in a coastal community	\$50,000	Completed
Executive Office of Energy and Environmental Affairs & Coastal Zone Management Resiliency Grant	Assessing Coastal Erosion, Sediment Transport & Prioritization Management Strategy for Shoreline Protection	\$270,000	Completed
Environmental Protection Agency Resiliency Grant	Repair and replacement to 525' of seawall along Oceanside Drive on Town-owned property	\$3,000,000	Completed
MAPC Planning Assistance Grant	Scituate Municipal Vulnerability Plan	\$60,000	Completed
Executive Office of Energy and Environmental Affairs & Coastal Zone Management Resiliency Grant	Humarock Roadway elevation, beach and dune nourishment conceptual designs	\$140,000	Completed
Executive Office of Energy and Environmental Affairs Dam, Levee and Seawall Grant	Repairs to 640' of seawall along Oceanside Drive near 7th Avenue	\$2,500,000	Completed

MEMA HMGP Grant	Elevation of 5 properties in the floodplain	\$616,252	In-progress
FEMA FMA 15-01 Elevation Grant	Elevation of 2 properties in the floodplain	\$303,386	In-progress
FEMA Storm Reimbursement	Foreshore damages 3rd Cliff	\$1,680,000	Awarded
FEMA Storm Reimbursement	Foreshore damages	\$5,900,000	Obligated
Executive Office of Energy and Environmental Affairs & Coastal Zone Management Resiliency Grant	Humarock Roadway elevation, beach and dune nourishment conceptual designs	\$240,000	Completed
Executive Office of Energy and Environmental Affairs & MAPC	Downtown Harbor Resiliency Plan	\$62,500	In-progress
MAPC	Peggotty Beach Managed Retreat Feasibility Study	\$35,000	In-progress
FEMA FMA 19-01	Elevation of 1 property in the floodplain	\$170,380	In-progress
Coastal Zone Management	50 Year Coastal Vision	\$261,472	In-progress

Source: Town of Scituate Coastal Zone Management Office.

Storm Tide Pathways¹²

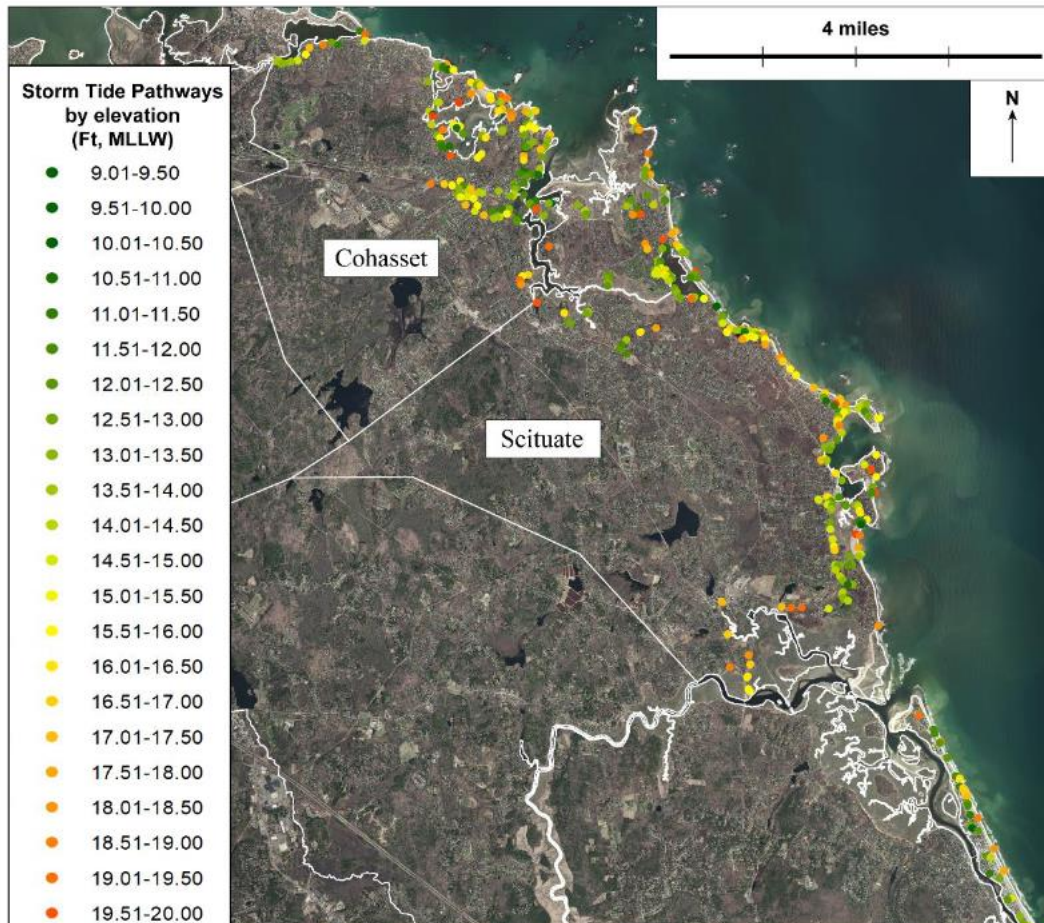
Coastal tourism, recreational use and enjoyment of natural, coastal resources, and the ecosystem services these resources provide are large contributors to the State's economy. To sustain activities such as these, managers, first responders, and public works professionals in low-lying coastal communities need information in real-time, and for future planning purposes, that is responsive to the threats posed by coastal hazards such as coastal storms and related flooding on a scale commensurate with their responsibilities. Presently, many low-lying coastal areas flood regularly during high water storm events with some beginning to flood during monthly spring tides. Storm tide pathways (STPs) describe spatially how coastal waters will flow inland during a flooding event associated with storm surge, extreme high tides, or sea level rise. Independent of long-term sea level rise projections, storm surge projections considered in the context of contemporary storms of record and accurate ground elevation data can be used to map the location of storm tide pathways with a high degree of certainty.

In 2019/2020, the Center for Coastal Studies worked with the Towns of Cohasset and Scituate to identify 465 storm tide pathways (Cohasset: 166, Scituate: 299). Several types of STPs are included in this dataset: standard storm tide pathways (STPs) total of 179; 'spillways' (STP-S) total of 90; 'roadways' (STP-R) total of

¹² Mapping Storm Tide Pathways in Scituate and Cohasset: Assessing Coastal Vulnerability to Storms and Sea Level Rise.

61; and unverified (STP-U) total of 165, to reflect different on-the-ground morphologies and techniques needed to identify and/or describe potential inundation at these locations. STPs can be described as a relatively low-lying area where flowing water would be directed inland via a natural or human made depression in topography. A low-lying channel or other depression, or conversely a series of elevated topographic features, could channelize flow into an area. Stopping flow at that STP could prevent inundation for a given elevation. Each STP has a Pathway Activation Level (PAL) at which water will begin to flow. Using the PALs Town staff can prioritize the most vulnerable STPs as efficiently and effectively as possible.

Figure 2-4 Storm Tide Pathways Scituate and Cohasset



Source: *Mapping Storm Tide Pathways in Scituate and Cohasset: Assessing Coastal Vulnerability to Storms and Sea Level Rise*

The project’s storm of record used for Scituate and Cohasset is the January 4, 2018 winter storm. Many STPs are just above water elevation seen in the 2018 storm. In fact, mapping revealed that 54 STPs are less than 12 inches above the storm of record (14.78 ft MLLW) identified in Figure 2-4 above. In other words, 54 locations throughout Scituate and Cohasset that have never been flooded before would be inundated with another 12 inches of water level beyond that last storm of record. This water elevation could be achieved singularly or with a

combination of higher tides, storm surge, waves, or sea level rise. A total of 25 of those 54 STPs would flood with only 6 inches of increased water level. Using data generated for this study it has been shown that on average approximately 100 acres of land will be inundated for every 6 inches of rise in total water level from 10.5 – 20.0 ft (MLLW) in any form.

The National Weather Service provides descriptions of the likely impacts associated with approaching storm tides characterized by general categories with suggested action levels or stages for communities threatened by approaching storms (with elevations and total number of pathways by category):

- Action Stage (Elevation 11.0 MLLW/total of 20): The water level at which some mitigation action should be considered in preparation for an approaching coastal storm tide.
- Minor Flooding Stage (Elevation 11.5 MLLW/total of 167): The water level at which some public threat, such as minor flooding of low-lying roads and infrastructure may be anticipated although minimal or no property damage is expected.
- Moderate Flooding Stage Elevation 13.5 MLLW/total of 107): The water level at which some inundation of structures and roads and possibly some evacuation of people and/or transfer of property to higher elevations can be anticipated.
- Major Flooding Stage (Elevation 15.5 MLLW/total of 145): The water level at which extensive inundation of structures, properties and roads and significant evacuation of people to higher elevations can be anticipated.

There are a number of STPs identified for Scituate that should be examined further (and perhaps periodically within dynamic settings) on a case-by-case basis to monitor the risk associated with them. A mitigation action has been included in Section 4 Mitigation Strategy, 4.3 Mitigation Action Plan to obtain the data generated from the study and then implement recommendations to avoid, minimize and mitigate adverse impacts.

Coastal storm surge is typically defined as the abnormal rise in water level caused by the wind and pressure forces of a hurricane and/or nor'easter. Scituate experiences significant coastal flooding several times per year due to coastal storm surges resulting mainly from winter storms and nor'easters. Based on the high frequency and extensive severity of coastal flooding events since the last plan, as reported by the National Centers for Environmental Information and indicated in Table 2-3, also confirmed by the HMPT, the Town is considered at high risk for future coastal flooding events.

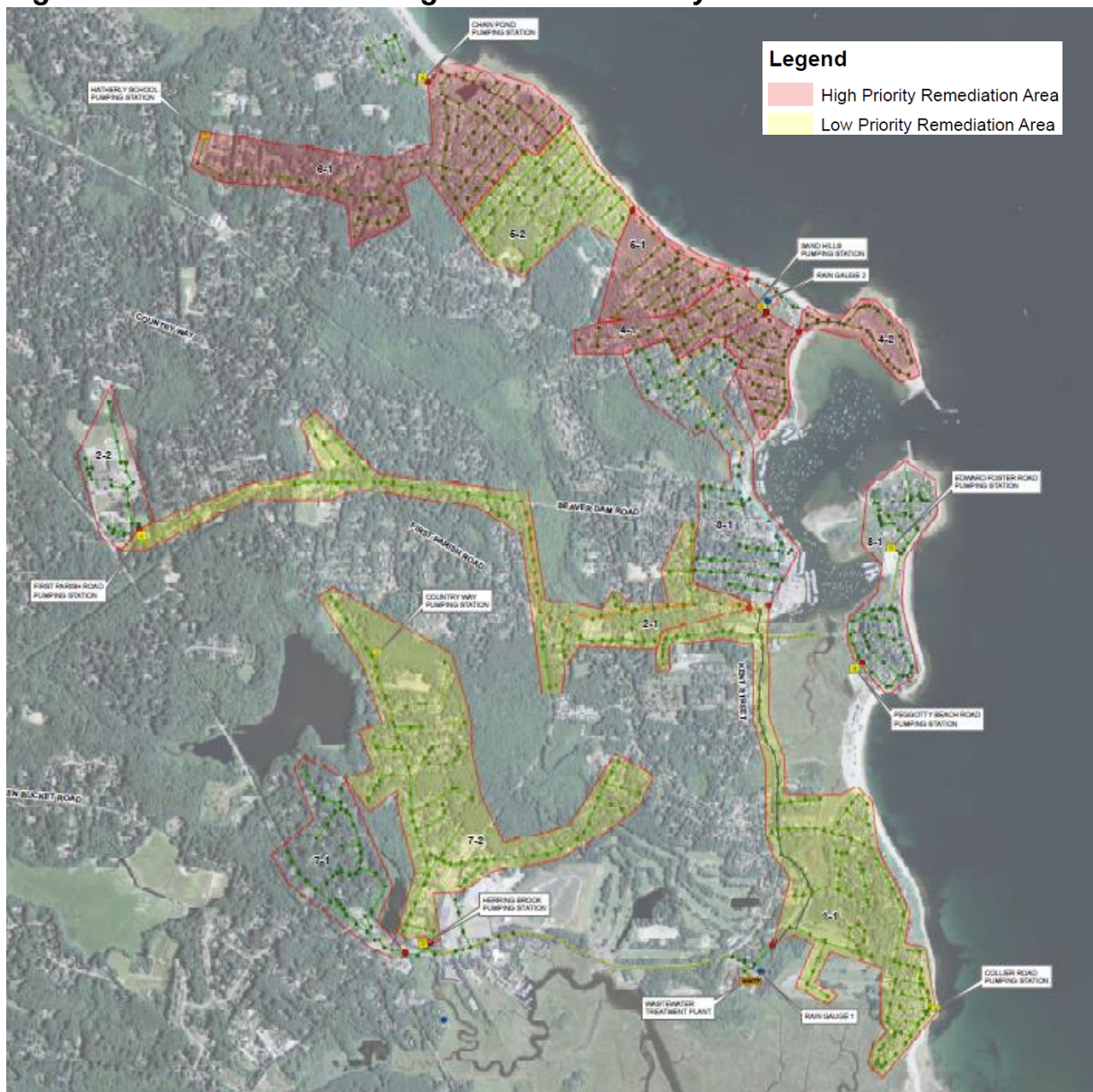
*Scituate Flow Monitoring Program and Infiltration/Inflow Analysis*¹³

Findings from the Town's flow monitoring program indicates that infiltration and inflow in several of the drainage areas contributes to increased flows at the wastewater treatment plant, as well as taking up collection system capacity (CDM Smith, 2016). During high tides (year-round) and especially during the high groundwater season, portions of the sewer system is submerged in groundwater/tidal waters. The majority of inflow entering the sewer system from rainfall events is indirect flow. According to high groundwater levels and tidal influence on groundwater, many of the sub-areas experience rainfall-derived inflow and infiltration (I/I) following a rainfall event. In addition, the inflow results indicate the sewer system is susceptible to direct inflow connections (roof leaders, driveway drains, etc.), however, more susceptible to groundwater/tide and indirect inflow sources (sewer pumps, foundation drains, etc.).

According to Massachusetts Department of Environmental Protection (MassDEP) guidelines, seven sub-areas exceed the inflow threshold, and five subareas exceed the infiltration threshold. Of these, sub-areas 4-1, 4-2, 5-1, and 6-1 exceed both the infiltration and inflow thresholds (considered high-priority areas), while sub-areas 1-1, 2-1, 5-2, and 7-2 exceed either the infiltration or inflow thresholds (low priority areas), Figure 2-5. A mitigation action to address these vulnerabilities and implement activities associated with Phase II of a Sewer System Evaluation Survey (SSES) has been included later in the plan in Section 4.3 Mitigation Action Plan.

¹³ Town of Scituate Flow Monitoring Program and I/I Analysis Memo: Infiltration Quantities and Severity Ranking (Low Tide), William Branton – Interim Supervisor. August 10, 2016 (Revised October 2, 2017).

Figure 2-5 Infiltration/Inflow High- and Low- Priority Areas



Source: Scituate Flow Monitoring Program and Infiltration/Inflow Analysis, CDM Smith, 2016.

Comprehensive Wastewater Resilience Feasibility Study¹⁴

Further exacerbating the findings from the Town’s flow monitoring program regarding the impacts of increased infiltration and inflow, this study also identified that the sewer and treatment system is vulnerable to flooding, in particular coastal flooding, including:

- Seven of the nine pump stations and the wastewater treatment plant are vulnerable to coastal flooding.

¹⁴ Comprehensive Wastewater Resilience Feasibility Study.

- System flood vulnerabilities include:
 - Direct damages due to flood inundation, corrosion, mold and structure damage.
 - Disruption or loss of service due to temporary or long-term repair.
 - Unanticipated environmental releases. The risk associated with the Town of Scituate Sewer Collection System and Treatment System can also negatively affect the future Town's municipal bond rating. The system's coastal flood vulnerability will increase in the future due to climate change-induced sea level rise and increased precipitation frequency and intensity.

A mitigation action with multiple components to address these vulnerabilities has been included later in the report in Section 4.3.

Climate Change Impacts on Coastal Flooding

Future increases in relative sea level will intensify coastal flooding and will ultimately lead to the loss of recreation areas, public space, and wetlands along the coast. Residential and commercial structures, roads, and bridges on or near the coast will be more prone to flooding. SLR will also reduce the effectiveness and integrity of existing seawalls and revetments, which were designed for historically lower water levels. Lower elevations will become increasingly susceptible to flooding as storm surge reaches further inland due to both SLR in concert with a probable increase in the frequency and intensity of storms predicted from climate change.

The future rise in relative sea level will increase the extent of flood damage over time. Importantly, increased flooding means both an increase in the areas that are flooded and an increase in the depth of floodwaters. This is because SLR will expand existing floodplains, causing flooding in places which have not previously experienced flooding, as well as result in deeper floodwaters in previously flooded areas.

Nuisance flooding, also referred to as high tide flooding, increasingly occurs in coastal locations both locally and globally as a result of SLR, which causes high tides that are higher than they were historically. Nuisance flooding may affect individual coastal properties, as well as roads, parking lots, and other public or commercial infrastructure in low-lying areas. This type of flooding has increased five- to ten-fold since the 1960s in several U.S. coastal cities, and rates of increase are accelerating in dozens of cities on the U.S. Atlantic and Gulf coasts. Like other types of coastal flooding, nuisance flooding will continue increasing in depth, frequency and extent over the 21st century.

Property at Risk from Flood-Related Hazards

The Town of Scituate is subject to two kinds of flooding; coastal flooding where wind and tide exacerbates flooding along the shore, and tidal waterways and inland flooding where the rate of precipitation or amount of water overwhelms the capacity of natural and structured drainage systems to convey water

causing it to overflow the system. These two types of flooding are often combined as inland flooding and prevented from draining by the push of wind and tide driven water.

Nor'easters can occur at any time of the year, but they are most common in winter. Hurricanes are most common in the summer and early fall. Scituate, being north of Cape Cod, is particularly vulnerable to nor'easters because the area is not protected by the sheltering arm of Cape Cod. Nor'easters cover a larger area than hurricanes although the winds are not as high. They also generally last long enough to include at least one high tide, which causes the most severe flooding. Large rain storms or snowfalls can also lead to inland flooding.

The frequency and locations of flood hazard events in Scituate can be estimated based on the reported loss occurrences for repetitive loss properties and from local knowledge captured through discussion with local staff and the public during identification of local flood hazard areas. Based on these factors, flooding occurs most often along the coast in the low area behind the seawalls and former dunes, with particular frequency at Cedar Point, Surfside Road, Glades Road, Peggotty Beach, Oceanside Drive, Turner Road, The Basin's (The Avenue's and Jericho Road) Edward Foster Road and Humarock.

Information on potential flood hazard areas was taken from a number of sources including: completed plans, studies and reports; GIS analyses with parcel overlay mapping for FEMA flood zones and projected sea level rise scenarios; and discussions with local officials. The Locally Identified Areas of Flooding described below were identified by town staff as areas where flooding is known to occur. Some of these areas do not necessarily coincide with the flood zones, they may be areas that flood due to inadequate drainage systems or other local conditions rather than location within a flood zone, affecting both roadways and bridges.

Locally Identified Areas of Flooding

Glades & Gannett Roads (Minot Beach, North Scituate Beach)

During coastal storms seawater washes over sea walls, then collects in low areas. The energy from overwash water and debris routinely damages homes. Debris collects on roads limiting access, with expensive removal costs.

Surfside Road, Seagate Circle and Musquashicut Pond

During coastal storms seawater washes over sea walls, then collects in low areas. The energy from overwash water and debris routinely damages homes. Debris collects on roads limiting access, with expensive removal costs.

Mann Hill Road, Egypt Beach, Pricilla and Alden Avenue

During coastal storms seawater washes over sea walls, then collects in low areas. The energy from overwash water and debris routinely damages homes.

Oceanside Drive and Turner Road

During coastal storms seawater washes over sea walls, then collects in low areas. The energy from overwash water and debris routinely damages homes. Debris collects on roads limiting access, with expensive removal costs.

Rebecca Road, Lighthouse Road and Lighthouse Point

During coastal storms seawater washes over sea walls, then collects in low areas. The energy from overwash water and debris routinely damages homes.

The Basin's (the Ave's and Jericho Road Basins)

This is a low area that collects overwash routinely. Improvements to subsurface infrastructure have contributed to faster drainage in this area.

Scituate Harbor (Cole Parkway, Front Street and Old Dock Street)

While the Harbor jetties provide some protection, flooding of parking and businesses occurs regularly with coastal storms.

Edward Foster Road (including the bridge and low point south of the Maritime Center)

While the Harbor jetties provide some protection, its bridge which provides the main access to First and Second Cliff can often flood during coastal storms.

Peggotty Beach (Inner Harbor Road and Town Way Extension)

This exposed area has adjacent homes on small lots which are very vulnerable. A number were purchased by FEMA.

Gilson Road (culverts)

This road crosses a low area where culverts need to be enlarged to carry stormwater to prevent serious road flooding during coastal storms.

Humarock (Central Avenue, Atlantic Avenue, roads parallel to the beach including Humarock Bach)

During coastal storms seawater washes over sea walls, then collects in low areas. The energy from overwash water and debris routinely damages homes. Debris collects on roads limiting access, with expensive removal costs.

Buttonwood Road and Bayberry Road

This is a low area subject to flooding.

Maple Street

Some flooding occurs where the road crosses First Herring Brook.

Jericho Road (from Rebecca to Foam Road, including the Jericho boat ramp parking lot)

This is a low area that collects overwash routinely. Improvements to subsurface infrastructure have contributed to faster drainage in this area.

Satuit Brook (in front of the Bank of America)

Front St. crosses the Satuit Brook in a low area where culverts need to be enlarged to carry stormwater to prevent serious road flooding during coastal storms.

Hatherly Road (near the Musquashicut Pond)

Hatherly Rd. at Musquashicut Pond crosses a low area where culverts need to be enlarged to carry stormwater to prevent serious road flooding during coastal storms.

Bailey's Causeway

Bailey's Causeway often floods during coastal storms. It is a main access to the Glades/Minot area.

Critical Facilities, Vulnerable Populations and Critical Infrastructure

Critical facilities are those public or private facilities that possess added value to the community and deserve additional consideration when determining mitigation strategies to protect these resources from natural hazard risks. Vulnerable populations are those public or private facilities that are host to vulnerable residents – children in day care or schools, seniors living in congregate care settings, or disabled residents living independently in the community. Critical infrastructure are the roadways and bridges impacted throughout the community.

A list of critical facilities and vulnerable populations were reviewed and approved with modifications by the Scituate HMPT and are presented in Maps 2.5 – 2.5.8 Critical Facilities and Vulnerable Populations (Appendix A). A GIS analysis with parcel overlay mapping for projected SLR scenarios (presented in Maps 2-6 – 2-6.4) and FEMA flood zones (Maps 2-5 – 2-5.8) identified a number of the Town's critical facilities and vulnerable populations are located in high hazard areas.

1-Foot Sea Level Rise

Critical Facilities affected:

- Musquashicut Avenue Pump Station
- Seawall (Minot to Third Cliff, Humarock)
- Scituate Harbor Yacht Club
- Satuit Boat Club
- State Launch Ramp (Jericho Road)
- Scituate Harbor Marina

- Pier 44
- Satuit Water Front Club
- Town Pier (Front Street)
- Scituate Marine Park
- Peggotty Beach Pump Station
- Driftway Park Launching Ramp
- Wind Turbine (167 Driftway)
- Boat Launch (Humarock)
- North River Marina
- Jacob Hatch Building (Medical Facility)
- Hunter's Pond Dam
- Scituate Wastewater Treatment Facility

Vulnerable Populations affected:

- St. Mary's Hall

Critical Infrastructure affected:

- Town Way along Peggotty Beach access beginning at Dickens Row
- Edward Foster Road/Bridge isolates First and Second Cliffs and access to First Cliff Pump Station, Environmental Police Facility, and NOAA Facility
- Sea Street and Francis R. Powers Bridges isolate Humarock and access to Fire Dept. (4 River Street), Humarock Post Office, Boat Launch, and Village at South River Marina
- North River Bridge (to Marshfield)

3-Foot Sea Level Rise

Critical Facilities affected:

- Musquashicut Avenue Pump Station
- Seawall (Minot to Third Cliff, Humarock)
- Scituate Harbor Yacht Club
- Satuit Boat Club
- State Launch Ramp (Jericho Road)
- Scituate Harbor Marina
- Pier 44
- Satuit Water Front Club
- Town Pier (Front Street)
- Coast Guard Facility
- Harbormaster
- Cole Parkway Launching Ramp
- Peggotty Beach Pump Station
- North River Waste Water Pollution Control Plant
- Driftway Park Launching Ramp
- Wind Turbine (167 Driftway)
- Jacob Hatch Building (Medical Facility)

- Hunter's Pond Dam
- Scituate Wastewater Treatment Facility

Vulnerable Populations affected:

- St. Mary's Hall

Critical Infrastructure affected:

...in addition to the Critical Infrastructure affected by 1-foot sea level rise discussed previously:

- Central Avenue (along Humarock Beach) isolates Forth Cliff
- Haverly Road at Musquashicut Avenue, Gannett Road at Hollett Street, Gannet Road at Kathy's Path, and Border Street through Cohasset isolate Scituate Neck and Minot Beach

FEMA Flood Hazard Areas

VE/Velocity Flood Zone

The VE Zones are velocity zones that are subject to breaking wave action where waves greater than 2.9 feet are forecasted during a 100-year flood or storm surge. Below is a breakdown of the number of parcels (by land use type), critical facilities, and vulnerable populations susceptible to inundation in the VE/Velocity Flood Zone:

Parcels affected: (799 parcels in total)

- Charitable: 1
- Commercial: 2
- Federal: 1
- Improved Public Safety (Town): 1
- Improved – Selectmen (Town): 2
- Marina: 3
- Multi-Family Residential: 37
- Multiple Use – Residential: 2
- Single-Family Residential: 578
- Vacant – Developable: 1
- Vacant – Potentially Developable: 2
- Vacant Undevelopable: 72
- Vacant – Conservation: 4
- Vacant – Selectmen (Town): 46
- Missing Data: 47

Critical Facilities affected:

- U.S. Post Office (76 Glades Road)
- Seawall (Minot to Third Cliff, Humarock)
- Scituate Harbor Yacht Club
- Satuit Boat Club

- State Launch Ramp (Jericho Road)
- Scituate Harbor Marina
- Pier 44
- Satuit Water Front Club
- Scituate Wastewater Treatment Facility

AE/100-Year Flood Zone

The AE zone or 100-year flood zone (has a 1% chance of flooding occurring each year) is a regulatory standard used by federal agencies and most states to administer floodplain management programs and is also used by the NFIP as the basis for insurance requirements nationwide. Below is a breakdown of the number of parcels (by land use type), critical facilities, and vulnerable populations susceptible to inundation in the AE/100-Year Flood Zone:

Parcels affected: (2,316 parcels in total)

- Auto Repair/Sales/Service: 2
- Chapter 61: 2
- Charitable: 5
- Commercial: 15
- Commercial Greenhouse: 1
- Federal: 3
- Housing Authority: 1
- Improved Public Safety (Town): 6
- Improved – Selectmen (Town): 11
- Marina: 4
- Multi-Family Residential: 8
- Multiple Use - Commercial: 12
- Multiple Use – Other: 3
- Multiple Use – Residential: 144
- Nursing Home: 1
- Office: 18
- Other: 3
- Outdoor Recreation: 6
- Pasture: 1
- Religious: 2
- Single-Family Residential: 1,548
- State: 4
- Utility: 1
- Vacant – County/Regional: 1
- Vacant – Developable: 25
- Vacant – Potentially Developable: 256
- Vacant Undevelopable: 6
- Vacant – Conservation (Town): 40
- Vacant – Selectmen (Town): 54
- Warehouse: 4

- Missing Data: 126

Critical Facilities affected:

- Musquashicut Avenue Pump Station
- Chain Pond Pump Station
- Sand Hills Pump Station
- Town Pier (Front Street)
- First Cliff Pump Station
- Scituate Marine Park
- Coast Guard Facility
- Harbor Master
- CVS (92 Front Street)
- Joseph's Hardware Store
- Cole Park Way Launching Ramp
- Peggotty Beach Pump Station
- Hunter's Pond Dam
- MBTA North Scituate Station
- North Scituate Substation
- First Parish Pump Station
- Pincin Hill Standpipe
- Well #19
- Well #22
- Well #17A
- Scituate Reservoir
- Herring Brook Reservoir Dam
- Old Oaken Bucket Pond Dam
- Scituate Water Treatment Plant
- Driftway Medical Facility (7 New Driftway)
- Herring Brook Pump Station
- Wind Turbine (167 Driftway)
- Collier Road Pump Station
- North River Waste Water Pollution Control Plant
- Village at South River Marina
- Boat Launch (Humarock)
- Humarock Post Office
- Fire Dept. (4 River Street)
- North River Marina
- Well #10
- Well #11
- Driftway Park Launching Ramp
- Village Market
- Scituate Wastewater Treatment Facility
- Front Street Sewer Interceptor

Vulnerable Populations affected:

- St. Mary's Hall
- St. Mary's Church
- CVS
- Cardigan Nursing Home

Critical Infrastructure affected:

- Edward Foster Bridge
- Sea Street Bridge
- Francis R. Powers Bridge
- North River Bridge

X/500-Year Flood Zone

The X zone or 500-year flood zone is a flood that has a 0.2% chance of occurring each year. Below is a breakdown of the number of parcels (by land use type), critical facilities, and vulnerable populations impacted by the X flood zone:

Parcels affected: (69 parcels in total)

- Cranberry Bog: 2
- Housing Authority: 1
- Improved – Selectmen (Town): 1
- Multi-Family Residential: 5
- Outdoor Recreation: 1
- Single-Family Residential: 32
- Vacant – Developable: 2
- Vacant Undevelopable: 11
- Vacant – Conservation (Town): 4
- Vacant – Conservation (Organization): 2
- Vacant – Selectmen (Town): 2
- Missing Data: 6

Critical Facilities affected:

- Scituate Wastewater Treatment Facility

HW performed a series of Vulnerability Analyses that considered those areas in Town impacted by the various flood zones according to land use type, critical facilities, and vulnerable populations. An Economic Analysis of these impacts follows later in Section 2.4.2 Economic Vulnerability.

Probability of Future Occurrence of Flood-Related Hazards

As new development and urbanization continues, with the increase of impervious surfaces increasing the rate of drainage collection and reducing the carrying capacity of the land, it is likely urban flooding and stormwater runoff events will also increase on a more frequent basis with even lower storm events. Until the Town permanently addresses the number of streets and properties subject to repetitive flooding identified above, the Town will continue to address these areas

as needed in the short-term. The continuing increase in frequency and severity of events and compounded by stormwater collection deficiencies in inland areas, the Town will continue to be at high risk for extensive damages at a medium/regional level for flood-related events (Table 2-2 Hazard Index).

2.3.2 Winter-Related Hazards

Winter weather events can include heavy snows, ice, and extreme cold and can affect the entire Town of Scituate. Heavy snow can bring the community to a standstill by inhibiting mobility (transportation networks, pedestrian travel), knocking down trees and utility lines, and cause structural collapses in older buildings. Ice buildup can down utility lines and communication towers. The impacts of both events can cause indirect issues such as freezing/rupturing pipes from lack of heat, while also changing the ground’s frost level, creating problems for underground infrastructure.

Because Scituate’s coast faces the northeast it more vulnerable than other coastal communities. Occasionally winter storms can also hinder the tidal exchange in tidally restricted watersheds and result in localized flooding within these areas. Ice build-up at gate structures can also damage tide gates and increase the hazard potential as a result of malfunctioning tide gates.

Table 2-7 below represents the various significant winter-related hazard events that have occurred in and around the Town of Scituate over time, utilizing NOAA’s National Centers for Environmental Information (<http://www.ncdc.noaa.gov/>). All events are county wide (Plymouth County), unless otherwise noted.

Table 2-7 Significant Winter-Related Events, Plymouth County

Hazard Type	Date	Level/ Description	Damages	Notes
<i>Extreme Cold/Wind Chill</i>				
	2/16/2015			
	2/14/2016			
<i>Blizzards/Heavy Snow/Winter Weather</i>				
	1/2/1996			
	1/7/1996		\$1.6 M	
	1/10/1996			
	2/2/1996			
	2/16/1996			
	3/2/1996			
	3/3/1996			
	3/7/1996			
	4/9/1996			
	1/11/1997			
	1/31/1997			

	2/16/1997			
	3/31/1997			
	4/1/1997			
	12/14/1997			
	12/24/1998			
	1/14/1999			
	2/25/1999			
	3/15/1999			
	11/30/1999			
	1/13/2000			
	2/18/2000			
	1/20/2001			
	2/25/2001			
	3/5/2001			
	3/26/2001			
	12/5/2002			
	3/16/2004			
	2/24/2005			
	1/23/2006		\$10K	
	2/12/2006		\$15K	Blizzard
	12/13/2007			
	12/16/2007			
	1/27/2008			
	12/19/2008	9-13"	\$3K	
	12/31/2008	8-12"		
	1/18/2009	5.5"		
	1/19/2009	5.5"		
	2/3/2009	6"		
	3/2/2009	6-8"		
	12/19/2009	13-21"		
	12/20/2009		\$100K	Blizzard
	12/20/2010	7-12"		
	1/26/2011	6-11"		
	1/19/2012	2-4"		
	1/21/2012	5-8"		
	2/8/2013	20-21"	\$345K	Blizzard
	2/17/2013	4-6"		
	3/7/2013	6-16"		
	3/18/2013	2-8"		
	3/21/2013	3-6"		
	1/2/2014	10-17"	\$5K	Blizzard
	1/21/2014	8-18"		
	2/5/2014	4-9"		

	2/15/2014	7-10"	\$5K	Downed trees and wires
	1/26/2015			Blizzard
	2/2/2015	5-14"		
	2/8/2015	8-29"		
	2/14/2015		\$10K	Blizzard
	2/25/2015	2-4"		
	3/1/2015	3-5"		
	3/5/2015	3-8"		
	1/23/2016	3-11"	\$50K	Blizzard
	2/5/2016	1-10"	\$100K	
	2/8/2016	5-8"	\$10K	Blizzard
	3/21/2016	2-5"		
	4/3/2016	2-4"		
	4/4/2016	4-9"		
	12/17/2016	2-3"		
	12/9/2017	2.5-3"		
	12/22/2017		\$5K	
	3/13/2018	8-16"	\$50K	Blizzard

Source: NOAA National Centers for Environmental Information, www.ncdc.noaa.gov, current through June 2020.

Snow/Blizzards/Winter Storms/Nor'easters

Winter storms often include natural hazards such as extreme winds, coastal erosion and flooding. Utility and power lines can break from the weight of snow or ice coupled with strong winds. This could put residents at risk of losing heat, electricity, and water (if using well water). Snow melting poses problems as well such as road flooding in low lying areas. The Town has experienced heavy snow and winter storms which have become more frequent over the past several years.

A heavy snow is generally defined as having more than eight (8) inches of accumulation in less than 24 hours. Heavy snow can bring the community to a standstill by inhibiting transportation, knocking down trees and utility lines, and by causing structural collapse in buildings not designed to withstand the weight of the snow. Repair and snow removal costs can be significant and surpass annual municipal salt and snow removal budgets, often before the end of the season. A winter storm warning is issued when snowfall is expected to accumulate more than four (4) inches in 12 hours and/or a quarter inch or more of freezing rain accumulation.

The storm radius of a nor'easter is often as large as 1,000 miles, and the horizontal storm speed is about 25 miles per hour, traveling up the eastern United States coast. Sustained wind speeds of 10-40 MPH are common during a nor'easter, with short term wind speeds gusting up to 70 MPH. Unlike hurricanes and tropical storms, nor'easters can sit off shore, wreaking damage

for days. Nor'easters are a common winter occurrence in New England and repeatedly result in flooding, various degrees of wave and erosion-induced damage to structures, and erosion of natural resources, such as beaches, dunes and coastal bluffs. The erosion of coastal features commonly results in greater potential for damage to shoreline development from future storms. Nor'easters cause varying amounts of coastal erosion depending on the intensity and the duration of the storm; the tidal phase at the time of the storm (neap or spring tide); the path of the storm; and the time interval between storms. Back-to-back storms do not allow time for the beaches and dunes to recover sand that has been transported offshore.

Damages resulting from nor'easters are often due to coastal erosion and undermining the structures that were previously behind the dunes or on the top of coastal bluffs. Damages to a house that topples off an embankment are usually much more costly than damages resulting from localized areas of flooding.

Heavy snow affects the entire state, but the highest amounts typically occur in the northern and northwestern areas of the state. Usually, the impact and vulnerability of winter weather is measured in terms of the financial costs associated with preparing for, responding to, and recovering from the event. The Town uniformly continues to experience heavy snow and winter storms with greater frequency and severity, as reported by the National Center for Environmental Information and indicated in Table 2-6. All of Scituate is susceptible to the effects of winter storms. Averaging only 4.25 miles wide, the inland portions of the community are easily impacted by nor'easters and other coastal storm events. Based on the high frequency and extensive severity of heavy snow/blizzards/winter storms/nor'easter events over time, as reported by the National Centers for Environmental Information and indicated in Table 2-7, also confirmed by the HMPT, Scituate is considered at high risk for heavy snow/blizzards/winter storms/nor'easters.

Climate Change Impacts on Heavy Snow Events

Climate change will result in increased average global temperatures. These impacts are already being felt in New England, as average winter temperatures in the region have risen 3.8°F in the last 30 years. Although at first glance this would appear to make winters less severe the Northeast has experienced the largest increase in extreme precipitation events in the country, which often fall as heavy wet snow in the winter.

Extreme Cold

Extreme cold events often accompany winter storms, may be left in their wake, or occur without any associated storm activity, and can lead to hypothermia and frostbite. Extreme cold temperatures vary dependent on the normal climate of the region however, Scituate can expect to be uniformly affected. For Massachusetts, extreme cold typically means temperatures below zero degrees Fahrenheit. Extreme cold can adversely affect people - some more than others,

infants and residents 65 years of age or more are especially vulnerable. Based on the high frequency and minor severity of extreme cold events over time, as reported by the National Centers for Environmental Information and indicated in Table 2-7, also confirmed by the HMPT, Scituate is considered at moderate risk to extreme cold.

Climate Change Impacts on Extreme Cold Temperatures

Climate change will result in increased average global temperatures, which will likely decrease the number of extreme cold days. This decrease in extreme cold days has already been documented and is expected to continue.

MVP Climate Change Projections on Extreme Cold Temperatures

As mentioned above, climate change impacts will result in increased average temperatures, so the number of extreme cold days is expected to decrease. Scituate should experience far fewer days with temperatures below freezing, and thus, will expend less energy on heating in the winter months. Table 2-8 below includes temperature projections (Annual and Winter) with a Baseline (1971 – 2000) through the mid-century (2050s) for the South Coastal Basin.

Table 2-8 Extreme Cold Temperature Projections, South Coastal Basin

Climate Parameter	Baseline 1970 – 2000	Projected Change 2030s	Mid-Century 2050s
Average Annual Temperature (°F)	49.7	51.6 – 53.4	52.3 – 55.5
Average Winter Temperature (°F)	30.3	32.2 – 34.3	32.9 – 36.5
Minimum Annual Temperature (°F)	39.7	41.7 – 43.5	42.8 – 45.9
Minimum Winter Temperature (°F)	21.1	23.2 – 25.9	24.0 – 27.8
Annual Days with Minimum Temperature Below 32 °F	125	113 – 98	108 – 42
Winter Days with Minimum Temperature Below 32 °F	77	73 - 68	73 - 61
Annual Heating Degree-Days (Base 65 °F)	6,147	5,655 – 5,179	5,465 – 4,709
Winter Heating Degree-Days (Base 65 °F)	3,146	2,972 – 2,772	2,923 – 2,575

Source: MVP Program, www.resilientma.org

Property at Risk from Winter-Related Hazards

New England experiences winter storms in more extreme ways than most of the rest of the country. The average annual snowfall for the Town of Scituate is 24.0 – 36.0 inches of snow per year (Map 2-4 Average Annual Snowfall Map, Appendix A). Minor hazards include flooding during snow melt and treacherous roadways due to ice (very low frequency), snow and downed wires/trees making roadways impassable, particularly for emergency vehicles.

Probability of Future Occurrence of Winter-Related Events

According to past history and climatic conditions, and the inability to predict extreme snow and temperature events, the Town will continue to be at high risk for extensive damages at a large/multiple community level winter-related events (Table 2-2 Hazard Index).

2.3.3 Wind-Related Hazards

Wind is the movement of air caused by a difference in pressure from one place to another. Local wind systems are created by the immediate geographic features in a given area, such as mountains, valleys, or large bodies of water. Wind effects can include blowing debris, interruptions in elevated power and communications utilities, and intensification of the effects of other hazards related to winter weather and severe storms.

Massachusetts is susceptible to high wind from several types of weather events: before and after frontal systems, hurricanes and tropical storms, severe thunderstorms and tornadoes, and Nor'easters. Sometimes, wind gusts of only 40 to 45 mph can cause scattered power outages from trees and wires being downed.¹⁵

Massachusetts coastal wind events can produce damage often associated with thunderstorms or tornadoes. In some instances, these events have been associated with weakening tropical weather systems, including downgraded tropical and sub-tropical storm systems. This section examines the risks associated with damaging wind events with emphasis on hurricanes, tornadoes, high winds, lightning/thunderstorms.

Nor'easters, while often a less dramatic storm than a hurricane, are far more frequent in Massachusetts, and can still produce considerable damage. On average, one to two nor'easters a year hit Massachusetts with a storm surge equal or greater than two feet. The duration of high surge and winds during a nor'easter can last from 12 hours to three days, while the duration of hurricane conditions generally lasts only six to 12 hours.

Tropical cyclones, a general term for tropical storms and hurricanes, are low pressure systems that usually form over the tropics. These storms are referred to as "cyclones" due to their rotation. Tropical cyclones are among the most powerful and destructive meteorological systems on earth. Their destructive phenomena include very high winds, heavy rain, lightning, tornadoes, and storm surge. As tropical storms move inland, they can cause severe flooding, downed trees and power lines, and structural damage.

¹⁵ 2018 State Hazard Mitigation and Climate Adaptation Plan, Commonwealth of Massachusetts.

There are three categories of tropical cyclones:

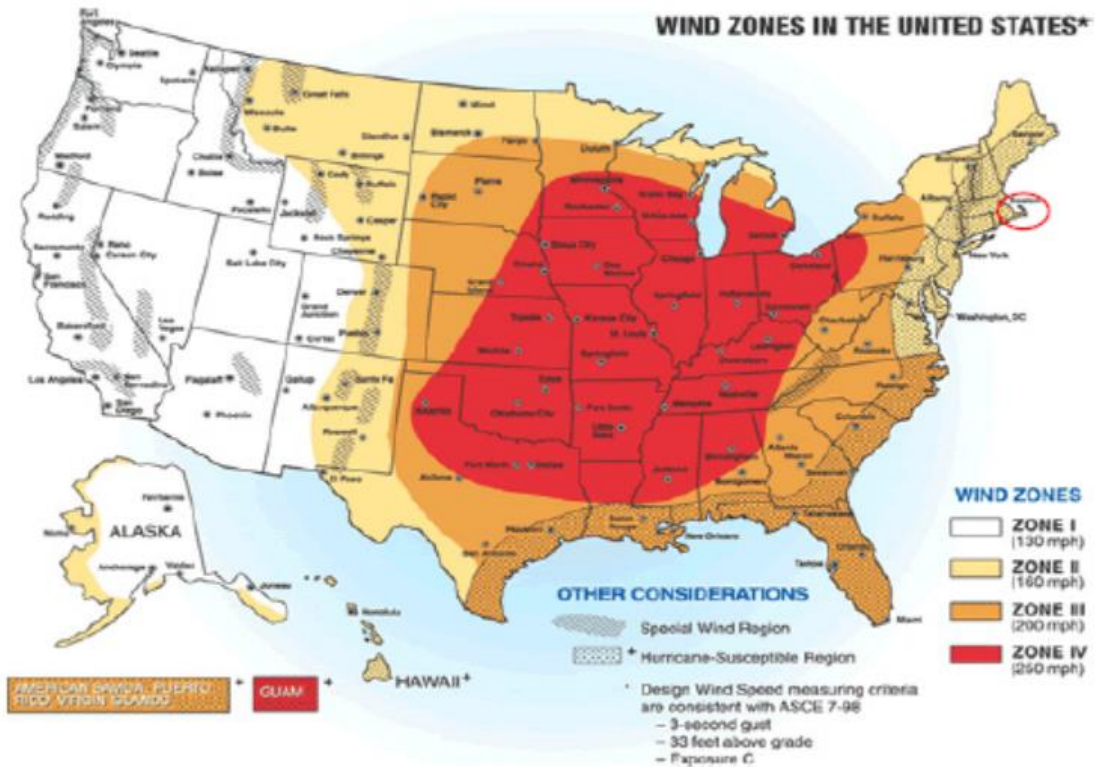
1. Tropical Depression: maximum sustained surface wind speed is less than 39 mph.
2. Tropical Storm: maximum sustained surface wind speed from 39-73 MPH.
3. Hurricane: maximum sustained surface wind speed exceeds 73 MPH.

Once a tropical cyclone no longer has tropical characteristics it is then classified as an extra tropical system.

Most Atlantic tropical cyclones begin as atmospheric “easterly waves” that propagate off the coast of Africa and cross the tropical North Atlantic and Caribbean Sea. When a storm starts to move toward the north, it begins to leave the area where the easterly trade winds prevail and enters the temperate latitudes where the westerly winds dominate. This produces the eastward curving pattern of most tropical storms that pass through the Mid-Atlantic region. When the westerly steering winds are strong, it is easier to predict where a hurricane will go. When the steering winds become weak, the storm follows an erratic path that makes forecasting very difficult.

Based on historical tornado and hurricane data, FEMA has produced a map that depicts maximum wind speeds for design of safe rooms. The Commonwealth is located within Wind Zone II, with speeds up to 180 mph (Figure 2-6). The entire Commonwealth is also located within the hurricane-susceptible region. Massachusetts wind events can produce damage often associated with thunderstorms or tornadoes.

Figure 2-6 Wind Zones in the United States



Source: FEMA

Table 2-9 below represents the various significant wind-related hazard events that have occurred in and around the Town of Scituate over time, utilizing NOAA’s National Centers for Environmental Information (<http://www.ncdc.noaa.gov/>). All events are county wide (Plymouth County), unless otherwise noted.

Table 2-9 Significant Wind-Related Events, Plymouth County

Hazard Type	Date	Level/Description	Damages	Notes
<i>Hail</i>				
	5/17/1959	1"		
	7/4/1964	2"		
	6/28/1969	1.5"		
	6/9/1973	1"		
	7/18/2000	0.88"		Town of Scituate
	7/18/2000	0.75"		Town of Scituate
	7/24/2012	1.75"		Town of Scituate
	8/7/2014	1"		Town of Scituate
<i>High/Strong Winds</i>				
	1/19/1996			
	1/27/1996			

	2/25/1996	50kts		
	7/13/1996	50kts		
	9/2/1996	55kts		
	10/8/1996	50kts		
	12/6/1996			
	12/24/1996			
	2/17/1997			
	3/6/1997			
	3/31/1997	55kts		
	4/1/1997			
	4/19/1997			
	7/25/1997			
	8/21/1997		\$90	
	11/1/1997		\$3.12K	
	11/27/1997		\$220	
	12/2/1997			
	12/14/1997			
	12/29/1997		\$310	
	1/28/1998			
	2/4/1998			
	2/18/1998			
	2/24/1998	52kts	\$1.25K	
	3/9/1998			
	3/21/1998			
	3/26/1998			
	4/9/1998			
	4/23/1998			
	5/9/1998			
	6/27/1998		\$2K	1 injury
	10/1/1998			
	11/11/1998			
	11/26/1998			
	12/1/1998			
	12/22/1998			
	12/30/1998			
	1/3/1999	56kts		
	1/15/1999			
	1/18/1999			
	1/24/1999			
	2/2/1999			
	3/4/1999			
	3/22/1999			
	9/16/1999	50kts		

	10/14/1999			
	12/11/1999			
	1/4/2000			
	1/16/2000			
	2/14/2000			
	3/28/2000			
	4/4/2000			
	4/8/2000	50kts		
	5/18/2000			
	6/6/2000			
	10/31/2000			
	12/12/2000			
	12/17/2000	50kts		
	2/10/2001			
	2/17/2001			
	11/5/2004	50kts	\$25K	1 injury
	12/1/2004	58kts	\$25K	
	3/8/2005	50kts	\$200K	
	5/7/2005	50kts	\$25K	
	5/24/2005	50kts	\$25K	
	8/31/2005	40kts	\$5K	
	9/29/2005	58kts	\$20K	
	10/16/2005	58kts	\$10K	
	10/25/2005	58kts	\$75K	
	11/3/2005	45kts	\$5K	
	12/9/2005	61kts	\$100K	
	1/15/2006	46kts	\$10K	
	1/18/2006	68kts	\$150K	
	1/18/2006	55kts	\$5K	
	1/18/2006	32kts	\$5K	
	2/17/2006	68kts	\$40K	
	10/28/2006	50kts	\$4K	
	11/23/2006	30kts	\$1K	
	12/1/2006	51kts		
	4/15/2007	55kts	\$30K	
	11/3/2007	60kts	\$6K	Power outages
	12/23/2007	40kts	\$3K	
	2/18/2008	42kts	\$6K	
	3/8/2008	52kts	\$5K	
	11/15/2008	50kts	\$7.5K	
	12/25/2008	35kts		
	6/21/2009	27kts	\$10K	
	10/18/2009	35kts	\$45K	Downed trees

	10/24/2009	50kts	\$10K	
	1/25/2010	50kts	\$25K	
	3/14/2010	50kts	\$25K	
	4/29/2010	40kts	\$8K	
	10/1/2010	40kts	\$10K	
	11/8/2010	45kts	\$45K	
	11/24/2010	45kts	\$6K	
	2/19/2011	51kts	\$10K	
	4/5/2011	33kts	\$15K	
	1/13/2012	50kts	\$20K	
	9/18/2012	50kts	\$10K	
	10/29/2012	50kts	\$100K	
	11/7/2012	53kts	\$80K	
	12/21/2012	40kts	\$5K	
	12/27/2012	53kts	\$8K	
	1/31/2013	56kts	\$25K	
	3/7/2013	50kts	\$75K	
	11/1/2013	50kts	\$55K	
	11/24/2013	37kts	\$10K	
	11/27/2013	50kts	\$55K	
	3/26/2014	52kts	\$5K	
	4/15/2014	41kts	\$15K	
	7/4/2014	40kts	\$2K	
	10/22/2014	52kts	\$100K	Downed trees and wires.
	11/2/2014	50kts	\$100K	Downed trees and wires.
	12/9/2014	48kts	\$15K	
	1/5/2015	45kts	\$15K	
	1/27/2015	64kts	\$30K	Downed trees and wires.
	3/17/2015	45kts	\$1K	
	6/28/2015	50kts	\$35K	
	9/30/2015	40kts	\$5K	
	10/29/2015	41kts	\$1K	
	1/10/2016	38kts	\$10K	
	1/13/2016	40kts	\$20K	
	2/25/2016	50kts	\$55K	
	3/31/2016	40kts	\$85K	
	4/7/2016	42kts	\$1K	
	9/5/2016	41kts	\$21K	Downed trees and wires.
	10/9/2016	38kts		
	10/23/2016	36kts	\$500	

	12/18/2016	43kts	\$100	
	12/27/2016	49kts	\$5.5K	
	1/23/2017	50kts	\$2K	
	2/13/2017	37kts	\$2K	
	3/2/2017	50kts	\$2K	
	3/14/2017	50kts	\$18K	Downed trees and wires.
	3/22/2017	41kts	\$1K	
	4/6/2017	40kts	\$2K	
	6/6/2017	40kts	\$2.5K	
	10/24/2017	45kts	\$5K	
	10/29/2017	70kts	\$10K	
	11/10/2017	40kts	\$5K	
	12/25/2017	59kts		
	1/12/2018	45kts	\$4K	
	3/2/2018	76kts	\$40K	Downed trees
	3/5/2018	40kts	\$2K	
	5/4/2018	40kts	\$1K	
	10/15/2018	42kts	\$1K	
	10/17/2018	40kts	\$1K	
	10/27/2018	36kts	\$30K	Power outages
	11/3/2018	52kts		
	11/16/2018	45kts	\$1K	
	12/19/2018	40kts	\$1K	
	12/21/2018	50kts	\$7K	
	1/1/2019	43kts	\$7K	
	1/24/2019	63kts	\$15.5K	
	1/30/2019	40kts	\$1.5K	
	2/8/2019	49kts	\$1K	
	2/25/2019	58kts	\$46K	
	4/15/2019	42kts	\$3K	
	10/10/2019	45kts	\$1.8K	
	10/17/2019	50kts	\$18.2K	
	11/1/2019	56kts	\$1K	
	1/12/2020	50kts	\$7.5K	
	2/7/2020	54kts	\$2K	
	3/4/2020	47kts	\$1K	
	3/6/2020	43kts	\$300	
	4/9/2020	47kts	\$1,300	
	4/13/2020	68kts	\$700	Downed trees and wires
	4/26/2020	45kts	\$500	
	5/9/2020	43kts	\$800	

<i>Tornado</i>				
	9/7/1958	F0	\$2.50	1 death, 1 injury
	7/4/1964	F1	\$250K	
	6/9/1965	F0	\$30	
	11/18/1967	F2	\$250	
	9/16/1986	F1	\$250K	
	7/10/1989	F1	\$25K	1 injury
<i>Tropical Storm</i>				
	8/28/2011		\$1.3 million	
	9/20/2017		\$25K	
	9/7/2019		\$500	
<i>Hurricanes</i>				
	8/31/1954			Carol
	9/11/1954			Edna
	10/15/1954			Hazel
	8/17/1955			Diane
	9/12/1960			Donna
	9/27/1960			Gloria
	8/19/1991			Bob
<i>Lightning/Thunderstorms</i>				
	4/26/1961			
	8/8/1963			
	6/5/1966			
	8/11/1966	65kts		
	6/28/1969			
	8/9/1969			
	8/2/1970			
	7/25/1972	51kts		
	7/25/1972	60kts		
	6/9/1973			
	8/10/1973			
	9/4/1973	65kts		
	10/3/1979			
	7/20/1981			
	6/27/1983			
	6/12/1991			
	7/18/2000	50kts		Town of Scituate
	8/5/2005	50kts	\$5K	Town of Scituate
	6/20/2008			1 injury, Town of Scituate, lightning
	8/5/2010	50kts	\$10K	Town of Scituate, downed trees

	6/23/2012	50kts	\$15K	Town of Scituate, downed trees and wires
	7/17/2019	50kts	\$2.50	Town of Scituate, downed trees

Source: NOAA National Centers for Environmental Information, www.ncdc.noaa.gov.
Data current through June 2020.

Hurricanes

Hurricanes are defined as a large circulating windstorm covering hundreds of miles that forms over warm ocean water. To be officially classified as a hurricane, the wind speeds must exceed 74 miles per hour. In the northern hemisphere winds circulate in a counterclockwise direction. A great dome of water as much as fifty miles in diameter (called the “storm surge”) is pushed ahead of the storm by its winds. In some coastal locations, this can result in tides 20 feet higher than usual. Occasionally, storm surge is responsible for damage to property and potential deaths.

The winds that accompany hurricanes have the potential to cause serious damage. Downed power lines leave residents without electricity and can impede business for days. Fallen trees can damage buildings and block roadways. Unsecured building components including gutters, screened enclosures, roof coverings, shingles, car ports, porch coverings, overhangs, siding, decking, windows, walls, gables can be blown off structures and carried by the wind to cause damage in other places. Wind driven rain often causes water damage in roof and wall envelopes.

Measuring the Intensity of a Hurricane

Hurricane damages come from wind, rain, tornadoes, floods/storm surge, and the effects of very low air pressure. The Saffir-Simpson Hurricane Wind Scale (SSHWS) intensity category system was developed in the 1970’s to characterize a hurricane’s destructive potential by indicating wind speeds and range of damage, see Table 2-10 below. The SSHWS category system measures sustained wind speed, central pressure, storm surge height, and coastal damage potential within five intensity categories.

Table 2-10 Saffir-Simpson Hurricane Wind Scale

Scale No. (Category)	Wind (mph)	Potential Damage
1	74 - 95	Minimal: Damage is primarily to shrubbery and trees, mobile homes, and some signs. No real damage is done to structures.
2	96 – 110	Moderate: Some trees topple, some roof coverings are damaged, and major damage is done to mobile homes.
3	111 – 130	Extensive: large trees topple, some structural damage is done to roofs, mobile homes are destroyed, and structural damage is done to small homes and utility buildings.

4	131 – 155	Extreme: Extensive damage is done to roofs, windows and doors; roof systems on small buildings completely fail; and some curtain walls fail.
5	> 155	Catastrophic: Roof damage is considerable and widespread, window and door damage are severe, there are extensive glass failures, and entire buildings could fail.
Additional Classifications: Tropical Storm 39 – 73, Tropical Depression < 38		

Source: NOAA.

The National Weather Service (NWS) will issue a hurricane warning when sustained winds of 74 mph or higher are reached and expected within a coastal area within 24 hours. On average, there are approximately 10 named tropical storms along the east coast of the U.S. each year, six of which are likely to develop into hurricanes, with only two or three likely to reach category 3 on the SSHWS. The SSHWS has undergone a minor modification for 2012 in order to resolve awkwardness associated with conversions among the various units used for wind speed in advisory products. The change broadens the Category 4 wind speed range by one mile per hour (mph) at each end of the range, yielding a new range of 130-156 mph.

Based on the high frequency and extensive severity of hurricane events over time, as reported by the National Centers for Environmental Information and indicated in Table 2-9, also confirmed by the HMPT, Scituate is considered at high risk to hurricanes.

Storm Surge

Of additional concern is hurricane storm surge. Storm surge refers to the rise of water levels caused explicitly by a storm and is measured as the height above the normal predicted tide. The combination of SLR and increased storm intensity will result in higher storm surges characterized that will extend further inland, potentially causing greater damage to property and infrastructure. The IPCC in 2014 found that increasing storm surges and other forms of coastal flooding have the potential to disrupt livelihoods and create severe health risks across various sectors.

Over time, as sea levels rise, water levels associated with what is thought of as today’s 100-year return period storm will increase, because a higher base sea level will increase the extent and depth of storm-related flooding. As a result, the 100-year return period storm of the future could result in much more flood-related damage than the 100-year return period storm of today. Additionally, from the perspective of water levels, SLR will cause the flooding that would occur with today’s 100-year return period storm to become a more regularly occurring event. For example, a future 20-year return period storm on top of a two-foot SLR will have the same water level and depth as today’s 100-year return period storm.

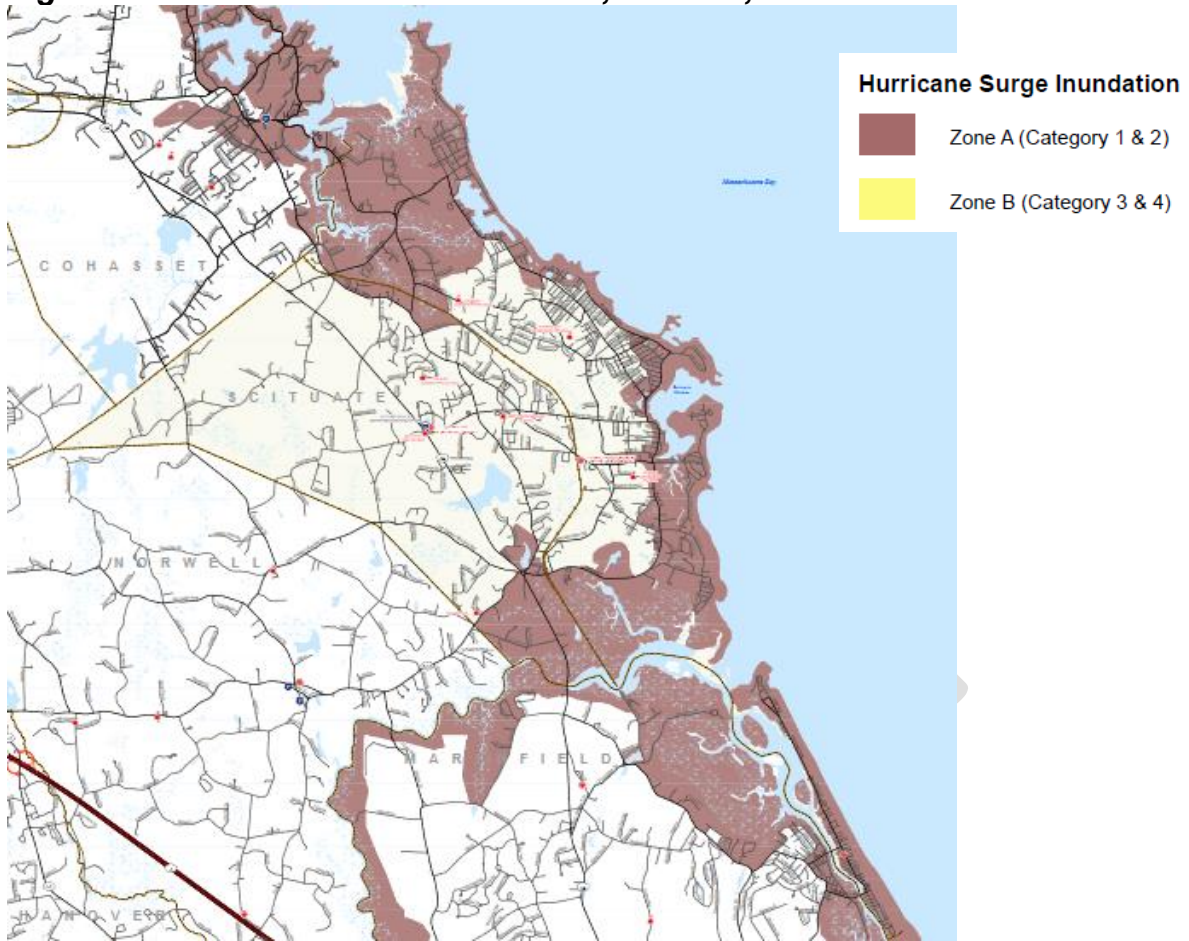
Storm surge is by far the most destructive force acting on the Scituate coast. Scituate has experienced damaging storm surge in conjunction with a number

of tropical depressions and winter storms. Storm surge from the Portland Gale of 1898 breached the land connecting Humarock to Third Cliff, separating it from the rest of the town. The highest storm surge tide recorded in the Boston area was approximately 15 feet Mean Low Low Water (MLLW) during the Blizzard of 1978. This storm also produced 25-foot waves which caused extensive damage to homes, infrastructure and flooding. The probability of a storm surge event is relative to the probable occurrence of tropical storms or nor'easters.

Hurricane surge inundation areas for Categories 1 through 4 hurricanes striking the coast were developed by the National Oceanic Atmospheric Administration (NOAA) using the Sea Lake and Overland Surge from Hurricanes (SLOSH) Model. Maps 2-7 through 2-7.4 Hurricane Inundation Areas shows those areas expected to be inundated by Categories 1 through 4 hurricanes.

In June of 2014, the U.S. Army Corps of Engineers (USACOE), FEMA, NOAA and Mass GIS completed the Massachusetts Hurricane Evacuation Study/Mapping which shows Hurricane Evacuation Zones to be evacuated from potential worst-case hurricane surge inundation (Figure 2-7). The evacuation zones are based on the inundation that can be expected to result from a combination of hurricane landfall location, forward speed and direction for each hurricane category. Evacuation Zone A, shown in brown, is recommended to be evacuated prior to an expected category 1 or 2 hurricane. Evacuation Zone B, shown in yellow, is recommended to be evacuated prior to an expected category 3 or 4 hurricane.

Figure 2-7 Hurricane Evacuation Zones, Scituate, June 2014



Source: Massachusetts Hurricane Evacuation Study

Climate Change Impacts on Hurricanes

Climate change is expected to result in the increased frequency and intensification of hurricanes and tropical storms worldwide. Rising sea levels, coupled with potentially higher hurricane wind speeds, rainfall intensity, and storm surges will combine to create more intense hurricanes, resulting in increased impacts to coastal communities. Research predicts a global increase in the intensity of such storms on average, by 2% to 11%, based on the IPCC mid-range emission scenario projections, as well as a poleward expansion in the latitude at which storms will reach their highest intensity. Some experts have noted that the three massive storms from the 2017 hurricane season (Harvey, Irma, and Maria) are consistent with this expected intensification.

Hurricanes and tropical storms are expected to result in more rainfall. This increase has been observed and is expected both globally (IPCC 2014) and for the Atlantic basin, including the U.S. east coast. Based on a synthesis of current science, NOAA predicts that Atlantic hurricanes and tropical storms in the coming century will have higher rainfall rates than present storms, especially near the center of the storm. Hurricane Harvey, which resulted in a record 51.9 inches of

rainfall at one station west of Houston, Texas, is one recent example of this trend.

Tornadoes/High Winds

Tornadoes are violently rotating columns of air in contact with and extending between a cloud and the surface of the earth. Generally, winds in most tornadoes are 100 mph or less, but can exceed 250 mph in the most violent and least frequent tornadoes. Several conditions are required for the development of tornadoes and associated thunderstorm clouds, including abundant low-level moisture to contribute to the development of a thunderstorm, along with a trigger/cold front to lift the moist air. Tornadoes usually form in areas where strong winds are turning in a clockwise direction and can be in the traditional funnel shape, or in a slender rope-like form. They typically begin in a supercell (severe thunderstorm), primarily in the month of May.

Measuring the Intensity of a Tornado

Typically, tornadoes are categorized by frequency values from historic data and area impacted based on the length and width of the damage path. Tornado damage severity is measured by the Fujita Tornado Scale, where wind speed is estimated from the amount of damage. As of February 1, 2007, the National Weather Service began rating tornadoes using the Enhanced Fujita-scale (Table 2-11). The Enhanced Fujita scale is more complicated than the original F-scale, allowing for more precise assessments of tornado severity.

Table 2-11 Enhanced Fujita Scale

Fujita Scale			Derived		Operational EF Scale	
F Number	Fastest ¼ mile (mph)	3-second gust (mph)	EF Number	3-second gust (mph)	EF Number	3-second gust (mph)
0	40 - 72	45 - 78	0	65 - 85	0	65 - 85
1	73 - 112	79 - 117	1	86 - 109	1	86 - 110
2	113 - 157	118 - 161	2	110 - 137	2	111 - 135
3	158 - 207	162 - 209	3	138 - 167	3	136 - 165
4	208 - 260	210 - 261	4	168 - 199	4	166 - 200
5	261 - 318	262 - 317	5	200 - 234	5	Over 200

Source: NOAA.

Based on the high frequency and serious severity of tornadoes over time as reported by the National Centers for Environmental Information and indicated in Table 2-9, also confirmed by the HMPT, the Town of Scituate is considered at moderate risk to future tornadoes. Based on the high frequency and extensive severity of high winds over time as reported by the National Centers for

Environmental Information and indicated in Table 2-9, also confirmed by the HMPT, the Town of Scituate is considered at high risk to future high wind events.

Lightning/Thunderstorms

Thunderstorms are formed when the right atmospheric conditions combine to provide moisture, lift, and warm unstable air that can rise rapidly. Thunderstorms occur any time of the day and in all months of the year but are most common during summer afternoons and evenings and in conjunction with frontal boundaries. Thunderstorms affect a smaller area compared with winter storms or hurricanes, but they can be dangerous and destructive for a number of reasons. Storms can form in less than 30 minutes, giving very little warning; they have the potential to produce lightning, hail, tornadoes, powerful straight-line winds, and heavy rains that produce flash flooding.

All thunderstorms produce lightning, and therefore all thunderstorms are dangerous. Lightning often strikes outside of areas where it is raining and may occur as far as 10 miles away from rainfall. It can strike from any part of the storm and may even strike after the storm has seemed to pass. Hundreds of people across the nation are injured annually by lightning, most commonly when they are moving to a safe place but have waited too long to seek shelter. The Town of Scituate can be uniformly affected by lightning and thunderstorms, dependent upon the time of day, existing/incoming weather conditions, and time of year.

Building construction, location, and nearby trees or other tall structures will have a large impact on how vulnerable an individual facility is to a lightning strike. A rough estimate of a structure's likelihood of being struck by lightning can be calculated using the structure's ground surface area, height, and striking distance between the downward-moving tip of the stepped leader (negatively charged channel jumping from cloud to earth) and the object. In general, buildings are more likely to be struck by lightning if they are located on high ground or if they have tall protrusions such as steeples or poles which the stepped leader can jump to. Electrical and communications utilities are also vulnerable to direct lightning strikes. Damage to these lines has the potential to cause power and communications outages for businesses, residences, and critical facilities. Based on the high frequency and serious severity of lightning/thunderstorm events over time, as reported by the National Centers for Environmental Information and indicated in Table 2-9, the risk of lightning/thunderstorms is considered moderate in Scituate.

Hail

Hail is formed in towering cumulonimbus clouds (thunderheads) when strong updrafts carry water droplets to a height at which they freeze. Eventually, these ice particles become too heavy for the updraft to hold up, and they fall to the ground at speeds of up to 120 MPH. Hail falls along paths called swaths, which can vary from a few square acres to up to 10 miles wide and 100 miles long. The

Town of Scituate can be uniformly affected by hail, dependent upon the existing/incoming weather conditions, and time of year.

The Tornado and Storm Research Organisation (TORRO) developed the TORRO Hailstorm Intensity Scale in 1986 to measure the intensity of hail storms. Table 2-12 categorizes hail by size code, description and typical damage.

Table 2-12 TORRO Hail Intensity Scale

Scale	Intensity Category	Description	Typical Diameter (inches)	Typical Damage Impacts
H0	Hard Hail	Pea	0.25	No damage
H1	Potentially Damaging	Mothball	0.50	Slight general damage to plants, crops
H2	Significant	Marble/Grape	0.75	Significant damage to fruit, crops, vegetation
H3	Severe	Walnut	1.25	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	Pigeon's egg > Squash ball	1.50	Widespread glass damage, vehicle bodywork damage
H5	Destructive	Golf ball > Pullet's egg	1.75	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	Hen's egg	2.0	Bodywork of grounded aircraft dented; brick walls pitted
H7	Destructive	Tennis ball > Cricket ball	2.5	Severe roof damage, risk of serious injuries
H8	Destructive	Large orange > softball	2.75	Severe damage to aircraft
H9	Super Hailstorms	Grapefruit	3.0	Extensive structural damage. Risk of seven even fatal injuries to persons caught in the open
H10	Super Hailstorms	Melon	4.0	Extensive structural damage. Risk of seven even fatal injuries to persons caught in the open

Source: TORRO.

Structure vulnerability to hail is determined mainly by construction and exposure. Metal siding and roofing is better able to stand up to the damages of a hailstorm than many other materials, although it may also be damaged by denting. Exposed windows and vehicles are also susceptible to damage. Crops are extremely susceptible to hailstorm damage, as even the smallest hail stones can rip apart unsheltered vegetation. Based on the high frequency and minor severity of hail events over time, as reported by the National Centers for Environmental

Information and indicated in Table 2-9, also confirmed by the HMPT, the risk of hail is considered moderate in Scituate.

Property at Risk from Wind-Related Events

Wind events are quite normal in New England and happen regularly each year. In the winter months, the Town of Scituate is susceptible to high winds from nor'easters and winter storms (both high frequency). Spring and summer seasons usually bring a number of severe thunderstorms to the region (high frequency). During the late summer and fall seasons, the area is at risk from a hurricane or tropical event (high frequency).

Critical Facilities, Vulnerable Populations and Critical Infrastructure

As previously discussed in Section 2.3.1, critical facilities are those public or private facilities that possess added value to the community and deserve additional consideration when determining mitigation strategies to protect these resources from natural hazard risks. Vulnerable populations are those public or private facilities that are host to vulnerable residents – children in day care or schools, seniors living in congregate care settings, or disabled residents living independently in the community. Critical infrastructure are the roadways and bridges impacted throughout the community.

A GIS analysis with parcel overlay mapping for projected Sea, Lake and Overland Surge from Hurricanes (presented in Maps 2-7 – 2-7.4) identified a number of the Town's critical facilities and vulnerable populations are located in areas vulnerable to storm surge, as detailed below.

Category 1 Hurricanes

Critical Facilities affected:

- Musquashicut Avenue Pump Station
- US Post Office (76 Glades Road)
- Seawall (Minot to Third Cliff)
- Chain Pond Pump Station
- Sand Hills Pump Station
- Scituate Harbor Yacht Club
- Satuit Boat Club
- State Launch Ramp (Jericho Road)
- Scituate Harbor Marina
- Pier 44
- Satuit Water Front Club
- Town Pier (Front Street)
- First Cliff Pump Station
- Scituate Marine Park
- Harbormaster
- Coast Guard Facility
- Watson Family Hardware
- Cole Parkway Launching Ramp

- Peggotty Beach Pump Station
- Collier Road Pump Station
- North River Waste Water Pollution Control Plant
- Wind Turbine (167 Driftway)
- Driftway Park Launching Ramp
- Village at South River Marina
- Boat Launch (Humarock)
- Humarock Post Office
- North River Marina
- Jacob Hatch Building (Medical Facility)
- Hunter's Pond Dam
- CVS (92 Front Street)
- Front Street Sewer Interceptor
- Scituate Wastewater Treatment Facility

Vulnerable Populations affected:

- St. Mary's Hall
- St. Mary's Church

Critical Infrastructure affected:

- Edward Foster Bridge
- Sea Street Bridge
- Francis R. Powers Bridge

Category 2 Hurricanes

Critical Facilities affected:

- Musquashicut Avenue Pump Station
- US Post Office (76 Glades Road)
- Seawall (Minot to Third Cliff)
- Chain Pond Pump Station
- Sand Hills Pump Station
- Scituate Harbor Yacht Club
- Satuit Boat Club
- State Launch Ramp (Jericho Road)
- Scituate Harbor Marina
- Pier 44
- Satuit Water Front Club
- Town Pier (Front Street)
- First Cliff Pump Station
- Scituate Marine Park
- Harbormaster
- Coast Guard Facility
- Watson Family Hardware
- Cole Parkway Launching Ramp
- Peggotty Beach Pump Station

- Collier Road Pump Station
- North River Waste Water Pollution Control Plant
- Wind Turbine (167 Driftway)
- Driftway Park Launching Ramp
- Village at South River Marina
- Boat Launch (Humarock)
- Humarock Post Office
- North River Marina
- Jacob Hatch Building (Medical Facility)
- Hunter's Pond Dam
- Village Market
- Well #10
- Well #11
- Herring Brook Pump Station
- Anderson Fuel
- CVS (92 Front Street)
- Front Street Sewer Interceptor
- Scituate Wastewater Treatment Facility

Vulnerable Populations affected:

- St. Mary's Hall
- St. Mary's Church

Critical Infrastructure affected:

- Edward Foster Bridge
- Sea Street Bridge
- Francis R. Powers Bridge

Category 3 Hurricanes

Critical Facilities affected:

- Musquashicut Avenue Pump Station
- US Post Office (76 Glades Road)
- Seawall (Minot to Third Cliff)
- Chain Pond Pump Station
- Sand Hills Pump Station
- Scituate Harbor Yacht Club
- Satuit Boat Club
- State Launch Ramp (Jericho Road)
- Scituate Harbor Marina
- Pier 44
- Satuit Water Front Club
- Town Pier (Front Street)
- First Cliff Pump Station
- Scituate Marine Park
- Harbormaster

- Coast Guard Facility
- Watson Family Hardware
- Cole Parkway Launching Ramp
- Edward Foster Bridge
- Peggotty Beach Pump Station
- Collier Road Pump Station
- North River Waste Water Pollution Control Plant
- Wind Turbine (167 Driftway)
- Driftway Park Launching Ramp
- Village at South River Marina
- Boat Launch (Humarock)
- Sea Street Bridge
- Humarock Post Office
- Francis R. Powers Bridge
- North River Marina
- Jacob Hatch Building (Medical Facility)
- Hunter's Pond Dam
- Village Market
- Well #10
- Well #11
- Herring Brook Pump Station
- Anderson Fuel
- Well #18B
- Transfer Station
- Cell Tower (280 Driftway)
- CVS (92 Front Street)
- Front Street Sewer Interceptor
- Scituate Wastewater Treatment Facility

Vulnerable Populations affected:

- St. Mary's Hall
- St. Mary's Church
- Life Care Center (309 Driftway)

Critical Infrastructure affected:

- Edward Foster Bridge
- Sea Street Bridge
- Francis R. Powers Bridge

Category 4 Hurricanes

Critical Facilities affected:

- Musquashicut Avenue Pump Station
- US Post Office (76 Glades Road)
- Seawall (Minot to Third Cliff)
- Chain Pond Pump Station

- Sand Hills Pump Station
- Scituate Harbor Yacht Club
- Satuit Boat Club
- State Launch Ramp (Jericho Road)
- Scituate Harbor Marina
- Pier 44
- Satuit Water Front Club
- Town Pier (Front Street)
- First Cliff Pump Station
- Scituate Marine Park
- Harbormaster
- Coast Guard Facility
- Watson Family Hardware
- Cole Parkway Launching Ramp
- Peggotty Beach Pump Station
- Collier Road Pump Station
- North River Waste Water Pollution Control Plant
- Wind Turbine (167 Driftway)
- Driftway Park Launching Ramp
- Village at South River Marina
- Boat Launch (Humarock)
- Humarock Post Office
- North River Marina
- Jacob Hatch Building (Medical Facility)
- Hunter's Pond Dam
- Village Market
- Well #10
- Well #11
- Herring Brook Pump Station
- Anderson Fuel
- Well #18B
- Transfer Station
- Cell Tower (280 Driftway)
- Scituate Water Treatment Plant
- Old Oaken Bucket Pond Dam
- Scituate Pharmacy
- US Post Office (365 Gannett Road)
- Community Residence (644 Country Way)
- CVS (92 Front Street)
- Front Street Sewer Interceptor
- Scituate Wastewater Treatment Facility

Vulnerable Populations affected:

- St. Mary's Hall

- St. Mary's Church
- Life Care Center (309 Driftway)
- Cardigan Nursing Home

Critical Infrastructure affected:

- Edward Foster Bridge
- Sea Street Bridge
- Francis R. Powers Bridge

HW performed a series of Vulnerability Analyses that considered those areas in Town impacted by the various Sea, Lake and Overland Surge from Hurricanes according to land use type, critical facilities, and vulnerable populations. An Economic Analysis of these impacts follows later in Section 2.4.2 Economic Vulnerability.

Probability of Future Occurrence of Wind-Related Hazards

As previously stated, wind events are quite normal in New England, as evidenced throughout the year. Given the increase in frequency and severity of high wind events realized over the last several years, the Town will continue to be at high to moderate risk for serious to extensive damages for wind-related events (Table 2-2 Hazard Index).

2.3.4 Geologic-Related Hazards

Earthquakes

An earthquake is the sudden release of strain energy in the Earth's crust, resulting in energy waves that radiate outward from the earthquake source. The point on the Earth's surface directly above the focus is called the earthquake epicenter. The severity of earthquake effects is dependent upon: magnitude of energy released; proximity to the epicenter; depth to the epicenter; duration; geologic characteristics; and type of ground motion.

When earthquakes occur, much of the damage is a result of structures falling under the stress created by the ground movement. Another significant effect is damage to the public and private infrastructure (i.e. water service, communication lines, drainage system). Because earthquakes are highly localized it is difficult to assign regional boundaries that share the same relative degree of risk.

Measuring the Intensity of an Earthquake

An earthquake's severity can be expressed in terms of intensity and magnitude. Intensity is defined by the observed effects of ground shaking on people, buildings, and the natural environment, which varies dependent upon the location of the observer with respect to the epicenter. Currently in the U.S., the Modified Mercalli (MMI) Intensity Scale is used to evaluate the effects of earthquakes – specifically, it describes how strongly an earthquake was felt at a particular

location, Table 2-13 below. Magnitude is defined by the amount of seismic energy released at the hypocenter of the earthquake, based on the amplitude of the earthquake waves recorded on seismographs (using the Richter Magnitude Scale, Table 2-14). Another measure of the relative strength of an earthquake is the expanse of area the shaking is noticed.

Table 2-13 Modified Mercalli Intensity Scale

Mercalli Intensity	Description
I	Felt by very few people, barely noticeable.
II	Felt by few people, especially on upper floors.
III	Noticeable indoors, especially on upper floors, but may not be recognized as an earthquake.
IV	Felt by many indoors, few outdoors. May feel like passing truck.
V	Felt by almost everyone, people have trouble standing. Small objects move, trees and poles may shake.
VI	Felt by everyone, people have trouble standing. Heavy furniture can move, plaster can fall off walls. Chimneys may be slightly damaged.
VII	People have difficulty standing. Drivers feel cars shaking. Some furniture breaks. Loose bricks fall from buildings. Damage is slight to moderate in well-built buildings; considerable in poorly built buildings.
VIII	Buildings suffer slight damage if well-built; severe damage if poorly built. Some walls collapse.
IX	Considerable damage to specially built structures; buildings shift off their foundations. The ground cracks. Landslides may occur.
X	Most buildings and their foundations are destroyed. Some bridges are destroyed. Dams are seriously damaged. Large landslides occur. Water is thrown on the banks of canals, rivers, lakes. The ground cracks in large areas.
XI	Most buildings collapse. Some bridges are destroyed. Large cracks appear in the ground. Underground pipelines are destroyed.
XII	Almost everything is destroyed. Objects are thrown into the air. The ground moves in waves or ripples. Large amounts of rock may move.

Source: USGS, 2012.

Table 2-14 Richter Magnitude Scale

Richter Magnitude	Earthquake Effects
2.5 or less	Not felt or felt mildly near the epicenter, but can be recorded by seismographs
2.5 to 5.4	Often felt, but only causes minor damage
5.5 to 6.0	Slight damage to buildings and other structures
6.1 to 6.9	May cause a lot of damage in very populated areas
7.0 to 7.9	Major earthquake; serious damage
8.0 or greater	Great earthquake; can totally destroy communities near the epicenter

Source: USGS, 2012.

There have been no recorded earthquakes in Scituate since the 2016 plan. Based on the very low frequency and serious severity of earthquake events over time, also confirmed by the HMPT, the risk of earthquakes is considered low in Scituate.

Landslides

Landslides include a wide range of ground movements, including rock falls, deep failure of slopes, and shallow debris flows. Often caused by a combination of unfavorable geologic conditions (silt clay or thick till deposits), the most common types in Massachusetts include transitional debris slides, rotational slides, and debris flows. Historical landslide data for the Commonwealth suggests that most landslides are preceded by 2 or more months of higher than normal precipitation, followed by a single, high-intensity rainfall of several inches or more.¹⁶ The highest prevalence of unstable slopes is generally found in the western part of the Commonwealth. There have been no recorded landslides in Scituate since the 2016 plan, confirmed by the HMPT. The entire Town of Scituate has been classified as having a very low risk for landslides.

Property at Risk from Geologic-Related Hazards

Because earthquakes have been detected all over New England, seismologists suspect that a strong earthquake could be centered anywhere in the region (Map 2-2). Furthermore, the mapped geologic faults of New England currently do not provide any indications detailing specific locations where strong earthquakes are most likely to be centered.¹⁷

All structures in Scituate are potentially vulnerable to seismic ground shaking. The most vulnerable are historic buildings constructed of unreinforced masonry. Other critical facilities or infrastructure at risk are unknown; their construction determines their ability to withstand seismic shaking. The Town has only experienced secondary effects from both regional events and longer-distance events emanating from the northeast in general. However, since building codes

¹⁶ Massachusetts Hazard Identification and Risk Assessment, 2019, p. 161.

¹⁷ 2018 State Hazard Mitigation and Climate Adaptation Plan, Commonwealth of Massachusetts.

do not require seismic proofing, the impact would be expected to be severe if an earthquake were to hit the Town of Scituate.

The Town of Scituate can be uniformly affected by landslides, dependent upon the existing/incoming weather conditions, saturation of the ground, and topography of where the event occurs (Map 2-2).

Probability of Future Occurrence of Geologic-Related Hazards

The Commonwealth has a 2% chance that an earthquake with a peak horizontal acceleration of 50 km above magnitude will occur within the next 50 years. A 'G' is the average acceleration produced by gravity at the earth's surface (9.80665 meters per second squared). This measurement describes ground shake during earthquakes. New England is not considered to be a hot spot for earthquakes, especially when compared to the western United States. Given the historic pattern of earthquakes, or more specifically the secondary impacts of earthquakes felt across the region (which has been the historic pattern), the Town will continue to be at very low risk for shaking, although serious damage (Table 2-2 Hazard Index).

Because landslides are often triggered by other natural hazard events, their frequency is also related to the frequency of those other hazards. The Town continues to be at very low risk for landslides (Map 2-2).

2.3.5 Extreme Heat-Related Hazards

Extreme heat occurs when a system of high atmospheric pressure moves into an area. In such a high-pressure system, air from upper levels of our atmosphere is pulled toward the ground, where it becomes compressed and increases temperatures. This high concentration of pressure makes it difficult for other weather systems to move into the area, which is why periods of extreme heat can last for several days, or even weeks. The longer the system stays in an area, the hotter temperatures become. The high pressure inhibits winds, making them faint to almost non-existent. Because the high-pressure system also prevents clouds from entering a region, sunlight can become punishing, increasing temperatures even more. The combination of all these factors come together to create what is known as a heat wave. Typically, a heat wave can last two or more days with significant impacts on human health and/or infrastructure. Heat waves can also cause catastrophic crop failures, cause roads to crumble, and can cause the ground around residences to dry out, leaving them susceptible to subsidence.

The Town of Scituate can expect to be uniformly affected by extreme heat-related conditions. Table 2-15 below represents the significant extreme heat-related hazard events that have occurred in and around the Town of Scituate over time, utilizing NOAA's National Centers for Environmental Information (<http://www.ncdc.noaa.gov/>). All events are county wide (Plymouth County), unless otherwise noted.

Table 2-15 Significant Extreme Heat-Related Events, Plymouth County

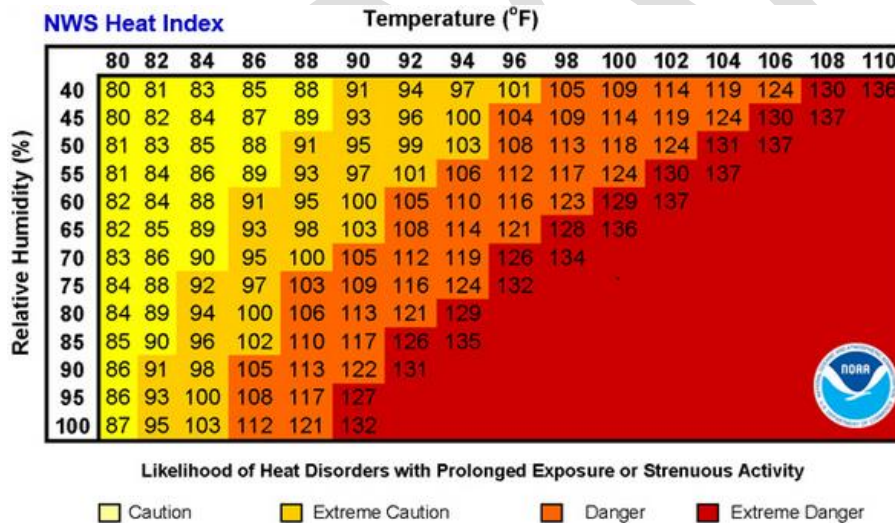
Hazard Type	Date	Level/Description	Damages	Notes
<i>Extreme Heat</i>				
	7/22/2011			
	7/3/2018			

Source: NOAA National Centers for Environmental Information, www.ncdc.noaa.gov.
Data is current through June 2020

NOAA’s NWS maintains a Heat Index (Figure 2.8), which is a measure of how hot it really feels when relative humidity is also factored in with actual air temperatures. As an example, if the air temperature is 96°F and the relative humidity is 65%, the heat index, how hot it feels, is 121°F. The NWS also initiates alert procedures when the Heat Index is expected to exceed 105°-110°F (depending on local climate) for at least two consecutive days:

- Caution – fatigue possible,
- Extreme Caution – sunstroke, muscle cramps, and/or heat exhaustion possible,
- Danger – sunstroke, muscle cramps, and/or heat exhaustion likely, and
- Extreme Danger – heat stroke or sunstroke highly likely.

Figure 2.8 NOAA’s National Weather Service Heat Index



Source: <https://www.weather.gov/phi/heatcond>

Based on the high frequency and minor severity of extreme heat-related events, as reported by the National Centers for Environmental Information and indicated in Table 2-14, also confirmed by the HMPT, the risk of extreme heat-related events is considered moderate in Scituate.

Climate Change Impacts on Extreme Heat

More intense and prolonged heat waves are predicted with climate change. The frequency of days with high temperatures at or above 90°F has already increased (Vallee and Giuliano, 2014). The average number of days expected to be above 90°F from 1970 – 2000 is sixty, while projections for the end of the century (2090s) is projected to be seventy.

MVP Climate Change Projections on Extreme Heat

As mentioned previously, climate change impacts will result in increased average temperatures, so the number of extreme heat days is expected to increase. Scituate should experience more days with warmer temperatures, particularly days over 90 degrees, and thus, will expend more energy on cooling. Table 2-16 below includes temperature projections (Annual and Summer) with a Baseline (1971 – 2000) through the 2030s for the South Coastal Basin.

Table 2-16 Extreme Heat Temperature Projections, South Coastal Basins

Climate Parameter	Baseline 1970 – 2000	Projected Change in 2030s	Mid-Century 2050s
Average Annual Temperature (°F)	49.7	51.6 – 53.4	52.3 – 55.5
Average Summer Temperature (°F)	69.1	70.6 – 72.8	71.1 – 75.2
Maximum Annual Temperature (°F)	59.5	61.3 – 63.0	61.8 – 65.1
Maximum Summer Temperature (°F)	79.1	80.5 – 82.6	81.0 – 85.1
Annual Days with Maximum Temperature Over 90 °F	5	9 – 16	10 – 29
Summer Days with Maximum Temperature Over 90 °F	5	8 - 15	9 - 25
Annual Cooling Degree-Days (Base 65 °F)	544	723 – 921	781 – 1,216
Summer Cooling Degree-Days (Base 65 °F)	473	580 - 760	619 - 966

Source: MVP Program, www.resilientma.org

Property/People at Risk from Extreme Heat-Related Hazards

Extreme heat-related conditions can have both short- and long-term impacts on a community, including:

Social Impacts

Increased demand on emergency, health, and social services and support:

- Impacts to vulnerable populations (elderly, homeless, special needs, and those with chronic health conditions) will be exacerbated (potential for cardiovascular and respiratory complications).
- Can endanger those who work outdoors.

- Increased demand for comfort/cooling stations (emergency services).
- Stressors (mental health) on those who do not have/can't afford air conditioning.
- Increased demands on emergency personnel and medical facilities.

Infrastructure Impacts

Disruptions to critical infrastructure with cascading effects:

- Increased electricity demand for cooling which can lower the ability of transmission lines to carry power.
- Impacts on transportation systems:
 - Higher temperatures can cause pavement to soften and expand causing rutting/potholes, stress bridge joints, and limit construction activities outdoors.
- Disruptions to water distribution systems:
 - Limited supply of water sources and quality of water sources.

Environmental/Built Environment Impacts

Compromised environmental conditions:

- Particularly damaging to agriculture (crops/livestock) stressing water supply sources (economic impacts and food security).
- Excessively dry ground conditions can be susceptible to subsidence and exacerbate stormwater runoff.
- Compromised air quality conditions can result in increased hospital admissions for heat-related illness.
- Potential for drought (s) to exacerbate conditions for wildfires.

Probability of Future Occurrence of Extreme Heat-Related Hazards

As mentioned previously, climate change impacts will result in increased average temperatures, so the number of extreme heat days is expected to increase. For this update, Scituate is considered at moderate risk for extreme-related events (Table 2-2 Hazard Index).

2.3.6 Drought - Related Hazards

Drought is a temporary irregularity characterized by long durations of below normal precipitation. Drought occurs in virtually all climatic zones yet varies significantly from one region to another, due to its relationship to normal precipitation in that specific region. Drought can affect agriculture, water supply, aquatic ecology, wildlife, and plant life.

Drought can be defined or grouped by the following:

- Meteorological drought is a measure of departure of precipitation from normal, defined solely on the degree of dryness.
- Agricultural drought links various characteristics of meteorological (or hydrological) drought to agricultural impacts with a focus on precipitation shortages, differences between actual and potential

evapo-transpiration, soil water deficits, reduced groundwater or reservoir levels, etc.

- Hydrological drought is associated with the effects of precipitation (including snowfall) shortfalls on surface or subsurface water supply and when water supplies are below normal.
- Socioeconomic drought is associated with the supply and demand of some economic goods with elements of meteorological, hydrological, and agricultural drought.

Based on past events and current criteria outlined in the Massachusetts Drought Management Plan, it appears that western Massachusetts may be more vulnerable than eastern Massachusetts to severe drought conditions.¹⁸ That being said, many factors, such as water supply sources, population, economic factors (i.e., agriculture-based economy), and infrastructure, contribute to the severity and length of a drought event. The Town of Scituate can expect to be uniformly affected by drought conditions. Table 2-17 below represents the significant drought-related hazard events that have occurred in and around the Town of Scituate over time, utilizing NOAA’s National Centers for Environmental Information (<http://www.ncdc.noaa.gov/>). All events are county wide (Plymouth County), unless otherwise noted.

Table 2-17 Significant Drought-Related Events, Plymouth County

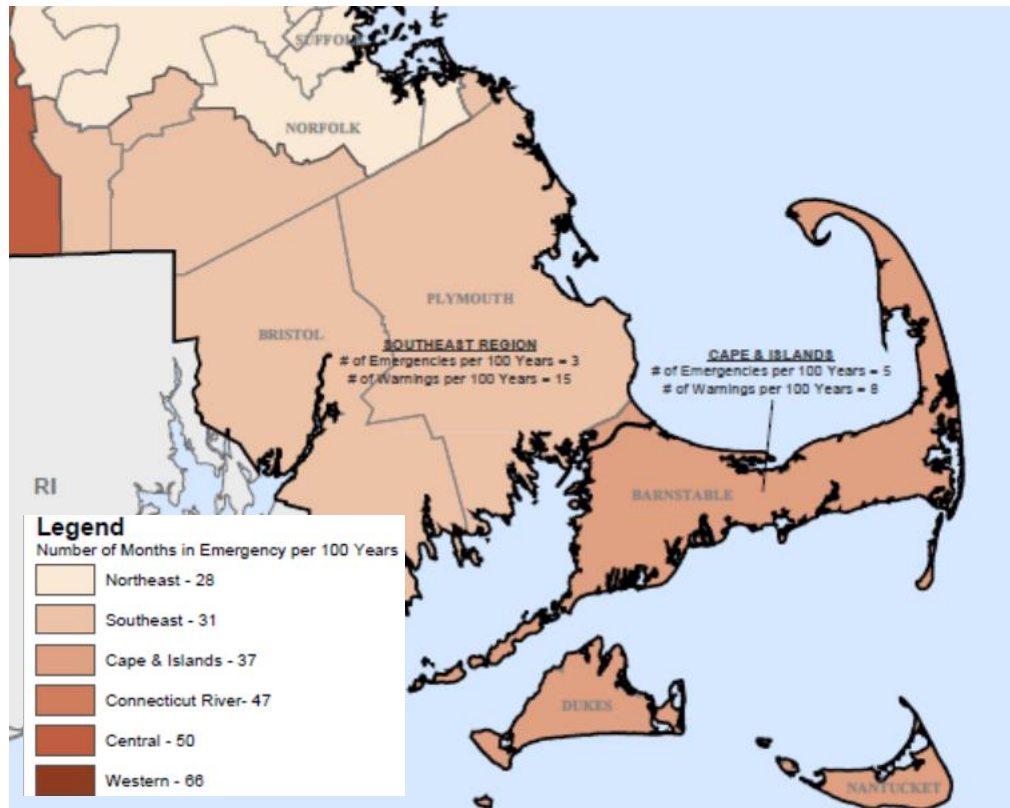
Hazard Type	Date	Level/Description	Damages	Notes
<i>Drought</i>				
	4/12/2012	D2		This was deemed a meteorological drought due to precipitation levels approximately one half of normal.
	5/1/2012	D2		This was deemed a meteorological drought due to precipitation levels approximately one half of normal.
	8/23/2016	D2		D2
	9/1/2016	D2		D2
	10/1/2016	D3 > D2		D3 > D2
	11/1/2016	D1		D1
	12/1/2016	D2		D2
	1/1/2017	D2 > D1		D2 > D1

Source: NOAA National Centers for Environmental Information, www.ncdc.noaa.gov.
Data is current through June 2020

¹⁸ 2018 State Hazard Mitigation and Climate Adaptation Plan, Commonwealth of Massachusetts.

Figure 2-9 shows that Plymouth County has been in a drought emergency for thirty-one months over the last 100 years.

Figure 2-9 Drought Occurrences Over the Last 100 Years



Source: 2018 State Hazard Mitigation Plan, Commonwealth of Massachusetts.

Based on the high frequency and minor severity of drought events, as reported by the National Centers for Environmental Information and indicated in Table 2-17, also confirmed by the HMPT, the risk of drought is considered moderate in Scituate.

Climate Change Impacts on Drought-Related Hazards

Climate change will result in increased average global temperatures, which will likely increase the potential for more drought-related conditions.

Property at Risk from Drought-Related Hazards

Past drought events in Massachusetts have typically affected entire regions, and sometimes the entire state. Although western Massachusetts may be more vulnerable than eastern Massachusetts to severe drought conditions as previously stated, the entire Town is uniformly vulnerable to drought/extreme heat with varying impacts based on the degree of moisture deficiency, the duration, and the size and location of the affected area.

Probability of Future Occurrence of Drought-Related Hazards

Although Massachusetts is relatively small, it has a number of distinct regions that experience significantly different weather patterns and react differently to the amounts of precipitation they receive.¹⁹ Outside of 2016, only several drought events have occurred in Plymouth County. For this update, Scituate is considered at moderate risk for drought-related events (Table 2-2 Hazard Index).

2.3.7 Urban Fire/Wildfire – Related Hazards

Urban fire or conflagration is a large destructive, sometimes uncontrollable, fire that spreads substantial destruction, typically as a result of other hazards, including storms, earthquakes, gas leaks, transportation accidents, hazardous material spills, criminal activity (arson), or terrorism.²⁰ Alternatively, smaller-scale structural fires often result from everyday events such as cooking, smoking, equipment/appliance malfunctions, etc.

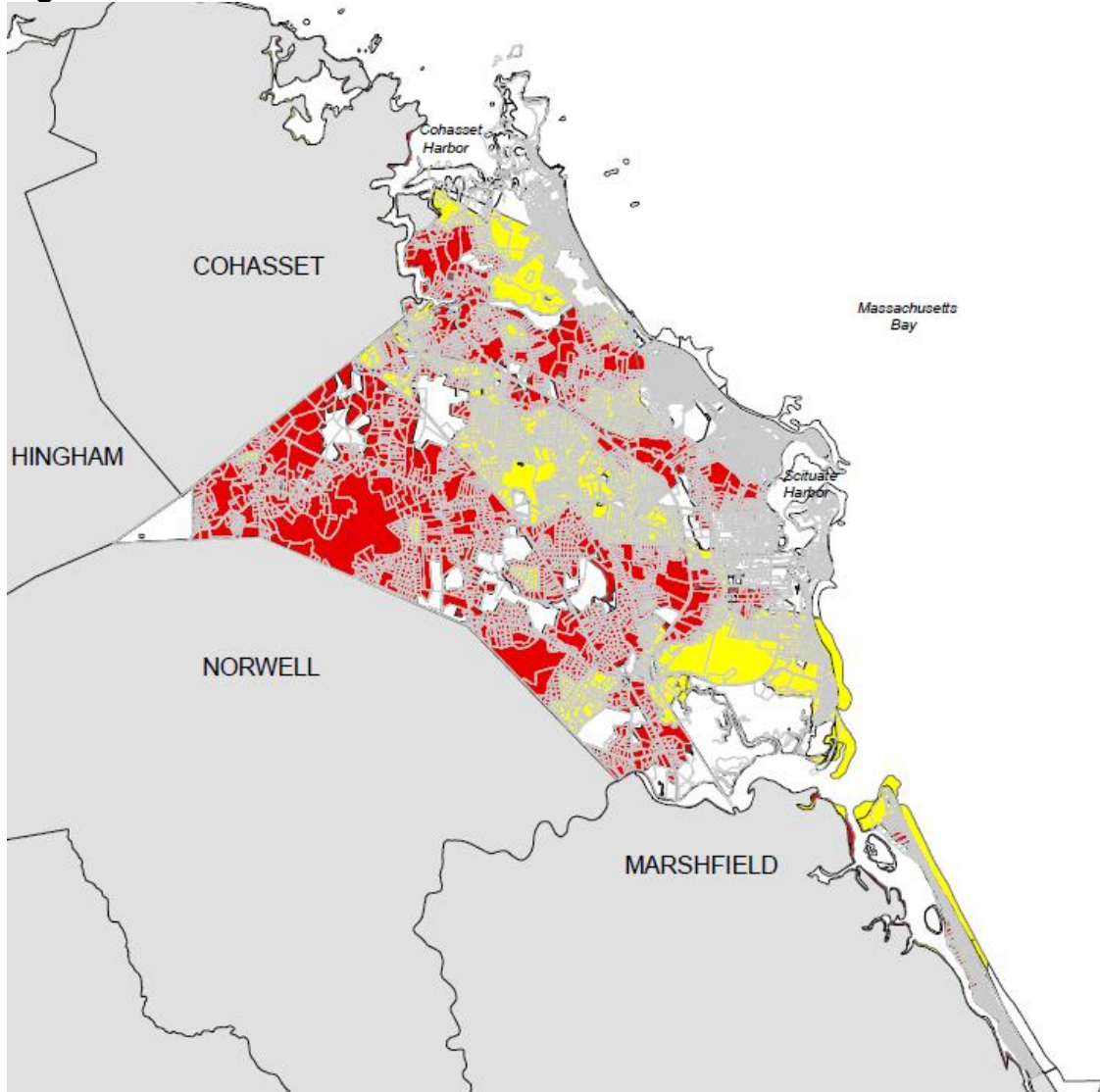
Wildfires are defined as any non-structure fire that occurs in the vegetative wildland, including grass, shrub, leaf litter/debris, and forested tree fuels. Most susceptible to the hazard are pitch pine, scrub oak, and oak forests – the most flammable vegetative fuels. Small wildfires are common throughout the State, especially when drought or near-drought conditions warrant, the potential for spreading wildfires is real. The State's Wildland Urban Interface (WUI) – the area where structures and human development meet and intermingle with undeveloped wildland, creates an environment in which fire can move readily between structural and vegetative fuels, mapped in yellow as shown below (Figure 2-10). The State's WUI includes the Intermix WUI – areas where housing and vegetation intermingle²¹, mapped in red as shown in Figure 2-10.

¹⁹ 2018 State Hazard Mitigation and Climate Adaptation Plan, Commonwealth of Massachusetts

²⁰ Ibid.

²¹ Radeloff, V.C., R.B. Hammer, S.I. Stewart, J.S. Fried, S.S. Holcomb, and J.F. McKeefry. 2005. The Wildland Urban Interface in the United States. *Ecological Applications* 15:799-805.

Figure 2-10 Scituate Wildland Urban Interface Zones



Source: <http://silvis.forest.wisc.edu/data/wui-change/>

The impact and vulnerability to wildfire is influenced by a variety of factors, such as land cover conditions, weather and the effectiveness of land management techniques. Suburban neighborhoods located at the WUI are very vulnerable to wildfire. Individual buildings may be more or less vulnerable to damage from wildfire based on factors such as the clear distance around the structure, and the structure's construction materials. A fire in any of these areas would quickly overwhelm local resources and could possibly threaten homes nearby.

Climate Change Impacts on Urban Fire/Wildfire

Climate change can alter the weather and fuel factors of wildfires. Hot dry spells can increase the risk of fire due to decreased soil moisture and increased evaporation/evapotranspiration. Climate change can also increase winds that spread fires.

Since 2018, Scituate has experienced a limited number of natural vegetation/brush fires including 12 in 2018, 13 in 2019, 25 in 2020 and none in 2021 (as of July 1, 2021). For this update, Scituate is considered at low risk with minor expected damages at a small/local level for future urban fire/wildfire-related events (Table 2-2 Hazard Index).

Property at Risk from Urban Fire/Wildfire-Related Hazards

While the Town has not experienced many large wildland fires, there are a few smaller fires annually when conditions are extremely dry and breezy. The most vulnerable area in Scituate is the west end of Town (west of Route 3A) which includes the majority of forested areas.

Probability of Future Occurrence of Urban Fire/Wildfire Hazards

Most urban fires are a result of negligent and/or intentional human behavior (arson, open flames, and cooking) and are preventable. Wildfire season in Massachusetts begins in late March and typically ends in early June, which also corresponds with the driest live fuel moisture periods of the year. Although the Town has experienced a low number of wildland fires over time, with projected increases in warmer temperatures, and in turn the potential for increased drought conditions, the likelihood of a wildfire remains.

2.3.8 Invasive Species-Related Hazards

For this update, invasive species (existing and early detection/emergent) for Plymouth have been incorporated as a hazard impacting the community. Invasive species are non-native species that can impact the environment, the economy or human health. Typically, they have the potential to cause or contribute to the following:

- Habitat loss/degradation
- Loss of native fish, wildlife, and tree species
- Loss of recreational opportunities and income
- Crop damage/diseases in humans

The list of invasives currently impacting Scituate include:

- Common Reed (*Phragmites australis*)
Rapidly form dense stands of stems which crowd out or shade native vegetation in inland and estuary wetland areas. Turns rich habitats into monocultures devoid of the diversity needed to support a thriving ecosystem.
- Garlic Mustard (*Alliaria petiolata*)
Forms dense stands that choke out native plants in the understory by controlling light, water, and nutrient resources.
- Japanese Knotweed (*Polygonum cuspidatum*)

Chokes-out native species by way of limiting sunlight infiltration, altering nutrient cycles, or by releasing toxic/inhibiting chemicals. Knotweed can contribute to stream bank erosion and flooding.

- Multiflora Rose (*Rosa multiflora*)
Extremely prolific and can form dense thickets, excluding native plant species.
- Norway Maple (*Acer platanoides*)
Produces large numbers of seeds that are wind dispersed and invade forests and forest edges. The dense canopy formed by Norway maple inhibits the regeneration of sugar maple and other tree seedlings, reducing forest diversity.
- Oriental Bittersweet (*Celastrus orbiculatus*)
Commonly found in old home sites, fields and road edges. Fast growing vines can cover, shade and outcompete other vegetation and can even girdle and kill large trees.
- Purple Loosestrife (*Lythrum salicaria*)
Dense growth along shoreland areas makes it difficult to access open water. Overtakes habitat and outcompetes native aquatic plants, potentially lowering diversity. Dense root systems change the hydrology of wetlands.

The Scituate Conservation Commission is a member of the Massachusetts Association of Conservation Commissions and participates in training opportunities targeted at invasive species management.

Property at Risk from Invasive Species

Invasive species typically harm native species through predation, habitat degradation and competition for shared resources. Negative consequences can be far-reaching, considering they can spread at astonishing rates and can affect property values, agricultural productivity, public utility operations, native fisheries, tourism, outdoor recreation, and the overall health of an ecosystem. Dependent upon the species, invasives often thrive along roadsides, forested and understory areas, lakes, ponds, rivers, streambanks, pond margins and along the coast.

Probability of Future Occurrence of Invasive Species

Eradication involves both chemical and mechanical methods, combined with ongoing monitoring. Often, due to limited staffing and diminished municipal budgets, limited controlled stands are typically often realized at best.

Because most invasives are considered more of a nuisance hazard and not directly associated with any primary impacts of other weather-related hazards such as loss of life, limited evacuation, or property damage, Scituate is considered at moderate/low risk with minor expected damages at a small/local level for future spread of invasive species (Table 2-2 Hazard Index).

2.4 Vulnerability

Vulnerability indicates what is likely to be damaged by the identified hazards and how severe that damage could be. After identifying types and areas of risk, a vulnerability analysis can help to determine the gaps in the community. This section examines the vulnerability of the built environment, such as structures, utilities, roads, and bridges, as well as social and environmental vulnerability. A vulnerability analysis also estimates the number of people exposed to hazards, including elderly populations and concentrated populations. This also includes such things as whether the shelter capacity is sufficient for the affected population, and whether businesses are likely to face temporary closure due to natural disasters. Historical damages are often good indicators for current exposure and potential damage.

A vulnerability chart was developed based on the identification and profile of the natural hazards that have occurred throughout Scituate over time, as presented earlier in Section 2.3. Below, Table 2-18 Vulnerability Matrix 2022 describes the expected frequency of occurrence, and the potential severity of the damage resulting from each individual hazard evaluated for this update. Coordination with the State Plan was also a consideration in the development of the updated Vulnerability Matrix.

Table 2-18 Vulnerability Matrix 2022 Update

Hazard	Frequency	Severity
Flood-Related Hazards	High	Extensive/Serious
Winter-Related Hazards	High	Extensive/Serious
Wind-Related Hazards	High	Extensive/Serious
Geologic-Related Hazards	Very Low	Serious
Extreme Heat-Related Hazards	High	Minor
Drought	High	Minor
Urban Fire/Wildfire	Low	Minor
Invasive Species	Medium	Minor

2.4.1 Development Trends

It is important to note that the frequency and severity of natural hazard events in Scituate continue to increase as a result of impacts from climate change, therefore increasing Scituate's vulnerabilities. New developments are in compliance with the updated State building codes and stormwater standards, and in turn, these more restrictive codes help facilitate decreases in a structures' overall vulnerability.

Municipal Development Trends

Municipal development/redevelopment interest continues in Scituate today. Below are municipal development projects completed since the 2016 plan.

- Gates Middle School (460 First Parish Road)
 - 225,000 SF
 - Completed
- Scituate Public Safety Center (800 C.J. Cushing Way)
 - 29,989 SF
 - Completed
- Scituate Senior Center (333 First Parish Road)
 - 90,000 SF
 - Completed
- Lawson Green Elderly Housing (99 Central Park Drive)
 - 30 units
 - Completed
- Scituate Public Library (85 Branch Street)
 - 31,300 SF
 - Completed
- Widows Walk Golf Club House (250 Driftway)
 - 8,960
 - Under Construction
- Humarock Fire Station (4 River Street)
 - 3,312 SF
 - Under Construction
 - Within 100-Year flood Zone

Residential/Mixed Use Development Trends

Residential development interest continues centered primarily on the inland sections of town. Below are residential/mixed use development projects completed since the 2016 plan.

- Blanchard Farm Subdivision (Blanchard Farm Lane)
 - 10 homes
 - Completed
- Curtis Estates (Curtis Farm Road)
 - 16 homes
 - Under Construction
- Deer Common (Deer Common Drive)
 - 12 homes
 - Completed
- Herring Brook Meadow (126-132 C.J. Cushing Way)
 - 60 units
 - Under Construction
 - Partially in 100-Year Flood Zone
- Stockbridge Landing (Atlantic Way)
 - 68 units
 - Under Construction
- 50 Country Way (50 Country Way)

- 30 units/5,000 SF retail
 - Completed
- Seaside at Scituate (Hatherly/Tilden Road)
 - 157 units
 - Under Construction
- Ford Place Condominiums (18 Ford Place)
 - 5 units
 - Under Construction
- Mac Donald Terrace (6 Mac Donald Terrace)
 - 5 units/314 SF office
 - Under Construction
- Drew – Greenbush (Driftway)
 - 78 units/8,000 SF retail
 - Under Construction
- Cottages at Oaken Bucket (Old Oaken Bucket)
 - 34 units
 - Planned
- 14-16 Old Country Way Condominiums (14-16 Old Country Way)
 - 6 units/2 commercial units
 - Under Construction
- Bartlett Fields (C.J. Cushing Way)
 - 268 units
 - Planned
- Former Medical Building Condominiums (7 New Driftway)
 - 21 units
 - Planned
- Residential Compound (105 Hatherly Road)
 - 5 homes
 - Completed
- Residential Compound (477-489 Country Way)
 - 5 homes
 - Planned

Commercial Development Trends

Commercial development interest also continues in Scituate. Below are commercial development projects completed since the 2016 plan.

- Gas Station/Convenience Store (48-52 New Driftway)
 - 7,400 SF
 - Under Construction
- Gunther Tooties Restaurant (52 Country Way)
 - 4,434 SF
 - Completed
- 131 Front Street (131 Front Street)
 - 8,171 SF
 - Under Construction

- Mullaney’s Fish Market (8 Allen Place)
 - 4,200 SF
 - Completed
- Inly School Toddler House (43 Watch Hill Drive)
 - 4,000 SF
 - Completed

2.4.2 Economic Vulnerability

NFIP-Insured Property Damage

As seen in Table 2-19, FEMA estimated that the value of property insured by the NFIP in Scituate is \$391,647,600 as of July 2021 (MA State Floodplain Coordinator). There are now 493 properties (480 residential and 13 non-residential) that have experienced repetitive loss damages. The general locations of these repetitive flood loss areas are shown on Map 2-1 Flood Hazard Areas. According to the State Floodplain Coordinator, as of July 9, 2021 there have been 2,007 repetitive loss claims totaling \$46,748,279.93 since the 2016 plan.

Table 2-19 Summary of National Flood Insurance Program Activity in Scituate, MA

Total Policies	Coverage Value	Policies in A-Zone	Policies in X-Zone	Policies in V-Zone	Losses Paid
1,435	\$391,647,600	914	441	80	\$46,748,279.93

Source: FEMA, NFIP through July 2021.

The majority of the NFIP-insured properties are located along the coast, where development occurs near flood plains, or low-lying areas.

Impacts of FEMA Flood Zones

As one of the highest risks to the community, HW performed an analysis to estimate the total land and building values within FEMA AE/100-, X/500-year and VE flood zones. The number and types of residential, commercial, industrial, and municipally owned structures are described earlier in Section 2.3.1 and quantified in Table 2-20 Total Vulnerability FEMA AE/100-Year Flood Zone Summary, Table 2-21 Total Vulnerability FEMA X/500-Year Flood Zone and Table 2-22 Total Vulnerability FEMA VE Flood Zone. All flood zone data presented is based on the FEMA FIRMs as revised through 2018.

Table 2-20 Total Vulnerability FEMA AE/100-Year Flood Zone Summary

Land Use	No. of Parcels Impacted	Total Value
Auto Repair/Gas/Service	2	\$2,640,400
Chapter 61	2	\$37,730
Charitable	5	\$1,105,800

Civic	3	\$1,281,500
Commercial	15	\$16,860,700
Commercial Greenhouse	1	\$955,100
Federal	3	\$2,688,900
Housing Authority	1	\$80,300
Improved Public Safety (Town)	6	\$6,977,300
Improved Selectmen (Town)	11	\$30,315,400
Marina	4	\$6,401,600
Multi-Family Residential	8	\$6,684,300
Multiple Use Commercial	12	\$12,370,100
Multiple Use Other	3	\$10,461,450
Multiple Use Residential	144	\$83,204,600
Nursing Home	1	\$2,180,700
Office	18	\$19,982,600
Other	3	\$2,145,100
Outdoor Recreation	6	\$6,203,380
Pasture	1	\$225,890
Religious	2	\$5,149,200
Single-Family Residential	1,548	\$1,004,628,910
State	4	\$677,700
Utility	1	\$227,200
Vacant - County/Regional	1	\$246,300
Vacant - Developable	25	\$8,845,700
Vacant - Potentially Developable	256	\$5,267,700
Vacant - Undevelopable	6	\$1,033,500
Vacant - Conservation (Town)	40	\$4,429,200
Vacant - Selectmen (Town)	54	\$14,625,800
Warehouse	4	\$1,839,100
Missing Data	126	
Total	2,316	\$1,259,773,160

Source: Scituate Tax Assessor CAMA data, Massachusetts Property Tax Use Code.

Table 2-21 Total Vulnerability FEMA X/500-Year Flood Zone Summary

Land Use	No. of Parcels Impacted	Total Value
Auto Repair/Gas/Service		
Chapter 61		
Charitable		
Civic		
Commercial		
Commercial Greenhouse		
Cranberry Bog	2	\$706,480
Federal		

Housing Authority	1	\$80,300
Improved Public Safety (Town)		
Improved Selectmen (Town)	1	\$17,370,900
Marina		
Multi-Family Residential	5	2127800
Multiple Use Commercial		
Multiple Use Other		
Multiple Use Residential		
Nursing Home		
Office		
Other		
Outdoor Recreation	1	\$2,351,930
Pasture		
Religious		
Single-Family Residential	32	\$236,628,000
State		
Utility		
Vacant - County/Regional		
Vacant - Developable	2	\$491,200
Vacant - Potentially Developable		
Vacant - Undevelopable	11	\$529,100
Vacant - Conservation (Town)	4	\$644,900
Vacant - Conservation (Organization)	2	\$24,700
Vacant - Selectmen (Town)	2	\$6,916,400
Warehouse		
Missing Data	6	
Total	69	\$267,871,710

Source: Scituate Tax Assessor CAMA data, Massachusetts Property Tax Use Code.

Table 2-22 Total Vulnerability FEMA VE Flood Zone Summary

Land Use	No. of Parcels Impacted	Total Value
Auto Repair/Gas/Service		
Chapter 61		
Charitable	1	\$39,900
Civic		
Commercial	2	\$1,034,300
Commercial Greenhouse		
Federal	1	\$2,570,000
Housing Authority		
Improved Public Safety (Town)	1	\$1,759,200
Improved Selectmen (Town)	2	\$4,625,400

Marina	3	\$3,053,200
Multi-Family Residential	37	\$29,339,600
Multiple Use Commercial		
Multiple Use Other		
Multiple Use Residential	2	\$1,494,300
Nursing Home		
Office		
Other		
Outdoor Recreation		
Pasture		
Religious		
Single-Family Residential	578	\$404,874,900
State		
Utility		
Vacant - County/Regional		
Vacant - Developable	1	\$327,800
Vacant - Potentially Developable	2	\$905,400
Vacant - Undevelopable	72	\$1,899,100
Vacant - Conservation (Town)	4	\$861,400
Vacant - Selectmen (Town)	46	\$13,878,400
Warehouse		
Missing Data	47	
Total	799	\$466,662,900

Source: Scituate Tax Assessor CAMA data, Massachusetts Property Tax Use Code.

Impacts of Sea Level Rise

Concerns about the accelerated rate of SLR in Massachusetts and the impacts on coastal areas, HW performed a second analysis to estimate the total assessed values of properties across a range of projected SLR scenarios. As discussed earlier, HW utilized NOAA’s Office of Coastal Management – Digital Coast data to illustrate the potential for future impacts across the range of projected SLR scenarios for Massachusetts. The number and types of residential, commercial, industrial, and municipally owned structures are quantified in Table 2-23 Total Vulnerability Sea Level Rise 1-Foot Scenario and Table 2-24 Total Vulnerability Sea Level Rise 3-Foot Scenario also shown on Maps 2-6 through 2-6.4.

Table 2-23 Total Vulnerability Sea Level Rise 1-Foot Scenario, Scituate

Land Use	No. of Parcels Impacted	Total Value
Auto Repair/Gas/Service		
Chapter 61		
Charitable	1	\$39,900
Civic	2	\$1,066,400

Commercial	4	\$6,319,600
Commercial Greenhouse	1	\$955,100
Federal	3	\$2,688,900
Housing Authority		
Improved Public Safety (Town)	1	\$1,759,200
Improved Selectmen (Town)	6	\$26,398,100
Marina	5	\$7,010,700
Multi-Family Residential	52	\$34,986,100
Multiple Use Commercial	2	\$8,563,770
Multiple Use Other		
Multiple Use Residential	2	\$3,577,900
Nursing Home		
Office	3	\$3,900,600
Other		
Outdoor Recreation	5	\$3,530,080
Pasture	1	\$225,890
Religious	2	\$3,303,700
Single-Family Residential	363	\$304,678,440
State	3	\$104,200
Tanks - Retail		
Utility		
Vacant - County/Regional		
Vacant - Developable	2	\$1,852,900
Vacant - Potentially Developable	2	\$905,400
Vacant - Undevelopable	138	\$3,543,800
Vacant - Conservation (Town)	15	\$1,755,000
Vacant - Selectmen (Town)	49	\$14,990,000
Warehouse		
Missing Data	76	
Total	738	\$432,155,680

Source: Scituate Tax Assessor CAMA data, Massachusetts Property Tax Use Code

Table 2-24 Total Vulnerability Sea Level Rise 3-Foot Scenario, Scituate

Land Use	No. of Parcels Impacted	Total Value
Auto Repair/Gas/Service		
Chapter 61		
Charitable	2	\$114,300
Civic	2	\$1,066,400
Commercial	4	\$6,319,600
Commercial Greenhouse	1	\$955,100
Federal	3	\$2,688,900
Housing Authority		

Improved Public Safety (Town)	2	\$2,507,700
Improved Selectmen (Town)		
Marina	5	\$7,010,700
Multi-Family Residential	81	\$47,138,200
Multiple Use Commercial	3	\$9,355,570
Multiple Use Other		
Multiple Use Residential	2	\$3,577,900
Nursing Home		
Office	6	\$6,665,900
Other		
Outdoor Recreation	4	\$3,090,480
Pasture	1	\$225,890
Religious	2	\$3,303,700
Single-Family Residential	609	\$467,785,940
State	3	\$104,200
Tanks - Retail		
Utility		
Vacant - County/Regional	1	\$246,300
Vacant - Developable		
Vacant - Potentially Developable	2	\$905,400
Vacant - Undevelopable	168	\$3,517,600
Vacant - Conservation (Town)	25	\$54,627,000
Vacant - Selectmen (Town)	57	\$15,494,900
Warehouse		
Missing Data	87	
Total	1,070	\$636,701,680

Source: Scituate Tax Assessor CAMA data, Massachusetts Property Tax Use Code

Impacts of Hurricane Surge Inundation Areas

Wind-related hazards (hurricanes) are one of the top hazards impacting Scituate. HW performed an analysis to estimate the total assessed values of properties located within the worst-case hurricane surge areas for categories 1 through 4 hurricanes developed by the National Hurricane Center using the SLOSH Model. The number and types of parcels/structures are quantified in Table 2-25 Total Vulnerability Hurricane Categories Category 1, Table 2-26 Total Vulnerability Hurricane Categories Category 2, Table 2-27 Total Vulnerability Hurricane Categories Category 3, Table 2-28 Total Vulnerability Hurricane Categories Category 4 below, and also shown on Maps 2-7 through 2-7.4.

Table 2-25 Total Vulnerability Hurricane Category 1, Scituate

Land Use	No. of Parcels Impacted	Total Value
Auto Repair/Gas/Service	8	\$9,300,300
Chapter 61		

Charitable	2	\$114,300
Civic	2	\$1,066,400
Commercial		
Commercial Greenhouse	1	\$955,100
Federal	3	\$2,688,900
Housing Authority		
Improved Public Safety (Town)	2	\$2,507,700
Improved Selectmen (Town)	7	\$27,031,700
Marina	5	\$7,010,700
Multi-Family Residential	86	\$50,608,000
Multiple Use Commercial	3	\$9,355,570
Multiple Use Other		
Multiple Use Residential	4	\$6,520,600
Nursing Home		
Office	13	\$15,444,200
Other	2	\$1,967,800
Outdoor Recreation	6	\$6,203,380
Pasture		
Religious	2	\$5,149,200
Single-Family Residential	684	\$519,654,640
State	3	\$104,200
Tanks - Retail		
Utility		
Vacant - County/Regional	1	\$246,300
Vacant - Developable	8	\$3,752,300
Vacant - Potentially Developable	2	\$905,400
Vacant - Undevelopable	179	\$4,690,600
Vacant - Conservation (Town)	17	\$1,815,900
Vacant - Selectmen (Town)	59	\$15,573,900
Warehouse		
Missing Data	91	
Total	1,190	\$692,667,090

Source: Scituate Tax Assessor CAMA data, Massachusetts Property Tax Use Code

Table 2-26 Total Vulnerability Hurricane Category 2, Scituate

Land Use	No. of Parcels Impacted	Total Value
Auto Repair/Gas/Service	1	\$981,400
Chapter 61		
Charitable	2	\$114,300
Civic	3	\$1,281,500
Commercial	15	\$16,860,700

Commercial Greenhouse	1	\$955,100
Federal	3	\$2,688,900
Housing Authority	1	\$80,300
Improved Public Safety (Town)	3	\$2,840,700
Improved Selectmen (Town)	9	\$29,018,000
Marina	5	\$7,010,700
Multi-Family Residential	127	\$82,213,200
Multiple Use Commercial	10	\$16,630,870
Multiple Use Other		
Multiple Use Residential	11	\$11,577,710
Nursing Home		
Office	16	\$17,657,100
Other	2	\$1,967,800
Outdoor Recreation	6	\$6,203,380
Pasture	1	\$225,890
Religious	2	\$5,149,200
Single-Family Residential	1,157	\$812,618,140
State	3	\$104,200
Tanks - Retail	1	\$535,100
Utility		
Vacant - County/Regional	1	\$246,300
Vacant - Developable	14	\$5,704,500
Vacant - Potentially Developable	3	\$987,600
Vacant - Undevelopable	187	\$5,362,300
Vacant - Conservation (Town)	21	\$2,667,100
Vacant - Selectmen (Town)	51	\$14,632,000
Warehouse	2	\$1,317,800
Missing Data	102	
Total	1,760	\$1,047,631,790

Source: Scituate Tax Assessor CAMA data, Massachusetts Property Tax Use Code

Table 2-27 Total Vulnerability Hurricane Category 3, Scituate

Land Use	No. of Parcels Impacted	Total Value
Auto Repair/Gas/Service	1	\$981,400
Chapter 61		
Charitable	3	\$1,104,400
Civic	3	\$1,281,500
Commercial	11	\$13,836,000
Commercial Greenhouse	1	\$955,100
Federal	1	\$2,570,000
Housing Authority	1	\$80,300
Improved Public Safety (Town)	2	\$2,507,700

Improved Selectmen (Town)	9	\$33,483,300
Marina	3	\$3,715,700
Motel	1	\$2,320,700
Multi-Family Residential	112	\$85,331,000
Multiple Use Commercial	13	\$19,918,970
Multiple Use Other		
Multiple Use Residential	12	\$12,204,510
Nursing Home	1	\$4,762,000
Office	12	\$13,764,400
Other	3	\$2,145,100
Outdoor Recreation	6	\$6,203,380
Pasture	1	\$225,980
Religious	2	\$5,149,200
Single-Family Residential	1,264	\$889,544,640
State	3	\$104,200
Tanks - Retail	2	\$947,000
Utility		
Vacant - County/Regional	1	\$246,300
Vacant - Developable	13	\$5,159,800
Vacant - Potentially Developable	2	\$905,400
Vacant - Undevelopable	153	\$4,766,900
Vacant - Conservation (Town)	12	\$1,688,000
Vacant - Selectmen (Town)	32	\$12,820,100
Warehouse	4	\$1,839,100
Missing Data	76	
Total	1,760	\$1,130,562,080

Source: Scituate Tax Assessor CAMA data, Massachusetts Property Tax Use Code

Table 2-28 Total Vulnerability Hurricane Category 4, Scituate

Land Use	No. of Parcels Impacted	Total Value
Auto Repair/Gas/Service	2	\$1,752,800
Chapter 61		
Charitable	3	\$1,734,500
Civic	3	\$1,281,500
Commercial	10	\$12,864,300
Commercial Greenhouse	1	\$955,100
Federal	1	\$2,570,000
Housing Authority	1	\$80,300
Improved Public Safety (Town)	3	\$5,607,200
Improved Selectmen (Town)	9	\$32,327,600
Marina	1	\$2,254,000
Motel	1	\$2,320,700

Multi-Family Residential	112	\$82,295,900
Multiple Use Commercial	15	\$21,182,070
Multiple Use Other		
Multiple Use Residential	9	\$9,587,110
Nursing Home	2	\$6,942,700
Office	9	\$8,766,300
Other	1	\$177,300
Outdoor Recreation	5	\$6,081,130
Pasture	1	\$225,890
Religious	2	\$5,149,200
Single-Family Residential	1,459	\$1,014,227,840
State	2	\$81,100
Tanks - Retail	2	\$947,000
Utility		
Vacant - County/Regional	1	\$246,300
Vacant - Developable	19	\$7,718,400
Vacant - Potentially Developable	1	\$789,400
Vacant - Undevelopable	143	\$4,306,600
Vacant - Conservation (Town)	11	\$1,332,300
Vacant - Selectmen (Town)	27	\$11,902,400
Warehouse	3	\$1,009,100
Missing Data	60	
Total	1,919	\$1,246,716,040

Source: Scituate Tax Assessor CAMA data, Massachusetts Property Tax Use Code

Impacts of Business Interruption

Notwithstanding the obvious costs of commercial property damage, the impacts of potential business interruption from a natural disaster in Scituate cannot be underestimated. Business closures result in a reduction of revenues to proprietors and a loss of wages to employees. State and local tax revenues can be significantly reduced, particularly targeted at the tourism industry. In addition to the costs of commercial property damage, the impacts from potential business interruption following a disaster in Scituate could have long-lasting effects on the local economy, quality of life, and sense of place that has been maintained and revered for generations.

2.4.3 Social Vulnerability

A critical step in assessing risk and vulnerability of Scituate to natural hazards is to identify the links between the potential destructive impacts to the built and natural environments and that relationship to the social structure. The social assets/potential losses continue to be key components of the community and include the closure of institutions, loss of vital services (water supply, wastewater collection and treatment, communication and transportation systems), and

disruption in the movement of goods and services, and emotional strain from financial and physical losses.

The vulnerability of a community obviously includes the potential for direct damage to residential, commercial and industrial property, as well as, schools, government and critical facilities. However, it also includes the potential for disruption of communication and transportation following disasters. Any disruption to the infrastructure, such as a loss of electric power or break in gas lines, can interrupt businesses and cause stress to affected families. This is especially the case where residents are forced to evacuate their homes and become subject to shortages of basic supplies.

Public Infrastructure and Emergency Life Lines

There are a number of public buildings/structures located in the flood plain and adjacent to the coastline. In addition to potential structural damage, various access roads for these buildings/structures also flood from time to time during an event, described previously in Section 2.3.1.

Drinking Water Systems

Scituate has two sources of drinking water, wells and surface water. The town maintains a water treatment plant, two booster stations, two water storage tanks, four corrosion control stations, and 124 miles of drinking water distribution pipes.

A number of Scituate's drinking water infrastructure is vulnerable to the FEMA 100-year flood zone as identified in Section 2.3.1, including wells 10, 11, 17A, 19, and 22. Drinking water infrastructure is also vulnerable to various hurricane categories, including wells 10 and 11 (Category 2 Hurricane), wells 10, 11, and 18B (Category 3 Hurricane), and wells 10, 11, 18B, and the Scituate Water Treatment Plant (Category 4 Hurricane).

With anticipated sea level rise, increased frequency and intensity of precipitation events and/or drought, extreme heat and shifting freeze/thaw cycles, climate change is expected to strain drinking water resources, both in quality and quantity. Overall, vulnerabilities for Scituate's drinking water include the potential for a stressed water supply, contamination from flooding, and potential for salt water intrusion into groundwater aquifers along the coast (Peggoty Beach).²²

Wastewater Systems

Scituate's municipal sewer system includes a treatment plant supported by six pump stations and 32 miles of sewer lines, while just over 70% of Scituate residences have private septic systems.

Municipal Sewer System

Sea level rise, extreme precipitation, and flooding (in particular coastal flooding) are the most important factors in understanding Scituate's sewer system vulnerability. Although not a significant risk to landslides, approximately half of

²² Building A Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018.

the facilities at the North River Waste Water Pollution Control Plant at the Driftway are currently within a 1% Annual Chance Flood. The vulnerability of the municipal sewer lines is significant for the 1% Annual Chance Flood for inundation with storm surge, where Cedar Point and most of Oceanside Drive sewer lines are submerged.²³

A number of other waste water infrastructure are vulnerable to the 1% Annual Chance Flood as identified in Section 2.3.1, including various pump stations (Musquashicut Avenue, Sand Hills, First Cliff, Peggotty Beach, First Parish, Herring Brook, and Collier Road) and the Scituate Waste Water Treatment Plant. Wastewater infrastructure is also vulnerable to inundation by various hurricane categories, including various pump stations for Category 1 Hurricanes (Musquashicut Avenue, Chain Pond, Sand Hills, First Cliff, Peggotty Beach, and Collier Road), Category 2, 3 and 4 Hurricanes (Musquashicut Avenue, Chain Pond, Sand Hills, First Cliff, Peggotty Beach, Collier Road, and Herring Brook). The North River Waste Water Pollution Control Plant is also vulnerable under all 4 hurricane categories.

Several other waste water infrastructure are also vulnerable to inundation by 1-foot (projected for 2038 in the Kleinfelder report) and 3-foot (projected for 2063 in the Kleinfelder report) rises in sea level as identified in Section 2.3.1, including Musquashicut Avenue Pump Station and Peggotty Beach Pump Station (1- and 3-foot rise in sea level) and the North River Waste Water Pollution Control Plant is vulnerable under the 3-foot rise scenario.

Onsite Waste Water Treatment²⁴

Scituate's private septic systems are vulnerable to sea level rise, extreme precipitation events and warming temperatures. Septic systems or Onsite Wastewater Treatment (OSWT) proximate to rivers, wetlands, and the coast, where the groundwater table would be most affected by sea level rise of flooding from extreme precipitation events, are geographically the ones at risk. At the coast, sea level rise will displace and potentially intrude into near-shore fresh groundwater tables, bringing the freshwater (which is less dense) closer to the surface. This mechanism could cause several complications. First, sea level rise and storm surge could ultimately expose and/or destroy the OWST completely. Residents in Humarock, Peggotty Beach, and Minot, most of whom have OSWT, are most vulnerable. Second, there will be more shallow depth to groundwater limiting septic leachate area. With less area, there is reduced microbial activity needed to properly filter wastewater potentially releasing fecal coliform and phosphorous. Third, OSWT will be susceptible to groundwater infiltration of leach fields, particularly during severe precipitation events and during times of inland and/or coastal flooding. Finally, groundwater and/or salt water intrusion of pipes with sea level rise, storm surge and inland flooding can cause deterioration of the system itself.

²³ Ibid.

²⁴ Ibid.

*Utility Systems*²⁵

Scituate owns and operates a wind turbine and solar farm at the Driftway, advancing clean energy and climate mitigation strategies as well as saving money on electricity for municipal buildings. Other utilities include Columbia gas company for natural gas, and Eversource and National Grid for electricity.

Electricity

Electrical infrastructure is vulnerable to extreme weather, particularly winter storms, heat waves, and floods. Ice storms, freeze/thaw cycles, and flooding can cause severe damage. Winter storms and hurricanes can increase loads on utility infrastructure, such as power lines and utility poles, from precipitation and wind strain. Additionally, over 90% of power outages are caused by fallen trees and limbs during storms. Heat waves are also damaging to infrastructure because of disruptions to cooling equipment with transformers, which are already overburdened during times of increased demand on the electric grid. Flooding can corrode critical infrastructure and prevent electronic components from functioning.

Eversource is currently implementing initiatives to bolster the resilience of their critical assets. These initiatives include emergency preparedness trainings for staff, flood-proofing vulnerable substations, and updating design standards for increased precipitation and flooding. National Grid is part of the U.S. Department of Energy's Partnership for Energy Sector Climate Resilience, a program for utilities to enhance its infrastructure from extreme weather events and climate change. Through this partnership, National Grid has committed to evaluate climate vulnerability, create and action plan for resiliency, evaluate the cost and benefits of resilient strategies to prioritize response, and share best practices with the partnership.

Natural Gas

Critical gas infrastructure includes pipelines, compressor stations, storage facilities, and control stations. Flooding from heavy precipitation poses a threat to underground gas infrastructure. Gas pipes rely on internal pressure to keep natural gas flowing. Water intrusion can disturb this internal pressure to keep natural gas flowing. Water intrusion can disturb this internal pressure and result in service disruption. Gas pipes within low pressure distribution systems are the most vulnerable to flooding because they do not have the hydrostatic pressure necessary to keep water out. Aboveground infrastructure, such as compressor stations, metering stations, and control stations are also vulnerable to flooding. Freeze/thaw events can cause gas mains to break. Older cast iron pipes are the most vulnerable to freeze/thaw events. Extreme heat does not pose significant threats to gas infrastructure.

Telecommunications

²⁵ Ibid.

Telecommunications infrastructure is the technology that transmits information electronically, including phone and computer networks, and the internet. This infrastructure plays a critical role in emergency response and recovery. Telecommunications infrastructure is vulnerable to extreme heat, precipitation, and storms. Most heat-related service disruptions are caused by power outages resulting from increased demand on the electric grid. Extreme heat can also cause critical infrastructure to overheat or malfunction, leading to equipment failure and reduced lifespan. Flooding from heavy precipitation, sea level rise, and storm surges are primary concerns for underground infrastructure and critical facilities with potential for corrosion and erosion. Heavy ice formation and snow accumulation can increase the load on telecommunication lines and infrastructure, resulting in damage. Heavy precipitation and increased humidity can interfere with the signal transmission on which wireless systems rely on.

Aboveground infrastructure is vulnerable to strong winds and lightning. Wired infrastructure and utility poles are particularly vulnerable to damage from falling trees and limbs. Many providers utilize shared fiber networks that reduce redundancy and therefore increase vulnerability to systems disruption during extreme weather.

Some service providers, such as Verizon, are taking steps to protect their infrastructure from the impact of climate change. They are creating backup power capability on critical sites, implementing emergency fuel plans for generators, hardening buildings and structures to withstand flooding and precipitation, deploying mobile communications units to heavily affected communities, and training staff to respond to emergencies. Specific data on the location of telecommunications infrastructure and networks is not publicly available.

*Transportation Systems*²⁶

MBTA

The MBTA provides services to Scituate residents and businesses via the Greenbush Commuter Line and two commuter stops, North Scituate and Greenbush. Data from the MBTA Ridership and Services Statistics 2014 Report reveals that the Greenbush line services approximately 5,400 riders daily, including approximately 500-1000 from the North Scituate Commuter Station. Though the Greenbush Commuter line is not the most heavily used, its ridership has increased by over 3,000 since 2010. While Greenbush line ridership increases significantly starting at the Quincy Center station, the notable growth in ridership both locally, statewide, and nationally on public transportation presents this line as a clear asset to the Town.

²⁶ Ibid.

MBTA infrastructure in Scituate is at risk from climate change. The Greenbush Station is in a 1% Annual Chance Flood and the North Scituate station is adjacent to a regulatory floodway and a 1% Annual Chance Flood Zone. Both are low lying and generally prone to flooding today. Portions of the commuter line rail itself is susceptible to 0.2% flooding between the North Scituate and Cohasset Stations. Some portions of the rail line exist within a current 1% Annual chance of flooding. Furthermore, the Greenbush station is located within an existing urban heat island.

MBTA climate concerns extend to extreme heat and warmer winters. Also, temperatures in excess of 85°F can cause buckled rails, overheated equipment, regional power failures, wear and tear on paved surfaces, and health and safety issue for workers and passengers. Warming temperatures could lead to more damage from ice storms if temperatures hover around freezing. The MBTA is committed to creating a resilient transportation system and employing incremental steps to address climate resilience.

Roadways and Bridges

Transportation infrastructure would likely experience an acceleration in deterioration of its components, like asphalt, from the combination of extreme temperatures, increased precipitation and flooding. Extreme temperatures for long periods would cause thermal expansion of metal structures and stress bridge infrastructure. This would also affect roadway materials through softening and expanding, which can lead to rutting and potholes. While a warmer climate may lead to a decreased need to provide snow and ice removal, more rapid freezing and thawing cycles could cause more acute damage sustained during the warmer months.

Roadways in Scituate subject to heat damage from heat island effects include: roads adjacent the North Scituate Commuter Rail Stop including Gannet Road and Country Way; roads adjacent to the Greenbush Commuter Rail Station including the Driftway, Stockbridge Road and Country Way; the municipal buildings complex off Route 3A including the Scituate High School, Gates Middle School, and Scituate Town Hall; Front Street at retail center; and roads in and around Humarock.

Flooding has the potential to block roadways for both regular and emergency transportation access. There are a number of major roads, streets and bridges prone to major flooding from a 1% Annual Chance Flood Zone, identified in Section 2.3.1.

Several other transportation infrastructure are also vulnerable to inundation by 1-foot (projected for 2038 in the Kleinfelder report) and 3-foot (projected for 2063 in the Kleinfelder report) rises in sea level as identified in Section 2.3.1.

Evacuation/Population at Risk

The use of mass care facilities during an emergency is dependent on a variety of circumstances which include warning time, public awareness of the hazard, the level of encouragement from public officials and the availability of shelters. The primary shelter for the Town is Scituate High School (606 Chief Justice Cushing Highway) with capacity for 150 people (currently reduced by 50% with COVID-19 restrictions). Scituate Middle School and the Senior Center serve as informal back-up shelters. All three sites offer food, showers and charging capabilities and also serve as warming/cooling centers and charging stations as needed and when parts of the Town lose power. The sites are also pet friendly, but the Scituate Emergency Management Agency urges residents to make arrangements for pets ahead of time.

Shelter use is not easily predicted because each emergency situation has different variables such as the length of the warning period, official encouragement of the evacuation, public awareness of the location and availability of shelter, and the severity of the approaching hazard. Shelter use may be higher in the winter, such as an ice or snowstorm, since homes would be without heat should there be power outages.

2.4.4 Environmental Vulnerability

Hurricanes, earthquakes, nor'easters, floods or any weather-related hazard event, in addition to invasive species, will have particular impacts on the natural and built environment. Differences in storm size, speed of movement, wind speeds, and landfall location relative to vulnerable resources makes for high variability in impacts and related costs associated with weather-related events. For invasive species, the location and breadth of the growth/stands will cause the same variability in impacts, however, mostly indirect in nature.

When the natural environment is impacted there are both direct and indirect costs. Impacts of severe weather events to the natural environment include both direct (loss of habitat and salinization of land/ groundwater) and indirect costs (widespread inland damage to the built environment, threats to ecosystems/ species, and contamination of potable water supply).

2.5 FEMA Disaster Grant Assistance

FEMA has provided the Town of Scituate with approximately \$1,333,158.37 in grant assistance since 2015 for the following disasters:

- February Snowstorm (Juno)
Disaster Number: DR-4214
\$484,778.54

Main Items for Funding Provided for:

- Debris removal
- Roof snow removal

- Snow removal (48 hrs.)
 - Pavement of Central Avenue/Glades Road
 - Sewer Pump Stations
 - Town Pier Marine Park/Harbormaster's Office
 - EPM (Police/Fire/Shelter)
 - School fences
 - Damage equipment/Buildings
- March 2-3, 2018 Severe Winter Storm/Flooding (Riley)
Disaster Number: DR-4372
\$848,379.83

Main Items for Funding Provided for:

- Emergency protective measures

DRAFT

Section 3 Capability Assessment

3.1 Introduction

The Capabilities Assessment section has been restructured to better document local, state, and federal department, agency and program capabilities in terms of pre- and post-disaster activities. It has been organized into three (3) main sections: Planning and Regulatory capabilities, Administrative and Technical capabilities, and Financial capabilities to better define the programs, policies, and funding opportunities each department or agency is implementing to reduce risk and work towards implementing hazard mitigation programs targeted at increased resiliency.

The Town of Scituate implements several hazard mitigation policies and procedures, current state laws, executive orders, and regulations to promote the safety of its residents and minimize risk to community assets. This section presents a brief description of each of the primary mitigation programs currently in place.

3.2 Planning and Regulatory Capabilities

Open Space and Recreation Plan 2018

The Open Space and Recreation Plan is a planning document intended to advise and guide the Town of Scituate's planning, conservation, acquisition, development and management of open space and recreational facilities. Scituate valuable natural areas which provide an opportunity for open space preservation and acquisition. The following objectives and strategies applicable to hazard mitigation planning are referenced:

Goal 2: Protect Scituate's natural shoreline and coastal features and waters, which are a prime recreational and economic resource, and which give the Town its identity as a very appealing seaside community.

- Actions include:
 - Continue to coordinate various town departments and local task forces to develop bylaws and best practices that relate to preserving and enhancing the natural shoreline and coastal resources in the current status and with expected impacts of sea level rise. Explore the use of beach nourishment to maintain attractive beaches well suited to local recreation.
 - Continue to strongly enforce Town bylaws discouraging new construction in the floodplain.
 - Implement recommendations from the Coastal Assessment Study and other recent and ongoing studies, as applicable to shoreline protection.
 - Initiate public education on shoreline and coastal resources protection, as well as issues affecting public use of the beach.

- Include lawn service contractors, landscapers, and other businesses whose actions impact the coastline.
- Work with surrounding communities on long-term planning to ensure regional cooperation on solutions to coastal hazards.

Goal 5: Enhance the natural beauty of the Town’s landscape by protecting existing open space, while promoting appropriate use.

- Actions include:
 - Prepare management plans for Scituate’s public beaches.

Housing Production Plan, 2020

The Housing Production Plan is a planning document that suggests a range of options to meeting pressing local housing needs in Scituate. The following was highlighted in the plan about challenges of building affordable housing in Scituate.

Approximately 30% of the Town’s land, or 3,279 acres, lies within the Flood Plain and Watershed Protection Zoning District. Within this Town Overlay District, a special permit is required for major additions and renovations to existing homes. New construction can only be allowed if a property owner can show his land is not subject to flooding. The Town has a second flood related Zoning District, the Flood Insurance District, which corresponds to the FEMA Zone A or hundred-year flood plain. Although large sections of Scituate’s barrier beaches are already extensively developed, they continue to provide excellent protection against flooding of more inland areas. They remain fragile and prone to erosion, and new building in these locations should be avoided to the greatest extent possible.

Waterways Management Plan, 2011

The Waterways Management Plan establishes a reasoned approach to ensure appropriate use and a clean environment in Scituate Harbor. The following actions applicable to hazard mitigation planning are referenced:

Land Use Patterns and Regulations – Actions

- Continue grants and similar programs to protect properties in the FEMA velocity zones. Investigate impacts of future sea level rise on town infrastructure and private properties. Develop long range plan for maintenance of infrastructure and seek sources of funds for repair and replacement, where appropriate.
- Provide for continuation of water quality monitoring program. Enforce town storm water bylaw and strongly adhere to the comprehensive storm water management plan.

Water Use – Actions

- Mark as off-limits for moorage any areas requiring protection for water quality and shellfish resource protection.

- Set aside five moorings for emergency and storm usage.

Town of Scituate Stormwater Regulations, 2010

The purpose of these regulations is to implement the Stormwater Bylaw, Section 3250 of the Town of Scituate General Bylaws. The regulations include requirements that address stormwater management and flood hazard mitigation, in addition to other hazards.

Section 8 – Low Impact Development Approach to Stormwater Management

1. Utilizes natural hydrology to manage stormwater.
2. Minimize impervious surfaces.
3. Treat stormwater in numerous small, decentralized structures.
4. Use natural topography for drainage ways and storage areas.
5. Preserve portions of the site in undisturbed, natural conditions. To the greatest extent possible, maintain existing vegetation so that it can continue to absorb and treat stormwater. Where vegetation is maintained, it shall be identified as a non-disturbance or no-cut area on subdivision or site plans, and on contractor's specifications.
6. Lengthen travel paths to increase time of concentration and attenuate peak rates.
7. Disconnect impervious surfaces. All applications for Administrative Stormwater Project Review or Stormwater Permits are required to show how LID will be incorporated or provide an explanation why it will not be feasible to utilize LID.

Section 9 – Stormwater Management Performance Standards

1. No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.
2. Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.
3. Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. This Standard is met when the Stormwater Management System is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

To prevent storm damage, alteration of stream channels, and down-gradient or offsite flooding, post-development discharge volume shall not exceed predevelopment discharge volume for the 2-year, 10-year, and 100-year 24-hour storms, and for each design point if flow leaves the property in more than one direction. Applicants must demonstrate volume

control for these storm events through intelligent site design, on-site storage, and reuse, by incorporating BMPs such as LID techniques (preferred,) or extended dry detention basins, or wet basins.

Water quality BMPs must treat the first 1-inch of runoff. In critical areas, such as shellfish beds, Coldwater fish habitats, public swimming beaches, and public drinking water recharge areas and reservoirs, BMPs must treat the first 1-inch of runoff. Recharge must be provided to offset the recharge lost due to site development to the maximum extent practicable (authorization may be required through the Mass. Underground Injection Control program, 310 CMR 27.00, see <http://mass.gov/dep/brp/dws/regs.htm>).

4. Source controls, pollution prevention measures and Best Management Practices (BMPs) in Massachusetts must be designed to remove 80% of the Total Suspended Solids (TSS) load. Within the Water Resource Protection District, a 90% removal rate shall be required. This district is as shown on the most recent Town of Scituate Zoning Map as provided in paragraph 6 below.
5. For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.
6. Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near¹ or directed to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply. Stormwater discharges to Outstanding Resource Waters² and Special Resource Waters shall be removed or set back from the receiving water or wetland and receive the highest and best practical method of treatment.
7. A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.
8. A long-term operation and maintenance plan shall be developed and implemented to ensure that Stormwater Management Systems function as designed.

General Bylaws, 2020

The purpose of the General Bylaws is to promote the health, safety, and general welfare of the public of Scituate. The Bylaws include requirements that address stormwater management and flood hazard mitigation, in addition to other hazards.

Section 30710 Adoption of Local Wetlands Protection Bylaw

The purpose of this bylaw is to protect the foreshore and wetlands of the Town of Scituate by prior review and control of activities deemed to have a significant effect upon wetland values, including the following: public or private water supply, groundwater, flood control, prevention of storm damage, prevention of water pollution, fisheries, shellfish and wildlife habitat. No person shall remove, fill, dredge or alter any of the following resource areas:

- In or within 100 feet of any freshwater wetland, coastal wetland, marsh, wet meadow, bog or swamp.
- In or within 100 feet of any bank, beach, dune or flat.
- In or within 100 feet of any lake, river, pond, stream, creek or estuary, or any land under said waters, or on any land subject to tidal action, coastal storm flow or flooding, without first filing written notice of their intention so to remove, fill, dredge, or alter by sending a separate letter, by certified mail, to Scituate Conservative Commission at least 21 days prior to any hearing for removing, filling, dredging or altering.

Section 32050 Stormwater Management

The purpose of this bylaw is to reduce flooding, protect water quality, increase groundwater recharge, reduce erosion and sedimentation, promote environmentally sensitive site design practices such as Low Impact Development that protect vegetation and enhance town character, ensure long-term maintenance of stormwater controls and meet or exceed federal requirements under Phase II of the National Pollutant Discharge Elimination System (NPDES).

Subdivision Regulations

The purpose of these regulations is to establish certain subdivision standards and procedures for the Town of Scituate. Among others, the Town uses these regulations to promote the public health, safety, convenience, and general welfare, and to promote safety from fire, flood, failure of impounding structures and impacts within dam break inundation zones, panic, and other dangers.

Stormwater Management Bylaw

The Town's Stormwater Management Bylaw Regulations (April 14, 2016) include requirements that address stormwater management and flood hazard mitigation, in addition to other hazards.

Section 8 – Performance Standards

Performance standards shall also be adopted for coastal storm associated floodwater, to avoid channelization and minimize the velocity of flood waters.

1. Standards for land subject to coastal storm flowage.
Preservation of the abilities of existing topography, slope, surface area, soil characteristics, erodibility, and permeability of land in the flood plain will tend to allow for the dissipation of storm wave energy, slowing of

moving water, and absorption of flood waters. Standards for land subject to coastal storm flowage may include limits on creation of new pavement or other impervious surfaces, or that there shall be no adverse impact from work proposed in Land Subject to Coastal Storm Flowage. Standards may also be adopted for increases in impervious surface, removal of natural vegetation and pervious areas, filling, locating foundations or pavement so as to channelize floodwater, use of solid foundations and fill so as to deflect, reflect or redirect wave energy or channelize floodwater, or dredging or removal of soil materials within the floodplain so as to allow storm waves to break further inland and impact upland or wetland resource areas.

Report of the Massachusetts Coastal Erosion Commission, Volume 1, Findings and Recommendations December 2015²⁷

In 2013, the MA Legislature established the Coastal Erosion Commission to investigate and document the levels and impacts of coastal erosion in the Commonwealth and to develop strategies and recommendations to reduce, minimize, or eliminate the magnitude and frequency of coastal erosion and its adverse impacts on property, infrastructure, public safety, beaches and dunes. This information, together with the CZM Shoreline Change Project, was combined with other data to analyze and present shoreline change trends. Both the long- and short-term average change rates with uncertainty values (as measured by standard deviation) for Scituate are presented below (negative values indicate erosion, positive values indicate accretion):

<u>Short Term Rate</u>		<u>Long-Term Rate</u>	
Mean (ft/yr)	Std Deviation (ft./yr)	Mean	Std. Deviation
-1.3	2.0	-1.0	1.7

Both short- and long-term rates can average out episodic changes, seasonally and as a result of storm events. Complementing this, the MA Rapid Response Coastal Storm Damage Assessment Team identified ‘hot spot’ locations where erosion, storm surge, flooding and wave activity have caused significant damages to buildings/infrastructure over time, including Glades, Lighthouse Point, Peggotty Beach, and Humarock Beach (northern half).

The report includes over-arching strategies under three topic areas:

Science, Data and Information

- Increase understanding of coastal and nearshore sediment dynamics, including the effects of man-made, engineered structures, to inform potential management actions and other responses to coastal erosion.

²⁷ Report of the MA Coastal Erosion Commission, Volume 1, Findings and Recommendations.

- Enhance available information based on type, extent, impacts, and costs of coastal erosion on public infrastructure, private property, and natural resources to improve the basis for decision making.
- Improve mapping and identification of coastal high hazard areas to inform managers, property owners, local officials and the public.

Legal and Policy

- Reduce and minimize the impacts of erosion (and flooding) on property, infrastructure, and natural resources by siting new development and substantial re-development away from high hazard areas and incorporating best practices in projects.
- Improve the use of sediment resources for beach and dune nourishment and restoration.

Shoreline Management, Assistance, and Outreach

- Promote the development of local and regional beach and shoreline management plans.
- Support the implementation and study of pilot projects for innovative solutions and the encouragement of learning-by-doing and experimentation in shoreline management approaches.
- Maintain and expand technical and financial assistance and communication and outreach to communities to support local efforts to address the challenges of erosion, flooding, storms, sea level rise, and other climate change impacts.

Next steps included a request to the MA Executive Office of Energy and Environmental Affairs (EOEEA) to work with the Legislature, other agencies, and partners to examine opportunities for implementation of its recommendations.

Massachusetts State Building Code

The Town of Scituate enforces the Massachusetts State Building Code which includes many detailed regulations regarding wind loads, earthquake resistant design, flood-proofing and snow loads.

- Wind-Related Hazards
 - The Town enforces the Massachusetts State Building Code where provisions are adequate to mitigate against most wind damage. The code's provisions are the most cost-effective mitigation measure against tornadoes given the extremely low probability of occurrence.
- Geologic-Related Hazards
 - The State Building Code contains a section on designing for earthquake loads (780 CMR 1612.0) which states that the purpose of these provisions is "to minimize the hazard to life to occupants of all buildings and non-building structures, to increase the expected performance of higher occupancy structures as compared to

ordinary structures, and to improve the capability of essential facilities to function during and after an earthquake.” This section goes on to state that due to the complexity of seismic design, the criteria presented are the minimum considered to be “prudent and economically justified” for the protection of life safety. The code also states that absolute safety and prevention of damage, even in an earthquake event with a reasonable probability of occurrence, cannot be achieved economically for most buildings.

Section 1612.2.5 sets up seismic hazard exposure groups and assigns all buildings to one of these groups according to Table 1612.5. Group II includes buildings which have a substantial public hazard due to occupancy or use and Group III are those buildings having essential facilities which are required for post-earthquake recovery, including fire, rescue and police stations, emergency rooms, power-generating facilities, and communication facilities.

Coastal Erosion, Sediment Transport, and Prioritization Management Strategy Assessment for Shoreline Protection, August 2016²⁸

Scituate’s coastline is a classic example of a developed coastline that faces east or northeast and is vulnerable to nor’easters, which are common winter storms in Massachusetts. Existing foreshore protection stands landward of sediment starved beaches and is not capable of withstanding projected future conditions. Potential over wash, undermining, and collapse by higher sea levels and storm surge are serious concerns, particularly since at normal high tides there is no beach present in many areas to dissipate wave energy or to stabilize the structures.

In 2015, the Town of Scituate pursued a long-term planning effort to identify ongoing coastal erosion and the sediment transport pathways, screen potential shore protection strategies to determine their applicability, assess both historical storm damage and needed shore improvement costs by shoreline reach, and prioritize shore protection and/or other management strategies based on potential costs and storm protection benefits.

The overall goal of the planning analysis is to produce a “roadmap” that the Town can utilize to proactively plan for projects that will improve the coastal resiliency of the community. By basing future shore protection decisions on a quantitative analysis of town-wide coastal processes it is anticipated that more cost-effective and sustainable solutions can be developed as part of a long-term planning process.

²⁸ Coastal Erosion, Sediment Transport, and Prioritization Strategy Assessment for Shoreline Protection.

A number of potential shore protection options were evaluated to provide the basis for the site-specific assessment of alternative for each shoreline sections. The list of alternative shore protection strategies includes numerous “hard” (e.g. seawall) and “soft” (e.g. beach and dune nourishment) coastal engineering techniques, as well as potential innovative approaches (e.g. boulder dikes). In addition, the baseline alternative consists of maintaining the status quo of continuing to repair infrastructure as needed following storm damage and/or demonstrable failure. Various types of shore protection options evaluated include: Maintain status quo, seawalls and revetments, beach nourishment, constructed dunes, offshore breakwaters, boulder dike, elevated road(s), drainage improvements for the basins, protection and improvements for pump stations, managed retreat, elevate buildings, and other innovative approaches.

Evaluated Shore Protection Approaches by Study Area:²⁹

For all study areas, elevating homes and buildings in high hazard flood areas above base flood elevations is recommended. Also, in all the shore protection approaches, appropriate public access easements will need to be acquired from the involved property owners if the project is publicly funded.

Minot Beach

- Beach nourishment/Perched cobble beach 1,200 feet:
 - \$600,000 construction costs
 - \$2.2 million over a 50-year life cycle
- Seawall improvements:
 - \$6.7 million over a 50-year life cycle

Increasing the height of the seawall by 2 feet can reduce overtopping rates to levels that will not damage pavement under existing climate conditions and does prevent damage under hypothetical SLR scenarios.

North Scituate Beach/Seaside Road

- North Scituate Beach - beach nourishment (Phase 1 2,900 feet):
 - \$8.2 million construction costs
 - \$58.9 million over a 50-year life cycle
- Surfside Road – beach nourishment (2,700 feet):
 - \$4.9 million
 - \$35.2 million over a 50-year life cycle

Nourishment has the benefit of providing improved storm protection, providing a sediment source for adjacent shorelines (Mann Hill, Egypt Beaches), and creating a recreational resource.

Mann Hill Beach

²⁹ Coastal Erosion, Sediment Transport, and Prioritization Management Strategy Assessment for Shoreline Protection August 2016.

- Managed retreat (move homes landward):
 - > \$1.5 million
- Managed retreat (buyout all homes):
 - > 2.3 million

Beach nourishment would improve the longevity of development along Mann ill Beach would be improved, although continued erosion of the cobble dune land form will be difficult and./or cost-prohibitive to maintain in the long-term.

Egypt Beach

- Construction of a boulder dike (2,300 feet):
 - \$1.42 million construction costs

The boulder dike alone does not provide protection from severe storm events; however, it is determined that a rejuvenated sediment supply via nourishment provided further to the north will allow long-term accretion along the landward side of the dike.

Oceanside Drive

- Rehabilitation of seawall and revetment (10,000 feet):
 - \$80.2 million
 - \$199.6 million over a 50-year life cycle
- Drainage improvements for the basins:
 - \$4.0 million

Beach nourishment could be implemented along Oceanside Drive at a lower cost, there are obstacles in providing lasting protection for the northern portions of the study area and the possibility on inhibiting and/or blocking navigational pathways into Scituate Harbor and outfalls from the basins.

Cedar Point

- Rehabilitation of seawall and revetments (1,300 feet):
 - \$10.4 million
 - \$25.9 million over a 50-year life cycle
- Beach nourishment/Cobble berm (1,200 feet)
 - \$4.6 million
 - \$17.1 million over a 50-year life cycle
- Boulder dike (1,200 feet):
 - \$720,000

Benefits include increased storm protection, upgraded condition of the existing coastal engineering structures, and improved emergency egress.

First Cliff

- Maintain the status quo:
 - \$10.3 million over a 50-year life cycle

Edward Foster Road

- Rehabilitation of seawall and revetment (1,300 feet):
 - \$10.4 million
 - \$25.9 million over a 50-year life cycle

The rehabilitated structure can protect against increased wave overtopping due to potential sea level rise and maintain the emergency egress between First and Second Cliff.

Second Cliff

- Maintain the status quo:
 - \$13.3 million over a 50-year life cycle

Peggotty Beach

- Managed retreat (move homes landward):
 - > \$4.8 million
- Managed retreat (buyout all homes):
 - > 8.7 million

Peggotty Beach represents one of the most highly erosional areas along the Scituate coast, where overwash of the low-lying barrier beach has caused readily observable landward migration of the barrier beach into the salt marsh system along its landward limit.

Third Cliff

- Maintain the status quo:
 - \$26.8 million over a 50-year life cycle

Fourth Cliff

- Maintain the status quo:
 - \$4.3 million over a 50-year life cycle

Humarock North/South

- Elevate Central Avenue (4,800 feet):
 - \$3.6 million
- Humarock North only beach nourishment (50-foot berm/3,500 feet):
 - \$4.1 million
 - \$160.7 million over a 50-year life cycle
- Humarock North only beach nourishment (100-foot berm/3,500 feet):
 - \$6.3 million
 - \$130.2 million over a 50-year life cycle
- Humarock North/South beach nourishment (50-foot berm/10,500 feet):
 - \$12.3 million
 - \$70.8 million over a 50-year life cycle
- Humarock North/South beach nourishment (100-foot berm/10,500 feet):
 - \$26.4 million

- \$120.0 million over a 50-year life cycle
- Construction of dunes stand-alone (4,800 feet):
 - \$9.6 million
 - \$78.2 million over a 50-year life cycle

Benefits include increased storm protection, eliminating the need for post-storm roadway clearing along Central Avenue, providing an increased littoral sediment supply to protect down-drift beaches, providing a greater recreational resource, and preventing a breach between Humarock and Fourth Cliff.

Elevating Roadway Improvements and Dune/Beach Nourishment Along North Humarock for Improved Coastal Resiliency, March 28, 2017

The study purpose was to develop a conceptual plan for elevating a portion of Central Avenue along northern Humarock Beach and optimizing a dune/beach nourishment design to provide storm damage protection for repetitively damaged public and private infrastructure.

The recommended shore protection approach for Humarock North is to elevate Central Avenue, construct dunes along the Humarock North, and nourish to beach along the entire Humarock North and South.

Dune/Beach Nourishment:

- Increase storm protection
- Reduce wave overtopping and over wash
- Reduce the need for post-storm roadway clearing
- Reduce over wash of sediment to the marsh
- Prevent breach between Humarock and Fourth Cliff

Elevating Central Avenue:

- Maintain emergency egress during flood events
- Prevent still water flooding from the marsh side
- Prevent breach between Humarock and Fourth Cliff

Scituate Harbor Sustainability and Resilience Master Plan, August 2020³⁰

The Town of Scituate had developed this Scituate Harbor Sustainability and Resiliency Master Plan to guide future growth, conservation and infrastructure enhancements over the next 25 years. The overall goal of the project was to create a near-term and long-term village district conceptual master plan with a focus on flood resilience in the Scituate Harbor business district. The district master plan was developed through a public process engaging the community's residents, business owners, property owners, and leadership and is based upon research, analysis, and community involvement. All of these efforts have helped

³⁰ Scituate Harbor Sustainability and Resilience Master Plan.

to articulate and define the vision statement to frame the strategies and recommendations of the resilience master plan.

Vision Statement: Create a cohesive vision for Scituate Harbor that will build resilience incrementally, through coordinated and layered measures, to meet flood challenges projected for mid-century (2050) and beyond. Near-term and long-term actions should create more flood resilience while creating additional benefits to the district that will:

- Enhance economic vitality by protecting, strengthening or expanding the key assets of the district.
- Improve the public realm for pedestrian and bicycle safety and more sustainable infrastructure.
- Strengthen community and civic gathering to reinforce Scituate Harbor as the heart of the community.
- Improve district parking to offer more convenient access and functionality.
- Maintain cost effectiveness by strategically weighing the advantages and disadvantages of investments.
- Retain the ability to implement current and future actions to further protect and improve the district.
- Reduce the negative impacts that may result from an approach to resilience investments including environmental, social, economic, or community impacts.

Resilience Recommendations: The resilience recommendations for Scituate Harbor focus on an incremental elevation and adaptation of the coastal perimeter of the district that integrates with an elevated Harborwalk, new coastal amenities and open space features. This approach is combined with the protection and improvement of the natural systems that provide protection to the district and adjacent shoreline at the Kent Street marshes and the banks of the Satuit Brook. The addition of green infrastructure in the district to protect and improve water quality of the harbor. All of these investments are focused on reducing the pathways of ocean water into the business district.

Specific Scituate Harbor resilience recommendations include:

- A new elevated waterfront park amenity at Cole Parkway that provides flood protection.
- New seating and coastal amenities along an elevated Scituate Harborwalk from Cole Parkway to the Town Pier.
- Elevation of sea walls and bulkhead edges that already exist in the district
- Floodproofing the waterside of buildings along Front Street and adding infrastructure for deployable floodgates between gaps in buildings.
- Exploration of roadway infrastructure resilience improvements at the Satuit Brook bridge and Edward Foster Road and bridge.

Town of Scituate Coastal Community Assessment, September 2018³¹

In the summer of 2018, the Town of Scituate, Massachusetts undertook a Coastal Community Assessment to learn more about what residents, businesses and civic organizations, as well as town staff and leadership think about the risks and opportunities associated with being a coastal community. Interviews with over 40 individuals representing a cross-section of the community in Scituate revealed a strong attachment to the town and deep ties to living or working near (or on) the water. Scituate residents see themselves as historically resilient to coastal impacts, but doubts are creeping in about Scituate's ability to remain resilient into the future.

Given the findings, the Consensus Building Institute recommends the following actions to the Town of Scituate:

1. **Through a robust community engagement process, develop and adopt a long-term coastal resilience vision and strategy.** The questions facing Scituate are not about whether to take action on the coast, but how, when, and where to act. The community is eager to see these questions answered strategically and to be meaningfully involved in the process, so the long-term plan is community-developed and community-supported. In the full recommendation section we lay out a skeleton process to ensure those decisions are made with the right information and guidance, and with support from community representatives.
2. **Review, summarize, and present in a simple format, the key actions that have been taken in recent years to improve coastal resilience in Scituate, and the relevant recommendations that have been made in previous studies and plans.** Currently, there is no easy way to find out what Scituate already knows about its own coastal vulnerabilities and strengths, what solutions have already been implemented or considered, and what remains unknown. An effort to compile and summarize that information would be tremendously helpful to many people for various reasons and would be critical for the effort described in Recommendation #1.
3. **Convene community conversations about managed retreat.** Many in the community want to talk about managed retreat, but it's a topic that can only be approached sensitively and skillfully, and without any expectation of a given outcome. We propose a possible path for supporting conversations on this challenging issue.
4. **Review, update, and document the emergency management protocols for coastal storms.** We recommend that the key players involved in emergency management be supported in an effort to review

³¹ Town of Scituate Coastal Community Assessment.

their processes, identify gaps that need additional support, and formally document the work needed to keep people safe during storms.

Peggotty Beach Managed Retreat Feasibility Study

In the Town of Scituate's comprehensive 2016 plan titled *Coastal Erosion, Sediment Transport and Prioritization Management Strategy Assessment for Shoreline Protection* the shoreline change and coastal processes of Peggotty Beach were analyzed to come up with the best possible mitigation and resiliency recommendation. After analyzing the alternatives of beach nourishment, dune enhancement, and managed retreat, the 2016 report determined that managed retreat was a viable recommendation worthy of further consideration.

The Town of Scituate is working with the MAPC to conduct a feasibility analysis of managed retreat options for Peggotty Beach. The analysis will include:

- Outreach to affected residents to understand their interests and concerns
- Review of projected future climate impacts
- Review of permitting requirements or limitations
- Analysis of environmental impacts
- Analysis of existing utilities and infrastructure and future needs
- Review of legal issues and liabilities
- Analysis of land use and zoning options

Scituate 2040 Master Plan Update (June 2021)

The Town of Scituate has completed the 20-year update to the Master Plan which serves as a guide to the Town for future decision-making on actions that will have long-term impacts on the Town's economic, social, and physical resiliency. A number of actions associated with planning for impacts from natural hazards are included below:

Climate Change and Sea Level Rise:

- Elevate structures within flood risk zones
- Enhance and raise seawalls and revetments
- Enhance and reinforce "hard-engineered" infrastructure such as breakwaters, jetties, and groins
- Provide beach nourishment to maintain ecological function
- Invest in "soft-engineered" infrastructure such as artificial dunes and berms
- Implement boulder dykes
- In low-lying areas susceptible to flooding, convert roads to bridges

Climate Change and Ecology:

- Expand wetland protections to include projected wetland migration areas
- Reduce clear-cutting

Land Use:

- Establish programs and policies for buy-outs, land swaps, relocations, and transfers of development rights to allow for relocation

Zoning:

- Consider reducing development on flood hazard areas

Community Services and Facilities:

- Evaluate existing community facilities for problems and as assets for impacts related to climate change

Transportation Infrastructure:

- Flood-proof key transportation routes
- Anticipate heat damage to roads

Water Infrastructure:

- Prepare for droughts and the effects of sea level rise on groundwater and saltwater intrusion

Sanitary Infrastructure:

- Develop a long-range plan for water and wastewater management

Comprehensive Wastewater Resilience Feasibility Study (June 2019)³²

GZA completed a Resilience Feasibility Study of the Town of Scituate Sewer Collection and Treatment System which also incorporated findings from the 2016 flow monitoring program and I/I analysis performed by CDM Smith. The treatment system is a critical Scituate lifeline system and failure or disruption of system operations will result in significant impacts to the Town and its residents. The sewer and treatment system are vulnerable to flooding, in particular coastal flooding, including:

- Seven of the nine pump stations and the wastewater treatment plant are vulnerable to coastal flooding.
- System flood vulnerabilities include:
 - Direct damages due to flood inundation, corrosion, mold and structure damage.
 - Disruption or loss of service due to temporary or long-term repair.
 - Unanticipated environmental releases. The risk associated with the Town of Scituate Sewer Collection System and Treatment System can also negatively affect the future Town’s municipal bond rating. The system’s coastal flood vulnerability will increase in the future due to climate change-induced sea level rise and increased precipitation frequency and intensity.

³² Comprehensive Wastewater Resilience Feasibility Study.

- Previous I/I analysis (CDM Smith) identified excessive I/I to the system which has significant implications relative to system treatment capacity and system impacts during coastal flood events.
- March 2018 flood events and observed system response indicates that this level of event (with estimated recurrence interval of 30 to 50 years) approximately represents the functional capacity of the system and that more intense flood events will likely shut down the system with potential significant damage. This probability is unacceptably high for a critical lifeline system and does not meet current industry standards.
- It is recommended that the Town form a Water and Wastewater planning committee and develop a comprehensive long-range plan for water and wastewater management, including wastewater system expansion and incorporation of coastal flood resilience measures.
- A water/sewer rate analysis has been performed (Tighe & Bond) including proforma analyses through the year FY 2028. A clear need for on-going rate increases was identified.

Based on the results of the coastal flood vulnerability assessment, including Inflow and Infiltration (I/I), the wastewater collection system and pump stations and the wastewater treatment plant, the following objectives (in order of priority) have been identified:

- I. Reduction to Elimination of Infiltration/Inflow:
 - a. 4 high priority drainage areas; 4 lower priority drainage areas
- II. Flood Protection of Pump Stations (in order of priority)
 - a. Sand Hills
 - b. Musquashicut
 - c. Herring Brook
 - d. Chain Pond
 - e. Pegotty Beach
 - f. Edward Foster
 - g. Collier Road
- III. Flood Protection of Treatment Plant
 - a. Plant SSCs
 - b. Plant outfalls
 - c. Stormwater outfalls
 - d. Hydraulic gradient
- IV. Enhance Treatment Plant Overflow Capacity
 - a. Liner restoration
 - b. Conversion to constructed wetlands/treatment

3.3 Administrative and Technical Capabilities

Massachusetts (Metro East) Medical Reserve Corps

Scituate utilizes the MA Medical Reserve Corps (MRC) Metro East unit with the objective to strengthen communities by establishing a system for medical and

public health volunteers to offer their assistance and expertise to existing medical and emergency service providers during times of regional/community need.

Scituate Comprehensive Emergency Operations Plan³³

The purpose of the Town of Scituate Comprehensive Emergency Operations Plan (CEOP) is to establish the overall framework for integration and coordination of the emergency management activities across Town government, NGOs, and the private sector in the Town of Scituate when an emergency or disaster occurs. The CEOP provides accepted guidance in advance of required actions and a flexible framework through which the responsible stakeholders may work to prepare for, respond to, recover from, and mitigate the potential hazards identified in the hazard profile for the Town. The CEOP is designed in a manner that facilitates departmental and multi-functional coordination among the Town, regional, state, federal, non-governmental, and private sector organizations before and during emergencies and disasters.

The CEOP is intended to accomplish the following goals:

- Assign responsibilities to agencies, organizations, and individuals for carrying out specific actions during an emergency or disaster.
- Detail the methods and procedures to be used to assess situations and take appropriate actions.
- Provide a process by which emergency response organizations and Town staff can efficiently and effectively mitigate, prepare for, respond to, and recover from emergencies and disasters.
- Identify the responsibilities and roles of Town, state, federal, non-governmental, volunteer, and private sector stakeholders during emergencies or disasters.
- Identify lines of authority and coordination for the management of an emergency or disaster.
- Assign responsibilities to agencies, organizations, and individuals to coordinate mutual aid to supplement Town resources.
- Comply with the applicable statutes and laws governing emergency and disaster management.

The Basic Plan provides an overview of the Town's emergency management program, describes specific hazards faced including the associated risks of these hazards and the capabilities and organizational structure needed to address these hazards. It also identified how and when interactions take place between the Town, state, and federal authorities. The plan also outlines the responsibilities of stakeholders; the phases of preparedness, mitigation, response, and recovery; and how the Town will interact with its businesses, NGOs, and volunteers contributing to the management of emergencies and disasters.

³³ Town of Scituate Comprehensive Emergency Operations Plan.

The Emergency Support Function (ESF) annexes that are included in this plan add details to the framework for how Town organizations coordinate and execute activities related to response. Each annex sets forth concepts and procedures that are aligned with the ESFs outlined in the NIMS to complement accepted national practice.

Emergency Operations Center

The Town maintains a primary and alternate (in the event that the primary location is rendered or deemed unusable) Emergency Operations Center (EOC) which serve as the central point for coordination of the community's emergency management and response activities, maintaining situational awareness about the emergency situation, and facilitating requests for deployment of resources.

Primary EOC:	Scituate Public Safety Complex 800 Chief Justice Cushing Highway Scituate, MA 02066 (781) 544-7903
Interim/Alternate EOC:	Scituate Fire Station 149 Parish Road Scituate, MA 02066 (781) 545-8749
Mass Care Shelter/Reception Center:	Weymouth High School 1 Wildcat Way Weymouth, MA 02190 (781) 337-7500

Mutual Aid System

The Town of Scituate is part of a mutual aid system (the provision of services from one jurisdiction to another) for additional resources from many fronts.

- Community-to-Community Mutual Aid. The Town of Scituate has opted into statewide mutual aid agreements. This allows the Town to request support from any community within the Commonwealth for response activities. It also provides a way for Scituate to share its resources with neighboring communities that are endured by an emergency resource shortfall. Established agreements and plans document the procedures and standards for intrastate mutual aid.
 - The Massachusetts Fire and EMS Mobilization Plan: In a disaster situation, the IC (Fire) initially requests mutual assistance by utilizing the local mutual aid system and when additional mutual aid is necessary then requests are supported from within Plymouth County Control.
- State-to-Community Mutual Aid. MEMA is authorized to make available any equipment, services, or facilities owned or organized by the Commonwealth for use in the Town of Scituate, upon request by the Town Select Board and appointed agents to include the Emergency

Management Director/Fire Chief, or Police Chief when there is a declaration of an emergency by the Governor that includes the Town. Furthermore, MEMA is authorized to reinforce emergency management agencies in areas stricken by emergencies or disasters.

Massachusetts has entered into agreements with the New England states and Canadian provinces to rapidly access resources for both notice and non-notice events:

- New England State Police Compact (NESPC) provides mutual aid and assistance in the event of police emergencies, and to provide for the powers, duties, rights, privileges and immunities of police personnel when rendering such aid.
- Northeastern Forest Fire Protection Compact (NFFPC) provides the means for member states and provinces to cope with fires that might be beyond the capabilities of a single member through information, technology, and resource sharing.
- Emergency Management Assistance Compact (EMAC). EMAC is an interstate mutual aid agreement that covers all 50 states, the District of Columbia, Puerto Rico, Guam, and the U.S. Virgin Islands. The National Emergency Management Association (NEMA) provides administrative support for EMAC. EMAC acts as a complement to the federal disaster response system and may be used in lieu of or in conjunction with federal assistance. The Town, through Massachusetts may receive assistance via EMAC after a state of emergency is declared when resources are not available in the Commonwealth.
- International Emergency Management Assistance Compact (IEMAC). IEMAC is a mutual aid compact which covers the six New England states as well as the Canadian provinces of Quebec, New Brunswick, Prince Edward Island, Nova Scotia, and Newfoundland. IEMAC operates under the same principles as the EMAC, save that the governor of an affected member state does not need to declare a state of emergency before requesting resources through IEMAC.

Emergency Alerts and Warnings

Emergency alert and warning systems are designed to allow the Town to warn the public of impending or current threats or emergencies that will affect the area. Public warning systems communicate critical emergency information to the public during times when other communications systems may not be dependable. Public warnings may be issued during severe weather, flooding, fire, hazardous materials release, terrorist threat, water contamination, and any other threats to life, property, and safety.

Public alerts and warnings are disseminated through specific channels, as appropriate:

- Emergency Alert System (EAS)
- Wireless Emergency Alerts

- Code Red
- NOAA Weather Radio
- The Town Website
- Social Media

Scituate Fire Department: Winter Safety Guidelines

The Town of Scituate's Fire Department put together a document with winter safety guidelines for residents. Emergency numbers for the public to call in winter emergencies are included. The document also covers the following:

- Preparing for possible emergencies before the cold weather hits or a winter storm
- What to do during extreme cold weather events and winter storms
- What to do after cold weather events and winter storms
- What to do if you or someone you know falls through ice or into cold water

Municipal Website

The Town's Emergency Management Agency maintains a municipal webpage hosted on the Town's website that includes a variety of local, state, and regional emergency program information for residents, business owners and tourists, including:

- CodeRED (<https://public.coderedweb.com/CNE/en-US/94F708CA1857>)
Community Notification Enrollment
 - Self-enrollment for notification by local emergency response team in the event of emergency situations or critical community alerts.
- Massachusetts 211 (<https://mass211.org/>)
 - Connects callers to information about critical health and human services available in the community.
- Access and functional needs assessment form (<https://www.scituatema.gov/emergency-management/webforms/access-and-functional-needs-assessment-form>)
- COVID-19 Information (<https://www.scituatema.gov/covid-19-information>)
- Emergency Shelter Information (<https://www.scituatema.gov/scituate-emergency-management-agency/pages/emergency-shelter-information>)
- Heat Wave Safety Checklist (<https://www.scituatema.gov/emergency-management/pages/heat-wave-safety-checklist>)
- Heavy Snow Loads on Roofs (<https://www.scituatema.gov/scituate-emergency-management-agency/pages/heavy-snow-loads-on-roofs>)
- Hurricane Preparedness (<https://www.scituatema.gov/emergency-management/pages/hurricane-preparedness>)
 - Prepare Your Property for a Hurricane (<https://www.scituatema.gov/emergency-management/pages/prepare-your-property-for-a-hurricane>)
- Town Evacuation Form (<https://www.scituatema.gov/emergency-management/webforms/i-have-evacuated>)

- Fire Safety Reminders from Red Cross (https://www.redcross.org/get-help/how-to-prepare-for-emergencies/types-of-emergencies/fire/fire-safety-equipment.html?utm_source=adobe&utm_medium=email&utm_content=nhqfy18sta2conf1&scode=RSC18040E004&subcode=nhqfy18sta2conf1#Smoke-Alarms)
- Tornado Safety Information (<https://www.scituatema.gov/emergency-management/pages/tornado-safety-info>)

The Town's Coastal Management and Flood Hazard Mitigation department maintains a municipal webpage hosted on the Town's website that includes a variety of resources, including:

- FEMA Flood Map Revision Process
https://www.scituatema.gov/sites/g/files/vyhliif3781/f/file/file/fema_flood_map_revision_info_sheet_final.pdf
- Home Elevation Grant Program <https://www.scituatema.gov/flood-hazard-mitigation/files/home-elevation-grant-program>
- Hurricane Preparedness Tips <https://www.scituatema.gov/flood-hazard-mitigation/pages/hurricane-preparedness-tips>
- MEMA Contacts <https://www.mass.gov/orgs/massachusetts-emergency-management-agency>
- Massachusetts Office of Coastal Zone Management
<https://www.mass.gov/orgs/massachusetts-office-of-coastal-zone-management>

The Town's Fire Department maintains a municipal webpage hosted on the Town's website that includes a variety of local, state and regional emergency program information for residents, business owners and tourists, including:

- Bonfire Regulations
(https://www.scituatema.gov/sites/g/files/vyhliif3781/f/file/file/bonfire_regulations.pdf)
- Burning Permit Regulations and Application
(<https://www.scituatema.gov/fire-department/pages/burning-permit-regulations>)
- Fire Safety Topics (<https://www.mass.gov/orgs/department-of-fire-services>)

The Town's Board of Health maintains a municipal webpage hosted on the Town's website that includes a variety of local, state, and regional emergency program information for residents, business owners and tourists.

Town of Scituate, Massachusetts Annual Flood Mitigation Progress Report, 2019³⁴

Foreshore Protection

The Town continues to pursue funding through Federal, state and local opportunities, including utilization of our capital budget and grant applications for drainage projects, to rebuild seawalls, nourish eroded beaches, and retrofit structures vulnerable to storm damage as a means of preserving and protecting public and private property in our flood zones.

Sea Level Rise and Climate Change

Two studies have been conducted for the towns of Scituate, Marshfield, and Duxbury, with a third study soon to be released, identifying the potential effects of sea level rise and possible ways to mitigate its impact. These reports predicted the magnitude of local sea level rise including the effects of land subsidence and storm surge, with long-term implications, and how it might affect public infrastructure, low-lying estuaries and floodplains subject to tidal action, natural resources, businesses, recreational opportunities, local economy and finances, and long-range planning options. Based upon planning horizons of 25, 50, and 75 years, the following sea level rise projections have been provided for Scituate and surrounding towns as follows:

<u>Planning Horizon:</u>	<u>25 Years</u>	<u>50 Years</u>	<u>75 Years</u>
Year:	2038	2063	2088
Total Relative SLR (feet):	1.08	2.80	5.16

FEMA Elevation Program

The Town has continued to apply for Flood Mitigation grants to help property owners elevate homes in the floodplain. The Town recently applied for FEMA Elevation grant funding in 2019 for 1 home elevation, and applied in 2016 for two properties, and five more under the HMGP Grant in 2015. The 2015 HMGP homes have been approved for elevation as well as the 2016 HMA applicants.

Emergency Management

Installation of a power grid shut-off system has been a priority for the Scituate Emergency Management Team. The plan involves isolating power grids in flood-prone and storm sensitive coastal areas. This effort has resulted in Eversource installing a remote electrical shut-off system for all of Humarock. For other vulnerable shore neighborhoods, the Town worked with National Grid to break the coastal streets into six zones from Lighthouse Point to the north end of Oceanside Drive. National Grid engineers moved the current shut-offs to safer areas far enough from the flooding to be accessible during a storm, and close enough to minimize the number of homes impacted.

³⁴ CRS Flood Mitigation Progress Report 2019.

On another public utility hazard mitigation measure, Columbia Gas has worked with the Town concerning the installation of gas flow limiters. These are installed between the main in the street and the service meter. In a case where the meter is damaged and leaking, an inline check valve limits the flow. Installing gas flow limiters in high hazard ocean front areas has reduced the potential damage from escaped gas, improved safety for responders and improved recovery and restoration time.

Outreach and Education

The Town continues to strengthen its outreach and education program efforts. Recent public informational meetings have included:

- Climate Vulnerability Assessment Public Presentation: July 17, 2017
- Humarock Detailed Engineering Designs: June 25, 2018
- Pre-Disaster Outreach: November 15, 2018
- Humarock Easement Results: December 18, 2018
- Coastal Community Assessment Presentation: January 20, 2019
- Downtown Harbor Community Forum: October 29, 2019
- Downtown Harbor Community Forum: March 3, 2020
- Virtual Community Vision Workshop: April 19/April 25, 2020
- Virtual Community Vision Q&A: July 8, 2020

Mapping Storm Tide Pathways in Scituate and Cohasset: Assessing Coastal Vulnerability to Storms and Sea Level Rise

The Town completed a Storm Tide Pathway Analysis in 2019 to supplement the LIDAR base maps with more accurate GPS survey data to map the routes through which 'storm tides' will pass, threatening vulnerable areas with inundation of varying depths. 299 pathways were identified for Scituate and provide town staff and the public with critical information on the precise location of potential flooding to address each individual pathway and prevent future inundation.

Municipal Administration and Staff

The Scituate Select Board, Planning Board, municipal officials and staff all work well together to develop, implement and update policies and plans to promote the safety of its residents and minimize risk to the community.

Scituate Community Response and Mutual Aid

The Town of Scituate has a community response and mutual aid organization called SANDS: Scituate Alliance of Natural Disaster Services. The mission of SANDS is to bring together community, government, faith-based organizations, business, and volunteers committed to making their community become more prepared, resilient and self-sufficient.

Building A Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Under Executive Order 569, as the Commonwealth advances an integrated climate change strategy, Scituate (and many other Massachusetts cities and

towns) is working at the local and regional level on resiliency planning and climate preparedness efforts. In 2018, through a grant from the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA), Scituate completed a Town-wide vulnerability assessment and developed an action-oriented resiliency plan following a Community Resilience Building Workshop. The Town became an MVP-Designated community shortly thereafter.

The Steering Committee agreed upon four guiding principles toward Building a More Resilient Scituate in its climate action approach:

1. Balance growth, preservation, and resiliency to enhance our vibrant community and ensure its livability into the next century and beyond
2. Invest in infrastructure that promotes multiple benefits that address climate risks as well as beautification, economic growth, public programming, and public health.
3. Leverage the resources of multiple disciplines and sectors within municipal departments and across sectors to generate layers of resilience.
4. Approach building a more resilient Scituate as an ongoing effort to ensure Scituate's ongoing success leveraging capital improvement cycles and outside funding cycles.

Scituate's Top Priority Actions

1. **Address the vulnerability of coastal business districts.** Lead a climate vulnerability and resilience workshop with stakeholders, property owners, residents, businesses, and municipal staff and officials for participatory visioning the future with sea level rise and coastal flooding. The goal of the workshop is to educate stakeholders to the current and future risks and ensure stakeholders are active participants in the waterfront's current and future resilience. Front Street is a priority for this action.
2. **Address the vulnerability of Scituate's municipal infrastructure.** A priority could be the Waste Water Treatment Plant, currently in a 1% Annual Chance Flood. Protection measures discussed include earthen berms and other natural shoreline protection as an incremental resilience measure while investigating more significant structural investments that addresses future risk.
3. **Initiate a public outreach and marketing campaign with a sense of urgency on climate change and resilience in Scituate.** The Town has demonstrated results in such an effort, when, during the 2016 drought where resident's behavior shifted sufficiently to mitigate drinking water scarcity during that time.

Coordination with Neighboring Municipalities

The Town of Scituate coordinates with the Towns of Cohasset, Hingham, Norwell, and Marshfield periodically across municipal issues. The Town will continue to coordinate with these communities on natural hazard mitigation planning, specifically any shared resource plans and evacuation plans.

3.4 Financial Capabilities

Federal/State Grant Opportunities

The Town, across all municipal departments, considers and pursues all applicable federal, state and local grant opportunities to assist in implementing hazard mitigation programs, such as FEMA, Housing and Urban Development (HUD CDBG) Program, United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS) and Rural Development Grants, Massachusetts Municipal Vulnerability Preparedness Program, Massachusetts Coastal Resilience Grant Program, Massachusetts Water Quality Grants, GrantWatch, and U.S. Economic Development Administration (EDA).

FEMA Hazard Mitigation Assistance (HMA) Program (HMGP, PDM, BRIC, and FMA) – Since 2015, the Town of Scituate has applied and received approximately \$1,333,158.37 in grant assistance from FEMA for various projects (see Section 2.5 for additional details).

HUD CDBG Program – a flexible program that provides communities with resources to address a wide range of unique community development needs, particularly the Disaster Recovery Assistance Program which provides grants to help cities, counties, and States recover from Presidentially-declared disasters, especially in low-income areas, subject to availability of supplemental appropriations.

USDA NRCS and Rural Development Grants – provides conservation technical assistance, financial assistance, and conservation innovation grants. USDA Rural Development operates over fifty financial assistance programs for a variety of rural applications.

MA MVP Program – provides action grants to communities that are MVP-Certified.

MA Coastal Resilience Grant Program - CZM administers the Coastal Resilience Grant Program to provide financial and technical support for local and regional efforts to increase awareness and understanding of climate impacts, identify and map vulnerabilities, conduct adaptation planning, redesign and retrofit vulnerable public facilities and infrastructure, and restore shorelines to enhance natural resources and provide storm damage protection.

MA Water Quality Grants – financial assistance options available for drinking water, wastewater, septic systems, wetlands and watersheds in Massachusetts.

GrantWatch – a proprietary grant searching engine for non-profits.

USEDA - EDA disaster grants are available under the Economic Adjustment Assistance (EAA) program. EAA funds can be awarded to assist a wide variety of

activities related to disaster recovery, including economic recovery strategic planning grants, and public works construction assistance.

3.5 National Flood Insurance Program

Scituate implements and enforces the state building code and fully participates in the NFIP. Scituate supports natural resource management and protection, which is articulated in the Open Space and Recreation Plan. Scituate understands that participation in the NFIP is an essential step in mitigation flood damage and is working to consistently enforce NFIP compliant policies in order to continue its participation in this program. FEMA has also developed new floodplain mapping for the Town finalized in 2015.

Table 3-1 Actions for Continued Compliance with NFIP below lists those actions that the Town has done and will continue to do and those actions that will be done within the next five years for continued compliance with the NFIP.

Table 3-1 Actions for Continued Compliance with NFIP

Actions (Listed in order of priority)	Done/Ongoing	To be Done
Join the NFIP.	X	
Participate in NFIP training by State and/or FEMA.	X	
Establish mutual aid agreements with neighboring communities to address administering the NFIP following a major storm event.		X
Address NFIP monitoring and compliance	X	
Revise/adopt subdivision regulations and erosion control regulations to improve floodplain management in the community.	X	
Participate in the CRS.	X	
Prepare, distribute, or make available NFIP, insurance and building code explanatory pamphlets or booklets.	X	
Identify and become knowledgeable on non-compliant structures in the community.	X	
Identify and become knowledgeable of submit to rate structures.		X
Identify cause of submit to rate structure and analyze how to prevent non-compliant structures in the future.		X
Inspect foundations at time of completion before framing to determine if lowest floor is at or above BFE.	X	
Require use of elevation certificates.	X	

Report any changes in the Special Flood hazard Area to FEMA within 180 days of change.	X	
Identify and keep track of LOMA/LOMR in the community.	X	
Gain familiarity with community's Flood Insurance Rate Maps.	X	
Address repetitive loss structures.	X	

Source: Scituate HMPT.

3.6 Community Rating System

NFIP's CRS Program is a voluntary program that recognizes and encourages a community's efforts that exceed the NFIP minimum requirements for floodplain management. The CRS program emphasizes three goals:

- the reduction of flood losses
- facilitating accurate insurance rating
- promoting the awareness of flood insurance

By participating in the CRS Program, communities can earn a 5-45% discount for flood insurance premiums based upon the activities that reduce the risk of flooding within the community. The Town of Scituate's current CRS rating is '7' which provides a 15% discount of flood insurance policy owners (effective May 1, 2020).

3.7 Existing Protection Matrix

A summary of the main identified existing and future protection measures presented above are summarized on Table 3-2. These measures constitute the baseline protection that was further evaluated by the Scituate HMPT to determine gaps in Scituate's protection from natural disasters. Goal statements and specific actions were then developed to mitigate the identified gaps in the existing protection. These identified protection measures facilitate the Town of Scituate to implement various hazard mitigation programs, ultimately making the community more resilient.

Table 3-2 Existing Protection Matrix Scituate, MA

Existing Protection	Description	Area Covered	Effectiveness and/or Enforcement	Improvements or Changes Needed
Planning and Regulatory				
Open Space and Recreation Plan 2018				
	Includes goals and objectives relative to the Town's natural resources, particularly water protection (potable and drinking) and land conservation.	Town-wide	Effectiveness: Very Good Enforcement: Recreation Dept. and Commission/Conservation Commission	Continue to Utilize
Waterways Management Plan 2011				
	Includes goals and objectives relative to the Town's natural resources, particularly impacts from climate change to strengthen resilience and adaptability.	Town-wide	Effectiveness: Very Good Enforcement: Waterways Commission/Coastal Management and Flood Hazard Mitigation Dept.	Continue to Utilize
Housing Production Plan 2020				
	Includes requirements that address building outside of the floodplain, watershed protection district, and protecting open space/wetlands/floodplains.	Town-wide	Effectiveness: Good Enforcement: Planning and Development/Housing Authority	Continue to Utilize
Subdivision Regulations				
	Includes regulations to establish subdivision standards and procedures to promote the public health, safety, convenience and general welfare, and to promote safety from fire, flood, failure of impounding structures and impacts within dam break inundation zones, panic and other dangers.	Town-wide	Effectiveness: Good Enforcement: Planning and Development/Planning Board	Continue to Utilize
Town of Scituate Stormwater Regulations 2010/Stormwater Management Bylaw				
	Includes requirements to effectively control stormwater including a low impact development approach to stormwater management and stormwater management performance standards...to implement the Stormwater Management Bylaw.	Town-wide	Effectiveness: Very Good Enforcement: Conservation Commission/Planning Board	Continue to Utilize

Table 3-2 Existing Protection Matrix Scituate, MA

Existing Protection	Description	Area Covered	Effectiveness and/or Enforcement	Improvements or Changes Needed
Planning and Regulatory				
Comprehensive Wastewater Resilience Feasibility Study June				
	Assessed the Town's wastewater facilities vulnerabilities to flooding, including coastal flooding.	Town-wide	Effectiveness: Good Enforcement: DPW Sewer Div.	Continue to Monitor
Scituate Harbor Sustainability and Resilience Master Plan				
	Guides future growth, conservation and infrastructure enhancements over a 25-year planning horizon, with a focus on flood resilience in the Scituate Harbor business district.	Business District	Effectiveness: Good Enforcement: Coastal Management and Flood Hazard Mitigation Dept.	Secure funding to implement recommended improvements
Coastal Erosion, Sediment Transport and Prioritization Management Strategy Assessment for Shoreline Protection August 2016				
	Provides a roadmap that the Town can utilize to proactively plan for projects that will improve the coastal resiliency of the community.	Coastal Areas	Effectiveness: Very Good Enforcement: Waterways Commission/Coastal Management and Flood Hazard Mitigation Dept.	Secure funding to implement recommended improvements
Elevating Roadway Improvements and Dune/Beach Nourishment Along North Humarock for Improved Coastal Resiliency March 2017				
	Developed a conceptual plan for elevating a portion of Central Avenue along northern Humarock Beach and optimizing a dune/beach nourishment design to provide storm damage protection.	North Humarock	Effectiveness: Very Good Enforcement: Waterways Commission/Coastal Management and Flood Hazard Mitigation Dept.	Continue to Monitor
Massachusetts Coastal Erosion Commission Report 2015				
	Included evaluation of impacts of coastal erosion in MA and development of recommendations to reduce, minimize or eliminate the frequency and magnitude of coastal erosion and its impacts	Coastal Areas	Effectiveness: Good Enforcement: Coastal Management and Flood Hazard Mitigation Dept.	Secure funding to implement recommended improvements
Town of Scituate Coastal Community Assessment September				
	Through a series of interviews with community stakeholders, identified a number of actions to remain resilient into the future.	Town-wide	Effectiveness: Good Enforcement: Coastal Management and Flood Hazard Mitigation Dept.	Continue to Utilize

Table 3-2 Existing Protection Matrix Scituate, MA

Existing Protection	Description	Area Covered	Effectiveness and/or Enforcement	Improvements or Changes Needed
Planning and Regulatory				
Massachusetts State Building Code				
	The Massachusetts State Building Code contains many detailed regulations regarding wind loads, earthquake resistant design, flood-proofing and snow loads.	Town-wide	Effectiveness: Most effective for new construction Enforcement: Planning Board/Building and Inspections	Continue to Utilize
Peggotty Beach Managed Retreat Feasibility Study				
	Utilizing a feasibility analysis of managed retreat options for Peggotty Beach.	Peggotty Beach	Effectiveness: Good Enforcement: Coastal Management and Flood Hazard Mitigation Dept.	Continue to Utilize
Scituate 2040 Master Plan Update June 2021				
	Serves as a guide to the Town for future decision-making on actions that will have long-term impacts to the Town's economic, social and physical resiliency.	Town-wide	Effectiveness: Good Enforcement: Planning and Development Dept.	Continue to Utilize
Administrative and Technical				
MA (Metro East) Medical Reserve Corps				
	Strengthens communities by establishing a system for medical and public health volunteers to offer assistance and expertise to existing providers.	Town-wide	Effectiveness: Good Enforcement: Board of Health	Continue to Utilize
Scituate Comprehensive Emergency Operations Plan				
	Provides a framework for a community-wide emergency management system to ensure a coordinated response to emergencies and coordinated support of certain pre-planned events.	Town-wide	Effectiveness: Very Good Enforcement: Emergency Management Director	Continue to Utilize
Municipal Website				
	A municipal webpage hosted on the Town's website that includes a variety of local, state and regional emergency program information for residents, business owners and tourists.	Town-wide	Effectiveness: Very Good Enforcement: Emergency Management Director/IT	Continue to Utilize

Table 3-2 Existing Protection Matrix Scituate, MA

Existing Protection	Description	Area Covered	Effectiveness and/or Enforcement	Improvements or Changes Needed
Administrative and Technical				
Municipal Administration and Staff				
	Municipal officials, staff, Boards and Commissions all work together to develop, implement and update policies and plans to promote the safety of residents and minimize risk to the community.	Town-wide	Effectiveness: Very Good Enforcement: Town Administrator, Select Board, Municipal Department Chairs	Maintain
Scituate Fire Dept. Winter Safety Guidelines				
	Provides guidance for public safety during winter weather/conditions/emergencies.	Town-wide	Effectiveness: Good Enforcement: Fire Dept.	Continue to Utilize
Building a Resilient Scituate - Climate Vulnerability Assessment and Action Plan March 2018				
	The Town has become an MVP-Certified community, and as such is eligible to seek implementation grants through the Commonwealth for any hazard mitigation actions identified as a result of the MVP process.	Town-wide	Effectiveness: Good Enforcement: Planning and Community Development	Continue to Utilize
Coordination with Neighboring Municipalities				
	Coordination to identify applicable efficiencies (resource-sharing and Mutual Aid agreements).	Regional context	Effectiveness: Very Good Enforcement: Emergency Management Director/DPW	Maintain
Town of Scituate, MA Annual Flood Mitigation Progress Report 2019				
	As part of the Town's participation in the NFIP's Community Rating System program, an annual report of mitigation activities is developed.	Town-wide	Effectiveness: Good Enforcement: Coastal Management and Flood Hazard Mitigation Dept.	Maintain
Mapping Storm Tide Pathways in Scituate and Cohasset: Assessing Coastal Vulnerability to Storms and Sea Level Rise				
	Identified 299 pathways through which storm tides will pass threatening vulnerable areas with inundation of varying depths.	Coastal Areas	Effectiveness: Good Enforcement: Coastal Management and Flood Hazard Mitigation Dept.	Maintain

Table 3-2 Existing Protection Matrix Scituate, MA

Existing Protection	Description	Area Covered	Effectiveness and/or Enforcement	Improvements or Changes Needed
Administrative and Technical				
Scituate Community Response and Mutual Aid				
	Scituate Alliance of Natural Disaster Services (SANDS) brings together community stakeholders/partners committed to making their community become more prepared, resilient and self-sufficient.	Town-wide	Effectiveness: Very Good Enforcement: Emergency Management Director	Continue to Utilize
Financial				
Federal/State Grant Opportunities				
	FEMA HMA Program https://www.fema.gov/grants/mitigation	Town-wide		Continue to utilize
	HUD CDBG Disaster Recovery Assistance: https://www.hud.gov/hudprograms/disaster-recovery	Low-income areas.		Continue to utilize
	USDA, Natural Resources Conservation Service (NRCS) Conservation Technical Assistance: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/technical/cta Financial Assistance: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/ Conservation Innovation Grant Programs:	Town-wide		Continue to utilize
	MA MVP Program https://www.mass.gov/municipal-vulnerability-preparedness-mvp-program	Statewide		Continue to utilize
	MA Coastal Resilience Grant Program https://www.mass.gov/service-details/coastal-resilience-grant-program	Statewide		Continue to utilize
	MA Water Quality Grants https://www.mass.gov/info-details/water-resources-grants-financial-assistance	Statewide		Continue to utilize

Table 3-2 Existing Protection Matrix Scituate, MA

Existing Protection	Description	Area Covered	Effectiveness and/or Enforcement	Improvements or Changes Needed
Financial				
	GrantWatch https://www.grantwatch.com/	Statewide		Continue to utilize
	US EDA https://www.eda.gov/funding-opportunities/	Statewide		Continue to utilize

Section 4 Mitigation Strategy

4.1 Introduction

Removing and precluding development from hazardous areas is the best method of mitigation. However, this cannot be the sole focus of hazard mitigation in Scituate. The Town's character and functionality require a level of intimacy with the areas of greatest risk – flood-related, winter-related and wind-related hazard events.

4.2 Mitigation Activities

In completing the risk and vulnerability analyses, the HMPT considered projects and actions that would reduce Scituate's vulnerability to the identified hazards. The 2022 Risk Assessment Matrix (Table 2-1) is the basis for the mitigation actions presented in Section 4.3.

4.3 Mitigation Action Plan

The HMPT considered the goals of this plan and re-prioritized the matrix and the associated actions based on historical damage, safety of the population, property protection and consistency with town wide goals and objectives. Although not based on similar methodologies for prioritization, the new 'Priority Score' for each mitigation action (2022 Plan), is followed by the 2016 Plan prioritization to reflect any changes in the prioritization of actions for this 2022 update by the HMPT (also included in Table 1-1, *2016 Plan Report Card*). Issues and objectives were aligned to public health risks, evacuation and mass care considerations, disruption of essential services and potential economic losses to the town.

The HMPT determined that the identified objectives could be met by considering actions aligned to the following Mitigation Categories:

- Public Education and Awareness
- Property Protection
- Natural Resource Protection
- Structural Projects
- Emergency Services
- Planning and Prevention

The HMPT has worked to set goals and objectives that are bounded by a time frame and are compatible and consistent with state hazard mitigation goals. Upon submittal of this plan to MEMA, the State Hazard Mitigation Committee (SHMC) is expected to review and approve these goals and objectives to ensure consistency with the statewide goals and objectives. The time frames used for this strategy are as follows:

- Short Term = 0 to 6 Months
- Medium Term = 6 to 18 Months
- Long Term = 18 Months to 5 Years

The following actions use the Risk Assessment Matrix (Table 2-1) to identify areas at risk, offer mitigation strategies and consider benefits. Each action offers a discussion of the project and if applicable, includes the options considered. Multiple actions associated with a vulnerable area reflect town priorities and are simply prioritized high, medium or low. If known, the actions include cost estimates and assign responsible parties to lead the efforts to complete the action. The cost ranges used for this strategy are as follows:

- Staff Time – municipal personnel time
- Minimal – less than \$5,000
- Moderate – more than \$5,000, but less than \$25,000
- Significant – over \$25,000

Other relevant departments/agencies that can offer support to the project are also listed. Finally, possible finance options are offered. Once the 2022 update receives FEMA’s ‘Approved Pending Adoption’, the mitigation strategy will be put into motion.

Evaluation/Selection of Mitigation Actions

After reviewing the Town’s identified risks and vulnerabilities to natural hazards, the input/feedback from the public workshop and recommendations from the Town, and the local Capability Assessment, the HMPT selected mitigation actions to incorporate into the 2022 update.

Prioritization of Actions

Due to budgetary constraints and other limitations, it is often impossible to implement all mitigation actions. The HMPT needed to select the most cost-effective actions for implementation first to use resources efficiently and develop a realistic approach toward mitigation risks. The DMA 2000 supports this principle of cost-effectiveness by requiring action plans to follow a prioritization process that emphasizes benefits over costs. DMA 2000 states:

“The mitigation strategy section shall include an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.”

Part 1: Review Benefits and Costs

As part of the planning process, the HMPT utilized Review Tools 1, 2, and 3 associated with each action identified.

Part 2 Prioritize Actions – Quantitative Method, Simple Score

The HMPT utilized Method B: Prioritization using the Social, Technical, Administrative, political, Legal, Economic and Environmental (STAPLEE) criterion Relative Scores, suggested in FEMA’s Hazard Mitigation Planning How-to-Guide Series (Table 4-1).

Table 4-1 STAPLEE Review and Selection Criteria

Category	Criteria
Social	Is the proposed action socially acceptable to the community?
	Are there equity issues involved that would mean that one segment of the community is treated unfairly?
	Will the action cause social disruption?
Technical	Will the proposed action work?
	Will it create more problems than it solves?
	Does it solve a problem or only a symptom?
	Is it the most useful action considering other community goals?
Administrative	Can the community implement the action?
	Is there someone to coordinate and lead the effort?
	Is there enough funding, staff, and technical support available?
	Are there ongoing administrative requirements that need to be met?
Political	Is the action politically acceptable?
	Is there public support both to implement and to maintain the project?
Legal	Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
	Are there legal side effects? Could the activity be construed as a taking?
	Is the proposed action allowed by a comprehensive plan, or must a comprehensive plan be amended to allow the proposed action?
	Will the community be liable for action or lack of action?

	Will the activity be challenged?
Environmental	How will the action affect the environment?
	Will the action need environmental regulatory approvals?
	Will it meet local and state regulatory requirements?
	Are endangered or threatened species likely to be affected?
Economic	What are the costs and benefits of this action?
	Do the benefits exceed the costs?
	Are initial, maintenance, and administrative costs considered?
	Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private)?
	How will this action affect the fiscal capability of the community?
	What burden will this action place on the tax base of the local economy?
	What are the budget and revenue effects of this activity?
	Does the action contribute to other community goals, such as capital improvements or economic development?
	What benefits will the action provide?

Part 3 Documentation of the Process

Each of the mitigation actions were scored against each of the STAPLEE criteria outlined above with a numerical score. These numbers were then totaled and developed into an overall priority score. The ranking of the Priority Score is a guideline for when the Town should begin acting on the identified strategies, or actions (Table 4-2).

The STAPLEE Method includes a cost-benefit review as part of the Mitigation Actions prioritization process. A more detailed cost-benefit analysis will be done, at the time of application, for those proposed Mitigation Actions that the Town applies for funding under the Pre-Disaster Grant Program and Hazard Mitigation Grant Program.

Table 4-2 STAPLEE Analysis

2022 Action Number	Title	Cost/ Benefit	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total	Prioritization
PUBLIC EDUCATION AND AWARENESS											
2022 - 1	Address the vulnerability of coastal business districts.	Cost	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	14	
2022 - 2	CRS participation and implementation of public information program.	Cost	2	2	2	1	2	2	0	11	24
		Benefit	2	2	2	2	2	2	1	13	
2022 - 3	Maintain and expand technical and financial assistance and communication and outreach to communities to support local efforts to address the challenges of erosion, flooding, storms, sea level rise, and other climate change impacts.	Cost	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	14	
2022 - 4	Implement recommendations from the Coastal Community Assessment, including:(1) develop and adopt a long-term coastal resilience vision and strategy (2) review/summarize/present key actions that have been taken in recent years to improve coastal resilience (3) convene community conversations about managed retreat.	Cost	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	14	
2022 - 5	Initiate a public outreach and marketing campaign with sense of urgency on climate change and resilience in Scituate.	Cost	2	2	1	2	2	2	0	11	25
		Benefit	2	2	2	2	2	2	2	14	
2022 - 6	Develop and implement an annual Disaster Mitigation Workshop for businesses, industry, and shoreline users.	Cost	2	2	1	2	2	2	0	11	25
		Benefit	2	2	2	2	2	2	2	14	

PROPERTY PROTECTION											
2022 - 7	Elevate Vulnerable Structures.	Cost	1	2	2	2	-1	-1	2	7	20
		Benefit	2	2	2	2	1	2	2	13	
NATURAL RESOURCE PROTECTION											
2022 - 8	Evaluate vulnerability to salt water intrusion for wells and aquifers near the coastline, and vulnerability of water pump stations to a 1% and a 0.2% Annual Chance Flood and prioritize infrastructure improvements that enhance resilience.	Cost	2	2	2	2	2	2	2	14	28
		Benefit	2	2	2	2	2	2	2	14	
2022 - 9	Relocate or elevate well field pump houses that are in the flood zone in the future.	Cost	2	2	2	2	2	2	2	14	28
		Benefit	2	2	2	2	2	2	2	14	
2022 - 10	Revise Stormwater bylaw so all new and redevelopment captures at least first 1" of rain onsite, using Low Impact Development and other strategies, or evaluate the design standards that consider sea level rise and/or the 1% Annual Chance Flood.	Cost	1	1	1	-1	-1	1	0	2	9
		Benefit	1	1	1	1	1	1	1	7	
2022 - 11	Salt Marsh Restoration: (1) Contract a formal evaluation on salt marsh health/long-term monitoring/maintenance. (2) Initiate short-term marsh restoration techniques such as invasive removals. (3) Evaluate Wetlands	Cost	2	2	2	2	2	2	2	14	28

	Protection Act/land acquisition opportunities to plan for, protect, and/or acquire land for horizontal marsh migration. (4) Perform recommendations for salt marsh restoration based upon formal evaluation. (5) Collaborate with the Town of Marshfield on salt marsh evaluation and restoration.	Benefit	2	2	2	2	2	2	2	2	14	
2022 - 12	Protect Scituate's natural shoreline and coastal features and waters, which are a prime recreational and economic resource, and which give the Town its identity as a very appealing seaside community.	Cost	2	2	2	2	2	2	2	2	14	28
		Benefit	2	2	2	2	2	2	2	2	14	
2022 - 13	Enhance the natural beauty of the Town's landscape by protecting existing open space, while promoting appropriate use: Prepare management plans for Scituate's public beaches.	Cost	2	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	2	14	
STRUCTURAL PROJECTS												
2022 - 14	For additional interim protection prior to raising critical infrastructure and residences, consider building soft shoreline protection features such as earthen berms with living shorelines to protect buildings located in low energy flood zones.	Cost	2	1	2	1	1	1	1	0	8	21
		Benefit	2	2	2	2	2	1	2	2	13	
2022 - 15	Continue beach and dune nourishment.	Cost	2	2	2	1	2	1	0	10	24	
		Benefit	2	2	2	2	2	2	2	14		
2022 - 16	Install sacrificial dunes, sand fences, seawalls and other coastal infrastructure investments.	Cost	2	2	2	2	-1	2	2	11	24	
		Benefit	2	2	2	2	2	2	2	14		
2022 - 17		Cost	2	1	1	1	-1	-1	0	3	17	

	Implement recommended Shore Protection Measures by Study Area.	Benefit	2	2	2	2	2	2	2	2	14	
2022 - 18	Implement resilience recommendations for Scituate Harbor.	Cost	2	1	1	1	-1	-1	0	3	17	
		Benefit	2	2	2	2	2	2	2	2		14
2022 - 19	Implement a flood mitigation measures for pump stations and the Wastewater Treatment Plant: (1) Form a water/wastewater planning committee (2) Flood protection of pump stations. (3) Flood protection of WWTP/Enhance overflow capacity.	Cost	2	2	2	2	2	2	2	2	14	28
		Benefit	2	2	2	2	2	2	2	2	14	
EMERGENCY SERVICES												
2022 - 20	Prepare a list of key utility facilities that require critical power restoration and inform the power company of locations of the facilities to expedite electricity restoration during an outage.	Cost	2	2	2	2	1	2	2	2	13	27
		Benefit	2	2	2	2	2	2	2	2	14	
2022 - 21	Create a Heat Emergency Plan.	Cost	2	2	2	2	2	2	0	12	26	
		Benefit	2	2	2	2	2	2	2	14		
2022 - 22	Set aside five moorings for emergency and storm usage.	Cost	2	2	2	2	2	2	0	12	24	
		Benefit	2	2	2	2	2	2	0	12		
PLANNING AND PREVENTION												
2022 - 23	Address the needs of the Old Oaken Bucket Pond Dam. (1) Complete a Phase 1 Inspection Report of the dam. (2) Complete recommended improvements based on most recent Phase 1. (3) Update the February 1994 EAP.	Cost	2	2	2	2	2	2	2	2	14	28
		Benefit	2	2	2	2	2	2	2	2	14	

2022 - 24	Obtain Storm Tide Pathways Study Data, then Implement Recommendations: (1) . Increase public awareness of the importance of healthy coastal wetlands and natural coastal processes, and the need to protect these resources. (2) Use best available tools to understand the potential impact of storm surge on public and private property, sensitive infrastructure and natural resources, and to develop strategies and plans to avoid, minimize or mitigate adverse impacts.	Cost	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	14	
2022 - 25	Identify municipal personnel to become a Certified Floodplain Manager.	Cost	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	14	
2022 - 26	Establish and Maintain a Climate Resilience Task Force that works across departments and commissions for a comprehensive approach across sectors.	Cost	2	2	2	2	2	2	2	14	28
		Benefit	2	2	2	2	2	2	2	14	
2022 - 27	Establish neighborhood Resilience Zones for specialized community-based participatory planning where residents, businesses, and neighborhood stakeholders create a shared vision of positive change/adaptation to current and future risks.	Cost	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	14	
2022 - 28	Perform a community-based participatory visioning process for Scituate's Waterfront around Front Street.	Cost	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	14	

2022 - 29	Seek out new funding opportunities to implement climate resilience investments.	Cost	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	14	
2022 - 30	Evaluate all zoning, bylaws, and codes for barriers to improvements for climate resilience measures in the built, natural, and landscaped environment (i.e., minimize impervious surfaces using pervious pavers, minimize parking requirements, and shared driveways, use low Impact Development and Green Infrastructure, etc.). Ensure consistency with MA 2020 Model Floodplain Bylaw by creating a Coastal Flood Plain District Bylaw.	Cost	2	2	1	1	1	1	0	8	22
		Benefit	2	2	2	2	2	2	2	14	
2022 - 31	Consider establishing a Coastal Business Improvement District.	Cost	2	2	1	1	1	1	0	8	22
		Benefit	2	2	2	2	2	2	2	14	
2022 - 32	Evaluate culverts, bridges, river and stream crossings for effectiveness in water flow during floods. Use MA Stream Crossing Standards.	Cost	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	14	
2022 - 33	Create a municipal working group to inform design standards on raising roads in response to current and future coastal flooding. Also consider the implications for commercial, industrial, and residential egress.	Cost	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	14	
2022 - 34	Support green building standards and energy use reduction for retrofits and new development. Incentivize when possible.	Cost	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	14	

2022 - 35	Explore feasibility of implementing Community Shared Solar (CSS) to institute Town-wide renewable energy efforts.	Cost	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	2	
2022 - 36	Implement renewable back-up energy strategies for municipal buildings and critical infrastructure such as wells and waste water pump stations.	Cost	1	1	1	1	1	1	0	6	20
		Benefit	2	2	2	2	2	2	2	2	
2022 - 37	Support the implementation and study of pilot projects for innovative solutions and the encouragement of learning by doing and experimentation in shoreline management approaches.	Cost	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	2	
2022 - 38	Establish programs and policies for buy-outs, land swaps, relocations, and transfers of development rights to allow for relocation.	Cost	1	1	1	1	1	1	0	6	20
		Benefit	2	2	2	2	2	2	2	2	
2022 - 39	Implement recommendations for Future Phase II Sewer System Evaluation Survey (SSES)	Cost	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	2	
2022 - 40	Prepare an 'After the Storm Recovery Plan' for the Community.	Cost	2	2	2	2	2	2	2	14	28
		Benefit	2	2	2	2	2	2	2	2	

Source: Scituate HMPT.

PUBLIC EDUCATION AND AWARENESS

Action #1

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Address the vulnerability of coastal business districts.

Lead a climate vulnerability and resilience workshop with stakeholders, property owners, residents, businesses, and municipal staff and officials for participatory visioning the future with sea level rise and coastal flooding. The goal of the workshop is to educate stakeholders to the current and future risks and ensure

stakeholders are active participants in the waterfront's current and future resilience. Front Street is a priority for this action.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Planning and Development
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Increased understanding of vulnerabilities, Improved resilience
- Vulnerable Area: Public Awareness/Education, Coastal Areas, Public/Private Property

Action #2

...2016 Plan

CRS participation/implementation of public information program.

Implement actions related to flood awareness and prevention to improve the current CRS rate.

- Action Type: Planning, Pre-Disaster
- Priority Score: 24
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Planning and Development
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Increased understanding of vulnerabilities, Improved resilience
- Vulnerable Area: Public Awareness/Education, Coastal Areas, Public/Private Property

Action #3

...Report of the Massachusetts Coastal Erosion Commission, Volume 1, Findings and Recommendations December 2015/Scituate 2040 Master Plan Update 2021

Maintain and expand technical and financial assistance and communication and outreach to communities to support local efforts to address the challenges of erosion, flooding, storms, sea level rise, and other climate change impacts.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Planning and Development/DPW/Master Plan Implementation Committee
- Time Frame: Medium Term

- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Increased understanding of vulnerabilities, Improved resilience
- Vulnerable Area: Public Awareness/Education, Coastal Areas, Public/Private Property

Action #4

...Town of Scituate Coastal Community Assessment, September 2018/Scituate 2040 Master Plan Update 2021

Implement recommendations from the Coastal Community

(1) Assessment, including:

- I. **Through a robust community engagement process, develop and adopt a long-term coastal resilience vision and strategy.** The questions facing Scituate are not about whether to take action on the coast, but how, when, and where to act. The community is eager to see these questions answered strategically and to be meaningfully involved in the process, so the long-term plan is community-developed and community-supported.
- II. **Review, summarize, and present in a simple format, the key actions that have been taken in recent years to improve coastal resilience in Scituate, and the relevant recommendations that have been made in previous studies and plans.** Currently, there is no easy way to find out what Scituate already knows about its own coastal vulnerabilities and strengths, what solutions have already been implemented or considered, and what remains unknown.
- III. **Convene community conversations about managed retreat.** Many in the community want to talk about managed retreat, but it's a topic that can only be approached sensitivity and skillfully, and without any expectation of a given outcome. We propose a possible path for supporting conversations on this challenging issue.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Planning and Development, DPW, Master Plan Implementation Committee
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Increased understanding of vulnerabilities, Improved resilience
- Vulnerable Area: Public Awareness/Education, Coastal Areas, Public/Private Property

Action #5

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Initiate a public outreach and marketing campaign with a sense of urgency on climate change and resilience in Scituate.

The Town has demonstrated results in such an effort, when, during the 2016 drought where resident's behavior shifted sufficiently to mitigate drinking water scarcity during that time.

- Action Type: Planning, Pre-Disaster
- Priority Score: 25
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Planning and Development
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Increased understanding of vulnerabilities, Improved resilience
- Vulnerable Area: Public Awareness/Education, Coastal Areas, Public/Private Property

Action #6

...HW

Develop and implement an annual Disaster Mitigation Workshop for businesses, industry, and shoreline users.

Prior to the start of hurricane season (June 1st), the Harbormaster (s) will:

- Develop and implement an education/training program for harbor and shorefront users that includes the distribution of storm readiness checklist for boaters.
- Update accurate lists of principal marine interests and pumpout facilities including marinas, waterfront businesses, neighboring Harbormasters, Coast Guard, Towing and Salvage Companies, environmental teams, key vessel operators, and fishing cooperatives.

- Action Type: Planning, Pre-Disaster
- Priority Score: 25
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Harbormaster, Planning and Development
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Increased understanding of vulnerabilities, Improved resilience
- Vulnerable Area: Public Awareness/Education, Coastal Areas, Public/Private Property

PROPERTY PROTECTION

Action #7

...2016 Plan/Coastal Erosion, Sediment Transport and Prioritization Management Strategy Assessment for Shoreline Protection, August

2016/Elevating Roadway Improvements and Dune/Scituate 2040 Master Plan Update 2021

Elevate Vulnerable Structures

The Town has completed a number of homes and utility elevations to date. This program has proven generally popular and the Town plans to continue to offer funding obtained through federal, state and regional grants. The program criteria will be modified as needed throughout the life of this plan.

- Action Type: Planning, Pre-Disaster
- Priority Score: 17
- Lead: Coastal Management and Flood Hazard Mitigation Dept./Building Official
- Supporting: Coastal Advisory Commission/ DPW/Planning and Development/Master Plan Implementation Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP/EOEEA Grants
- Cost Estimate: Significant
- Benefit: Improved public safety, Minimized impacts from flooding, Improved resilience
- Vulnerable Area: Repetitive Loss properties, Coastal Areas, Public/Private Property

NATURAL RESOURCE PROTECTION

Action #8

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018/Scituate 2040 Master Plan Update 2021

Evaluate vulnerability to salt water intrusion for wells and aquifers near the coastline, and vulnerability of water pump stations to a 1% and a 0.2% Annual Chance Flood and prioritize infrastructure improvements that enhance resilience.

- Action Type: Planning, Pre-Disaster
- Priority Score: 28
- Lead: DPW Water Division
- Supporting: Water Resources Committee, Master Plan Implementation Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Protection of natural resources
- Vulnerable Area: Municipally-owned Infrastructure, Coastal Areas

Action #9

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018/Scituate 2040 Master Plan Update 2021

Relocate or elevate well field pump houses that are in the flood zone in the future.

- Action Type: Planning, Pre-Disaster
- Priority Score: 28
- Lead: DPW Water Division
- Supporting: Water Resources Committee/Master Plan Implementation Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Protection of natural resources
- Vulnerable Area: Municipally-owned Infrastructure, Coastal Areas

Action #10

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Revise Stormwater bylaw so all new and redevelopment captures at least first 1” of rain onsite, using Low Impact Development and other strategies, or evaluate the design standards that consider sea level rise and/or the 1% Annual Chance Flood.

- Action Type: Planning, Pre-Disaster
- Priority Score: 9
- Lead: Planning and Development
- Supporting: Conservation Commission, Building Official, Planning Board
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Protection of natural resources, Minimized impacts from flooding
- Vulnerable Area: Natural Resources

Action #11

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018/Scituate 2040 Master Plan Update

Salt Marsh Restoration:

- I. Contract a formal evaluation on salt marsh health and long-term monitoring and maintenance such as citizen science groups.
- II. Initiate short-term marsh restoration techniques such as invasive removals.
- III. Evaluate Wetlands Protection Act and land acquisition opportunities to plan for, protect, and/or acquire land for horizontal marsh migration.

- IV. Perform recommendations for salt marsh restoration based upon formal evaluation.
- V. Collaborate with the Town of Marshfield on salt marsh evaluation and restoration.

- Action Type: Planning, Pre-Disaster
- Priority Score: 28
- Lead: Coastal Resource Commission
- Supporting: Coastal Advisory Committee/Master Plan Implementation Committee
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget, FEMA/EOEEA grants
- Cost Estimate: Municipal Personnel Time
- Benefit: Protection of natural resources, Minimized impacts from flooding
- Vulnerable Area: Coastal Areas, Natural Resources

Action #12

...Open Space and Recreation Plan 2018/Scituate 2040 Master Plan Update 2021

Protect Scituate's natural shoreline and coastal features and waters, which are a prime recreational and economic resource, and which give the Town its identity as a very appealing seaside community.

- I. Continue to coordinate various town departments and local task forces to develop bylaws and best practices that relate to preserving and enhancing the natural shoreline and coastal resources in the current status and with expected impacts of sea level rise. Explore the use of beach nourishment to maintain attractive beaches well suited to local recreation.
- II. Continue to strongly enforce Town bylaws discouraging new construction in the floodplain.
- III. Implement recommendations from the Coastal Assessment Study and other recent and ongoing studies, as applicable to shoreline protection.
- IV. Initiate public education on shoreline and coastal resources protection, as well as issues affecting public use of the beach. Include lawn service contractors, landscapers, and other businesses whose actions impact the coastline.
- V. Work with surrounding communities on long-term planning to ensure regional cooperation on solutions to coastal hazards.

- Action Type: Planning, Pre-Disaster
- Priority Score: 28
- Lead: Conservation Commission
- Supporting: Coastal Advisory Commission, DPW, Master Plan Implementation Committee
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget, FEMA/MEMA grants

- Cost Estimate: Municipal Personnel Time
- Benefit: Protection of natural resources, Minimized impacts from flooding
- Vulnerable Area: Coastal Areas, Natural Resources

Action #13

...Open Space and Recreation Plan 2018/Report of the Massachusetts Coastal Erosion Commission, Volume 1, Findings and Recommendations December 2015

Enhance the natural beauty of the Town's landscape by protecting existing open space, while promoting appropriate use.

Prepare management plans for Scituate's public beaches.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Coastal Management and Flood Hazard Mitigation
- Supporting: Scituate Beach Commission
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Moderate
- Benefit: Protection of natural resources
- Vulnerable Area: Coastal Areas, Natural Resources

STRUCTURAL PROJECTS

Action #14

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018/Scituate 2040 Master Plan Update 2021

For additional interim protection prior to raising critical infrastructure and residences, consider building soft shoreline protection features such as earthen berms with living shorelines to protect buildings located in low energy flood zones.

- Action Type: Planning, Pre-Disaster
- Priority Score: 21
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Coastal Advisory Commission/Master Plan
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Improved public safety, Minimized impacts from flooding, Improved resilience
- Vulnerable Area: Repetitive Loss properties, Municipally-owned Infrastructure/Buildings, Coastal Areas, Public/Private Property

Action #15

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018/Scituate 2040 Master Plan Update 2021

Continue beach and dune nourishment.

- Action Type: Planning, Pre-Disaster
- Priority Score: 24
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Scituate Beach Commission/Coastal Advisory Commission, DPW, Master Plan Implementation Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Improved public safety, Minimized impacts from flooding, Improved resilience
- Vulnerable Area: Repetitive Loss properties, Municipally-owned Infrastructure/Buildings, Coastal Areas, Public/Private Property

Action #16

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018/Scituate 2040 Master Plan Update 2021

Install sacrificial dunes, sand fences, seawalls and other coastal infrastructure investments.

- Action Type: Planning, Pre-Disaster
- Priority Score: 24
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Scituate Beach Commission/Coastal Advisory Commission, DPW, Master Plan Implementation Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Improved public safety, Minimized impacts from flooding, Improved resilience
- Vulnerable Area: Repetitive Loss properties, Municipally-owned Infrastructure/Buildings, Coastal Areas, Public/Private Property

Action #17

...Coastal Erosion, Sediment Transport and Prioritization Management Strategy Assessment for Shoreline Protection, August 2016/Elevating Roadway Improvements and Dune/Beach Nourishment Along North Humarock for Improved Coastal Resiliency, March 28, 2017/Scituate 2040 Master Plan Update 2021

Implement Recommended Shore Protection Measures by Study Area³⁵

Ongoing threats to public and private infrastructure continue to be a major concern for the Town, as both long-term coastal erosion and relative sea level rise in the coming decades will continue to exacerbate regional storm damage. With this understanding, the Town pursued a long-term planning effort to identify ongoing coastal erosion and the sediment transport pathways that govern this process, screen potential shore protection strategies to determine their applicability, assess both historical storm damage and needed shore improvement costs by shoreline reach, and prioritize shore protection and/or other management strategies based on costs and storm protection benefits.

For all study areas, elevating homes and buildings in high hazard flood areas above base flood elevations is recommended. Also, in all the shore protection approaches, appropriate public access easements will need to be acquired from the involved property owners if the project is publicly funded.

Minot Beach

- Beach nourishment/Perched cobble beach 1,200 feet:
 - \$600,000 construction costs
 - \$2.2 million over a 50-year life cycle
- Seawall improvements:
 - \$6.7 million over a 50-year life cycle

Increasing the height of the seawall by 2 feet can reduce overtopping rates to levels that will not damage pavement under existing climate conditions and does prevent damage under hypothetical SLR scenarios.

North Scituate Beach/Seaside Road

- North Scituate Beach - beach nourishment (Phase 1 2,900 feet):
 - \$8.2 million construction costs
 - \$58.9 million over a 50-year life cycle
- Surfside Road – beach nourishment (2,700 feet):
 - \$4.9 million
 - \$35.2 million over a 50-year life cycle

Nourishment has the benefit of providing improved storm protection, providing a sediment source for adjacent shorelines (Mann Hill, Egypt Beaches), and creating a recreational resource.

Mann Hill Beach

- Managed retreat (move homes landward):
 - > \$1.5 million
- Managed retreat (buyout all homes):

³⁵ Coastal Erosion, Sediment Transport, and Prioritization Management Strategy Assessment for Shoreline Protection August 2016.

- > 2.3 million

Beach nourishment would improve the longevity of development along Mann Hill Beach would be improved, although continued erosion of the cobble dune land form will be difficult and./or cost-prohibitive to maintain in the long-term.

Egypt Beach

- Construction of a boulder dike (2,300 feet):
 - \$1.42 million construction costs

The boulder dike alone does not provide protection from severe storm events; however, it is determined that a rejuvenated sediment supply via nourishment provided further to the north will allow long-term accretion along the landward side of the dike.

Oceanside Drive...consider first the incremental improvements/repairs completed through several EOEEA coastal grants (1st grant to repair 760 feet of seawall/\$4.0 million...2nd grant to repair/replace 525' of seawall/\$3.0 million...3rd grant to repair 640 feet of seawall/\$2.5 million)

- Rehabilitation of seawall and revetment (10,000 feet):
 - \$80.2 million
 - \$199.6 million over a 50-year life cycle
- Drainage improvements for the basins:
 - \$4.0 million

Beach nourishment could be implemented along Oceanside Drive at a lower cost, there are obstacles in providing lasting protection for the northern portions of the study area and the possibility on inhibiting and/or blocking navigational pathways into Scituate Harbor and outfalls from the basins.

Cedar Point

- Rehabilitation of seawall and revetments (1,300 feet):
 - \$10.4 million
 - \$25.9 million over a 50-year life cycle
- Beach nourishment/Cobble berm (1,200 feet)
 - \$4.6 million
 - \$17.1 million over a 50-year life cycle
- Boulder dike (1,200 feet):
 - \$720,000

Benefits include increased storm protection, upgraded condition of the existing coastal engineering structures, and improved emergency egress.

First Cliff

- Maintain the status quo:
 - \$10.3 million over a 50-year life cycle

Edward Foster Road

- Rehabilitation of seawall and revetment (1,300 feet):
 - \$10.4 million
 - \$25.9 million over a 50-year life cycle

The rehabilitated structure can protect against increased wave overtopping due to potential sea level rise and maintain the emergency egress between First and Second Cliff.

Second Cliff

- Maintain the status quo:
 - \$13.3 million over a 50-year life cycle

Peggotty Beach

- Managed retreat (move homes landward):
 - > \$4.8 million
- Managed retreat (buyout all homes):
 - > 8.7 million

Peggotty Beach represents one of the most highly erosional areas along the Scituate coast, where overwash of the low-lying barrier beach has caused readily observable landward migration of the barrier beach into the salt marsh system along its landward limit.

Third Cliff

- Maintain the status quo:
 - \$26.8 million over a 50-year life cycle

Fourth Cliff

- Maintain the status quo:
 - \$4.3 million over a 50-year life cycle

Humarock North/South

- Elevate Central Avenue (4,800 feet):
 - \$3.6 million
- Humarock North only beach nourishment (50-foot berm/3,500 feet):
 - \$4.1 million
 - \$160.7 million over a 50-year life cycle
- Humarock North only beach nourishment (100-foot berm/3,500 feet):
 - \$6.3 million
 - \$130.2 million over a 50-year life cycle
- Humarock North/South beach nourishment (50-foot berm/10,500 feet):
 - \$12.3 million
 - \$70.8 million over a 50-year life cycle
- Humarock North/South beach nourishment (100-foot berm/10,500 feet):
 - \$26.4 million

- \$120.0 million over a 50-year life cycle
- Construction of dunes stand-alone (4,800 feet):
 - \$9.6 million
 - \$78.2 million over a 50-year life cycle

Benefits include increased storm protection, eliminating the need for post-storm roadway clearing along Central Avenue, providing an increased littoral sediment supply to protect down-drift beaches, providing a greater recreational resource, and preventing a breach between Humarock and Fourth Cliff.

- Action Type: Planning, Pre-Disaster
- Priority Score: 17
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Scituate Beach Commission/Coastal Advisory Commission/ DPW/ Master Plan Implementation Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP/EOEEA Grants
- Cost Estimate: Significant
- Benefit: Improved public safety, Minimized impacts from flooding, Improved resilience
- Vulnerable Area: Repetitive Loss properties, Municipally-owned Infrastructure/Buildings, Coastal Areas, Public/Private Property

Action #18

Scituate Harbor Sustainability and Resilience Master Plan, August 2020/Scituate 2040 Master Plan Update 2021

Implement Resilience Recommendations for Scituate Harbor

The resilience recommendations for Scituate Harbor focus on an incremental elevation and adaptation of the coastal perimeter of the district that integrates with an elevated Harborwalk, new coastal amenities and open space features. This approach is combined with the protection and improvement of the natural systems that provide protection to the district and adjacent shoreline at the Kent Street marshes and the banks of the Satuit Brook. The addition of green infrastructure in the district to protect and improve water quality of the harbor. All of these investments are focused on reducing the pathways of ocean water into the business district.

- I. A new elevated waterfront park amenity at Cole Parkway that provides flood protection.
- II. New seating and coastal amenities along an elevated Scituate Harborwalk from Cole Parkway to the Town Pier, evaluating the feasibility of potential for extension to the Scituate Marine Park.
- III. Elevation of sea walls and bulkhead edges that already exist in the district
- IV. Floodproofing the waterside of buildings along Front Street and adding infrastructure for deployable floodgates between gaps in buildings.

V. Exploration of roadway infrastructure resilience improvements at the Satuit Brook bridge and Edward Foster Road and bridge.

- Action Type: Planning, Pre-Disaster
- Priority Score: 17
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: DPW Highway Division
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Improved public safety, Minimized impacts from flooding, Improved resilience
- Vulnerable Area: Repetitive Loss properties, Municipally-owned Infrastructure/Buildings, Coastal Areas, Public/Private Property

Action #19

...Scituate Comprehensive Wastewater Treatment Resilience Feasibility Study/
Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan,
March 2018/Scituate 2040 Master Plan Update 2021

Implement Flood Mitigation Measures for the Identified Pump Stations and the Wastewater Treatment Plant

The sewer collection and treatment system are a critical Scituate lifeline system and failure, or disruption of system operations will result in significant impacts to the Town and its residents.

- Seven of the nine pump stations and the wastewater treatment plant are vulnerable to coastal flooding.
- System flood vulnerabilities include:
 - Direct damages due to flood inundation, corrosion, mold and structure damage.
 - Disruption or loss of service due to temporary or long-term repair.
 - Unanticipated environmental releases.

Based on the results of the coastal flood vulnerability assessment the following objectives (in order of priority) have been identified:

- I. Form a water/wastewater planning committee to develop a long-range management plan for the resilience of water/wastewater within the Town.**
- II. Reduction to Elimination of Infiltration/Inflow**
 - Addressed in a separate mitigation action.
- III. Flood Protection of Pump Stations (in order of priority)**
 - a. Sand Hills**
 - Near-term measures: (\$25,000)
 - i. Personnel entryway: install full flood door (\$9,600)

- ii. Wall penetrations: flood proof any structural/wall penetrations (\$1,200)
- iii. Air and exhaust vents: raising and/or extension of ventilation ducts that are below or at the maximum flood elevation (\$5,000)
- iv. Air and exhaust vents: raising and/or extension of ventilation ducts that are below or at the maximum flood elevation (\$5,000)
- v. Gas meter: provide shielding to protect the gas meter components from debris collision in the event of projected maximum flooding (\$3,000)
- vi. Gas Meter: relocate the gas meter assembly above the anticipated flood elevation (\$5,000)

Long-term measures: (\$225,000 without flood wall protection options included)

- vii. Pump motors: Elevate pump motors (\$20,000)
- viii. Electric Meter: relocate the electric meter assembly above the anticipated flood elevation (\$5,000)
- ix. Gas generator: raise generator above maximum flood elevation (\$150,000)
- x. Control Panels: relocate or elevate electrical components (\$50,000)
- xi. Flood Wall Protection Options:
 - 1. Option 1: 8' high aqua-fence with concrete pad/stop log gate (\$225,000)
 - 2. Option 2: 8' high stop logs with concrete pad (\$235,000)
 - 3. Option 3: 8' high sheet piling flood wall with concrete pad/stop log gate (\$382,000)

*Sand Hills Pump Station was prioritized separately from the other pump stations, as well as the Treatment Plant due to their significance in maintaining a functional system.

b. Musquashicut

Near-term measures: (\$35,000)

- i. Wet/Dry well hatches: replace hatches with watertight hatches (\$20,000)
- ii. Personnel entry: install full flood door (\$4,800)
- iii. Wet well vent: raise wet well vent pipe above flood elevation (\$1,000)
- iv. Air and exhaust vents: raising and/or extension of ventilation ducts that are below or at the maximum flood elevation (\$1,200)

- v. Gas meter: provide shielding to protect the gas meter components from debris collision in the event of projected maximum flooding (\$3,000)
- vi. Gas Meter: relocate the gas meter assembly above the anticipated flood elevation (\$5,000)

Long-term measures: (\$387,000)

- vii. Electric Meter: relocate the electric meter assembly above the anticipated flood elevation (\$5,000)
- viii. Gas generator: raise generator above maximum flood elevation (\$150,000)
- ix. Control Panels: relocate or elevate electrical components (\$50,000)
- x. Flood Wall Protection Options:
 1. Option 1: 8' high aqua-fence with concrete pad/stop log gate (\$225,000)
 2. Option 2: 8' high stop logs with concrete pad (\$235,000)
 3. Option 3: 8' high sheet piling flood wall with concrete pad/stop log gate (\$382,000)

c. *Herring Brook*

Near-term measures: (\$104,000)

- i. Wet/Dry well hatch covers: replace hatches with watertight hatches (\$20,000)
- ii. Gas generator: raise generator above maximum o elevation (\$75,000)
- iii. Wet well vent: raise wet well vent pipe above flood elevation (\$1,000)
- iv. Gas meter: provide shielding to protect the gas meter components from debris collision in the event of projected maximum flooding (\$3,000)
- v. Gas Meter: relocate the gas meter assembly above the anticipated flood elevation (\$5,000)

Long-term measures: (\$387,000 without flood wall protection options included)

- vi. Electric Meter: relocate the electric meter assembly above the anticipated flood elevation (\$5,000)
- vii. Control Panels: relocate or elevate electrical components (\$50,000)
- viii. Flood Wall Protection Options:
 1. Option 1: 7' high sheet piling flood wall with concrete pad/stop log gate (\$156,250)
 2. Option 2: 7' high stop logs with concrete pad/stop log gate (\$162,500)

3. Option 3: 8' high sheet piling flood wall with concrete pad/stop log gate (\$232,000)

d. *Chain Pond*

Near-term measures: (\$33,200)

- i. Wet/Dry well hatches: replace hatches with watertight hatches (\$25,000)
- ii. Personnel entry: install full flood door (\$4,000)
- iii. Wall penetrations: flood proof any structural/wall penetrations (\$1,200)
- iv. Gas Meter: provide shielding to protect the gas meter components from debris collision in the event of projected maximum flooding (\$3,000)

Long-term measures: (\$160,000)

- v. Electric Meter: relocate the electric meter assembly above the anticipated flood elevation (\$5,000)
- vi. Gas generator: raise generator above maximum flood elevation (\$150,000)
- vii. Gas Meter: relocate gas meter assembly above the anticipated flood elevation (\$5,000)

e. *Peggotty Beach*

Near-term measures: (\$36,200)

- i. Wet/Dry well hatches: replace hatches with watertight hatches (\$20,000)
- ii. Personnel entry: install full flood door (\$4,800)
- iii. Wet well vent: raise wet well vent pipe above flood elevation (\$1,000)
- iv. Wall penetrations: flood proof any structural/wall penetrations (\$1,200)
- v. Air and exhaust vents: raising and/or extension of ventilation ducts that are below or at the maximum flood elevation (\$1,200)
- vi. Gas meter: provide shielding to protect the gas meter components from debris collision in the event of projected maximum flooding (\$3,000)
- vii. Gas Meter: relocate the gas meter assembly above the anticipated flood elevation (\$5,000)

Long-term measures: (\$205,000 without flood wall protection options included)

- viii. Electric Meter: relocate the electric meter assembly above the anticipated flood elevation (\$5,000)
- ix. Gas generator: raise generator above maximum flood elevation (\$150,000)

- x. Control Panels: relocate or elevate electrical components (\$50,000)
- xi. Flood Wall Protection Options:
 - 1. Option 1: 7' high aqua-fence with concrete pad (\$156,250)
 - 2. Option 2: 7' high stop-logs with concrete pad (\$162,500)
 - 3. Option 3: 8' high sheet piling flood wall with concrete pad/stop log gate (\$232,000)

f. *Edward Foster*

Near-term measures: (\$36,200)

- i. Wet/Dry well hatches: replace hatches with watertight hatches (\$20,000)
- ii. Personnel entry: install full flood door (\$4,800)
- iii. Wall penetrations: flood proof any structural/wall penetrations (\$1,200)
- iv. Wet well vent: raise wet well vent pipe above flood elevation (\$1,000)
- v. Air and exhaust vents: raising and/or extension of ventilation ducts that are below or at the maximum flood elevation (\$1,200)
- vi. Gas meter: provide shielding to protect the gas meter components from debris collision in the event of projected maximum flooding (\$3,000)
- vii. Gas Meter: relocate the gas meter assembly above the anticipated flood elevation (\$5,000)

Long-term measures: (\$205,000 without flood wall protection options included)

- viii. Electric Meter: relocate the electric meter assembly above the anticipated flood elevation (\$5,000)
- ix. Gas generator: raise generator above maximum flood elevation (\$150,000)
- x. Control Panels: relocate or elevate electrical components (\$50,000)
- xi. Flood Wall Protection Options:
 - 1. Option 1: 8' high aqua-fence with concrete pad/stop log gate (\$225,000)
 - 2. Option 2: 8' high stop logs with concrete pad (\$235,000)
 - 3. Option 3: 8' high sheet piling flood wall with concrete pad/stop log gate (\$382,000)

g. *Collier Road*

Near-term measures: (\$29,000)

- i. Wet/Dry well hatches: replace hatches with watertight hatches (\$20,000)
- ii. Personnel entry: install full flood door (\$4,800)
- iii. Wall penetrations: flood proof any structural/wall penetrations (\$1,200)
- iv. Gas Meter: provide shielding to protect the gas meter components from debris collision in the event of projected maximum flooding (\$3,000)

Long-term measures: (\$205,000)

- v. Control panels: relocate or elevate electrical components (\$50,000)
- vi. Gas generator: raise generator above maximum flood elevation (\$150,000)
- vii. Gas Meter: relocate gas meter assembly above the anticipated flood elevation (\$5,000)

All identified pump stations recommended for future pump station replacement Benefit-Cost Analysis and Feasibility Study.

*Musquashicut, Herring Brook, Chain Pond, Peggotty Brook, Edward Foster and Collier Road pump stations were prioritized together.

IV. Flood Protection of Treatment Plant/Enhance Treatment Plant Overflow Capacity

- a. Plant SSCs
- b. Plant outfalls
- c. Stormwater outfalls
- d. Hydraulic gradient
- e. Liner restoration
- f. Conversion to constructed wetlands/treatment

Short-term measures: (\$947,000 without deployable flood protection options included)

- i. Electric/Instrumentation Manholes: 10 @ \$10,000 each (\$100,000)
- ii. Effluent Outfall 20" Pipe: Install backflow prevention/20" duckbill valve (\$17,000)
- iii. Stormwater Outfall 15" Pipe: Install backfill prevention/15" duckbill valve (\$25,000)
- iv. Stormwater Outfall 6" Pipe: Install backflow prevention/6" duckbill valve (\$5,000)
- v. Lined Emergency Storage Lagoon: Liner lagoon restoration (\$800,000)
- vi. Deployable Perimeter Flood Protection:
 - 1. Option 1: Aqua-Fence System (\$950,000)
 - 2. Option 2: Stop Logs System (\$775,000)

Long-term measures: (\$400,000 without permanent flood wall protection options included)

- vii. Pump station: new pump station with generator upgrade to manage hydraulic head (\$400,000)
- viii. Permanent Flood Wall Protection:
 - 1. Option 1: 8' high sheet piling flood wall (1,000 LF) with concrete pad (\$2,000,000)
 - 2. Option 2: 8' high sheet piling wall (1,370 LF) with concrete pad (\$27,400,000)

*Treatment Plant was prioritized separately from other system components due to its significance in maintaining a functional system.

- Action Type: Planning, Pre-Disaster
- Priority Score: 28
- Lead: DPW Sewer Division
- Supporting: Master Plan Implementation Committee, Water/Wastewater Planning Committee (once established)
- Time Frame: Near/Short-term recommendations: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Improved resilience, Minimized impacts/damages/costs, Protection of natural resources
- Vulnerable Area: Municipally-owned Infrastructure/Buildings, Coastal Areas, Natural Resources

EMERGENCY SERVICES

Action #20

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Prepare a list of key utility facilities that require critical power restoration and inform the power company of locations of the facilities to expedite electricity restoration during an outage.

- Action Type: Planning, Pre-Disaster
- Priority Score: 27
- Lead: DPW
- Supporting: Eversource
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Improved Public Safety/Health/Welfare, Continuation of critical services
- Vulnerable Area: Public Utilities, Municipally-owned Infrastructure

Action #21

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018/Scituate 2040 Master Plan update 2021

Create a Heat Emergency Action Plan.

Prioritize creating cooling centers for those most vulnerable to heat, systematic communications strategies, and back-up energy plans. Stress the importance of tree canopy for cooling buildings (reduce clear-cutting) and anticipate heat damage to roads.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Health Dept.
- Supporting: Planning and Development, Conservation Commission, Master Plan Implementation Committee
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Improved Public Health/Safety/Welfare
- Vulnerable Area: Public Awareness/Education

Action #22

...Waterways Management Plan 2011

Set aside five moorings for emergency and storm usage.

- Action Type: Planning, Pre-Disaster
- Priority Score: 24
- Lead: Harbormaster
- Supporting: Fire Dept.
- Time Frame: Short Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Improved emergency services
- Vulnerable Area: Coastal Areas

PLANNING AND PREVENTION

Action #23

...HW

Address the needs of the Old Oaken Bucket Pond Dam:

A. Complete a Phase 1 Inspection/Report of the dam.

The last Phase 1 Inspection on file was completed August 16, 2012. This dam is classified as a significant hazard structure. According to ODS regulations, a Phase 1 Inspection should be conducted every five years,

which is now past due for this structure.

B. Complete recommended improvements based on most recent Phase 1 Inspection Report

- Repair leak in fish ladder wall at end near stone training wall.
- Repair loose stones in upstream spillway embankment and stones that have fallen out of training walls.
- Remove all trees and brush including roots from spillway and upstream embankment.
- Install weed control fabric and rip-rap on spillway between primary and auxiliary weirs.
- Remove large boulders from streambed inside the culvert.

C. Develop an Emergency Action Plan (EAP) for Old Oaken Bucket Pond Dam.

Old Oaken Bucket Pond Dam is a Significant hazard dam owned by the Town of Scituate. An EAP is a plan of action to reduce potential property damage and loss of life in an area affected by a dam failure. An EAP identifies the areas, structures, facilities and roads that could be affected by dam failure. It also establishes a monitoring system which can activate the plan. Lastly, it identifies the corresponding official(s), organizations, and agencies along with their responsibilities regarding implementation of the plan. The most recent available Phase 1 Inspection Report (August 16, 2012) notes an EAP date February 1994 which should be updated.

- Action Type: Mitigation, Pre-Disaster
- Priority Score: 28
- Lead: DPW Engineering Division
- Supporting: Planning and Development/Conservation
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget/FEMA and MEMA Grants
- Cost Estimate: Significant
- Benefit: Protection of property, protection of life/infrastructure (water supply)
- Vulnerable Area: Municipally-owned Infrastructure

Action #24

...Mapping Storm Tide Pathways in Scituate and Cohasset: Assessing Coastal Vulnerability to Storms and Sea Level Rise

Obtain Storm Tide Pathways Study Data, then Implement Recommendations:

A. Increase public awareness of the importance of healthy coastal wetlands and natural coastal processes, and the need to protect these resources.

Education materials should be aimed at shoreline property owners, among others, to discuss the importance of natural sediment transport processes, and best practices for vegetation management, erosion management, and buffer protection, etc. This effort should be coordinated with the development of permitting guidance.

B. Use best available tools to understand the potential impact of storm surge on public and private property, sensitive infrastructure and natural resources, and to develop strategies and plans to avoid, minimize or mitigate adverse impacts.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Coastal Advisory Commission, DPW
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget/General Fund
- Cost Estimate: Municipal Personnel Time
- Benefit: Protection of property, Protection of life/infrastructure, Increased awareness of vulnerabilities, Accelerated evacuation
- Vulnerable Area: Coastal Areas

Action #25

...HW

Identify municipal personnel to become a Certified Floodplain Manager

Personnel from the Building/Community Development/Marine and Environmental Affairs department should become a Certified Floodplain Manager (CFM) through the Association of State Floodplain Managers. In addition to providing floodplain coordination information to the public, a CFM can assist with floodplain mapping, elevation certificates and floodplain mitigation alternatives.

- Action Type: Planning and Pre-Disaster
- Priority Score: 26
- Lead: Building Official
- Supporting: Planning and Development
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Institutional awareness of hazards for contractors/homeowners, Increased property protection, Improved resilience
- Vulnerable Area: Municipally-owned Infrastructure, Repetitive Loss Properties

Action #26

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Establish and Maintain a Climate Resilience Task Force that works across departments and commissions for a comprehensive approach across sectors. Task force to assess all plan recommendations for coastal and climate resilience, prioritize mitigation actions, and identify and pursue funding for project implementation.

- Action Type: Planning, Pre-Disaster
- Priority Score: 28
- Lead: Planning and Development
- Supporting: Coastal Management and Flood Hazard Mitigation Dept.
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Improved resilience/communication
- Vulnerable Area: Climate Resilience

Action #27

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Establish neighborhood Resilience Zones for specialized community-based participatory planning where residents, businesses, and neighborhood stakeholders create a shared vision of positive change/adaptation to current and future risks.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Planning and Development
- Supporting: Coastal Management and Flood Hazard Mitigation Dept.
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Improved resiliency/communication
- Vulnerable Area: Climate Resilience

Action #28

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Perform a community-based participatory visioning process for Scituate's Waterfront around Front Street.

Include business owners, residents, fishermen, and other stakeholders to collectively create solutions for the future of Front Street that address current and future coastal flooding in addition to public benefits and economic growth.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Coastal Management and Flood Hazard Mitigation Dept
- Supporting: Planning and Development
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Institutional awareness of hazards for contractors/homeowners, Increased property protection, Improved resilience
- Vulnerable Area: Coastal Areas

Action #29

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Seek out new funding opportunities to implement climate resilience investments. These may include local surcharges similar in concept to the Community Preservation Act that can provide a dedicated source of funding for climate improvement projects.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Planning and Development
- Supporting: Coastal Management and Flood Hazard Mitigation Dept.
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Improved resiliency/communication
- Vulnerable Area: Climate Resilience

Action #30

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Evaluate all zoning, bylaws, and codes for barriers to improvements for climate resilience measures in the built, natural, and landscaped environment (i.e., minimize impervious surfaces using pervious pavers, minimize parking requirements, and shared driveways, use low Impact Development and Green Infrastructure, etc.). Ensure consistency with MA 2020 Model Floodplain Bylaw by creating a Coastal Flood Plain District Bylaw.

- Action Type: Planning, Pre-Disaster
- Priority Score: 22
- Lead: Planning and Development

- Supporting: Coastal Management and Flood Hazard Mitigation Dept., Planning Board
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Improved resilience
- Vulnerable Area: Climate Resilience

Action #31

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Consider establishing a Coastal Business Improvement District.

This could be a consistent source of revenue that could fund climate resilience improvements projects in addition to creating public programming and encouraging business patronage along the waterfront.

- Action Type: Planning, Pre-Disaster
- Priority Score: 22
- Lead: Planning and Development
- Supporting: Economic Development Commission
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Improved resilience, Economic development
- Vulnerable Area: Climate Resilience

Action #32

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Evaluate culverts, bridges, river and stream crossings for effectiveness in water flow during floods. Use MA Stream Crossing Standards.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: DPW Engineering Division
- Supporting: Coastal Management and Flood Hazard Mitigation Dept.
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Institutional awareness of hazards for contractors/homeowners, Increased property protection, Improved resilience
- Vulnerable Area: Municipally-owned Infrastructure, Repetitive Loss Properties

Action #33

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018/Scituate 204 Master Plan Update 2021

Create a municipal working group to inform design standards on raising roads in response to current and future coastal flooding. Also consider the implications for commercial, industrial, and residential egress.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: DPW Engineering Division
- Supporting: Building Official/Master Plan Implementation Committee
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Municipal Personnel Time
- Benefit: Protection of property. Protection of life/infrastructure, Increased awareness of vulnerabilities, Accelerated evacuation
- Vulnerable Area: Municipally-owned infrastructure

Action #34

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Support green building standards and energy use reduction for retrofits and new development. Incentivize when possible.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Building Official/Planning and Development
- Supporting: Renewable Energy Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Moderate
- Benefit: Energy use reductions
- Vulnerable Area: Public/Private Property, Public Utilities

Action #35

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Explore feasibility of implementing Community Shared Solar (CSS) to institute Town-wide renewable energy efforts.

CSS can provide solar energy benefits to residents, non-profits, and businesses that are unable to install solar on their own properties while reducing Town-wide carbon emissions.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Building Official, Planning and Development

- Supporting: Renewable Energy Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants/US DOE
- Cost Estimate: Moderate
- Benefit: Energy use reductions, Improved resilience
- Vulnerable Area: Public/Private Property, Public Utilities, Climate Resilience

Action #36

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Implement renewable back-up energy strategies for municipal buildings and critical infrastructure such as wells and waste water pump stations.

- Action Type: Planning, Pre-Disaster
- Priority Score: 20
- Lead: Building Official, Planning and Development
- Supporting: Renewable Energy Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants/US DOE
- Cost Estimate: Significant
- Benefit: Energy use reductions, Improved resiliency, Continuation of critical services
- Vulnerable Area: Municipally-owned Buildings/Infrastructure

Action #37

...Report of the Massachusetts Coastal Erosion Commission, Volume 1, Findings and Recommendations December 2015

Support the implementation and study of pilot projects for innovative solutions and the encouragement of learning by doing and experimentation in shoreline management approaches.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Coastal Management and Flood Hazard Mitigation
- Supporting: Coastal Advisory Commission, DPW
- Time Frame: Long Term
- Financing Options: FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Improved public safety, Property protection, Protection of natural resources
- Vulnerable Area: Coastal Areas

Action #38

...Scituate 2040 Master Plan Update (June 2021)

Establish programs and policies for buy-outs, land swaps, relocations, and transfers of development rights to allow for relocation.

- Action Type: Planning, Pre-Disaster
- Priority Score: 20
- Lead: Coastal Management and Flood Hazard Mitigation
- Supporting: Planning and Development/Master Plan Implementation Committee
- Time Frame: Long Term
- Financing Options: FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Improved public safety, Property protection, Protection of natural resources
- Vulnerable Area: Coastal Areas

Action #39

...Scituate Flow Monitoring Program and Infiltration/Inflow Analysis, CDM Smith, 2016.

Implement Recommendations for Future Phase II Sewer System Evaluation Survey (SSES)

The next step in the Town's I/I program is to begin to investigate and locate the sources of infiltration and inflow in the areas identified as contributing excessive flow (SSES). The results of the SSES program will provide the Town with a roadmap for implementation of I/I removal and capital improvements program. Area 4-2 completed...sewer service in this area has been entirely replaced with the Cedar Point Sewer Replacement Project.

Task 1: Flow Isolation and CCTV Inspection of Sewers for high-priority sub-areas (4-1, 5-1, and 6-1) and low-priority sub-areas exceeding the infiltration threshold (2-1), divided into two parts:

- Flow Isolation – Flow isolation is used to document the extent of infiltration entering the sewer system on a reach-to-reach basis. This work is performed during the night-time hours (11:00 PM – 6:00 AM) when sanitary flows are typically at their lowest and during dry weather to gain an understanding as to the extent of infiltration entering a sewer pipe. The results of the program will help determine those sewer reaches that should be further evaluated under a CCTV inspection program.
- CCTV Inspection – CCTV inspection includes cleaning and follow-up televising to gain visual documentation of sewer pipe defects that might contribute excessive flows. Given the potential for rainfall derived inflow and infiltration (RDII) influenced flows in certain areas, it is recommended that, in addition to a traditional program, that certain areas be CCTV inspected during rainfall

events and/or during periods of high tide to document the presence of RDII and I/I from private sources. If available, the Town can utilize their equipment to minimize follow-up investigations costs. Area 6-1CCTV and SSES report completed.

Task 2: Manhole Inspection Program for high priority sub-areas (4-1, 5-1, and 6-1) and low priority sub-areas (1-1, 2-1, 5-2, and 7-2). The inspections shall include visually identifying and quantifying sources of extraneous flow entering through defects such as pipe connections, defective shelves, or leaking walls.

Task 3: Smoke Testing Program for the remaining low priority sub areas exceeding the inflow threshold (1-1 and 7-2) shall occur during the summer/fall to help locate potential inflow sources and to aid in the further stages of inflow removal. This smoke testing will help to target where to implement inflow remediation programs such as dye testing, CCTV inspection of sewer service connections, and house-to-house programs...Areas 2-1, 3-1, 4-1, 5-1, 5-2, and 6-1 preliminary study and smoke testing completed. Further CCTV inspections, design, and engineering needs to occur.

Task 4: Multi-Sensor Inspection (MSI) for approximately 13,400 linear feet of the 18-inch to 36-inch diameter reinforced concrete main interceptor. This will also determine the structural condition of the interceptor (sub-areas 1-1 and 3-1) and help measure the potential pipe deterioration from hydrogen sulfide.

Task 5: Community Relations Program for high priority sub-areas (4-1, 5-1, and 6-1) and low priority sub-areas (1-1, 2-1, 5-2, and 7-2). Program includes public outreach by providing notifications for affected homeowners prior to commencement of the field work.

Task 6: SSES Report. Using the data from these investigations, the final SSES report with rehabilitation recommendations will be generated.

See table below for a summary of estimated costs for an SSES program and follow-up rehabilitation for each basin (sub-area). The extent of the required rehabilitation will not be known until the SSES program is completed, therefore a range of costs for rehabilitation construction have been provided.

Meter	Priority	Priority Ranking ¹	Length (ft)	I/I	Construction Range ^{3,4,5,6}	
				Investigations ²	Total Low Cost	Total High Cost
				Total		
4-2	High	1	4,724	\$ 20,000	\$ 700,000	\$ 1,700,000 ⁷
5-1	High	2	9,223	\$ 25,000	\$ 1,400,000	\$ 1,900,000
6-1	High	3	21,068	\$ 55,000	\$ 3,000,000	\$ 4,200,000
4-1	High	4	14,735	\$ 40,000	\$ 2,100,000	\$ 3,000,000
Subtotal			49,750	\$ 140,000	\$ 7,200,000	\$ 9,100,000
5-2	Low	5	15,999	\$ 40,000	\$ 1,900,000	\$ 2,800,000
2-1	Low	6	19,424	\$ 45,000	\$ 2,300,000	\$ 3,500,000
1-1	Low	7	29,971	\$ 115,000	\$ 3,000,000	\$ 4,600,000
7-2	Low	8	20,190	\$ 55,000	\$ 2,300,000	\$ 3,500,000
Subtotal			85,584	\$ 255,000	\$ 9,500,000	\$ 14,400,000

Notes

1. Priority ranking based on the subarea's total I/I divided by the inch-miles. Based on MassDEP guidelines, subareas 2,2 3-1, 7-1 and 8-1 were not recommended for further inspection.
2. I/I Investigations cost includes flow isolation, cleaning and CCTV inspection, smoke testing, manhole inspections, and multi-sensor inspection of the main interceptor (where applicable). Cost does not include follow-up investigations such as house-to-house inspections and dye testing.
3. High priority subareas assumes 10%-15% of mainline sewer will need to be open cut replaced and 50%-70% will need to be cured-in-place pipe (CIPP) lined. Also assumes that 50%-70% of the manholes will need to be rehabilitated and 50%-70% of sewer services will need to be open cut replaced.
4. Low priority subareas assumes 7.5%-12.5% of mainline sewer will need to be open cut replaced and 40%-60% will need to be cured-in-place pipe (CIPP) lined. Also assumes that 40%-60% of the manholes will need to be rehabilitated and 40%-60% of sewer services will need to be open cut replaced.
5. Cost does not include main interceptor rehabilitation. This cost should not be estimated until a multi-sensor inspection is completed.
6. Construction cost includes construction contingency, engineering and permitting, bidding, construction services and police. Costs are in August 2016 dollars.
7. High cost for subarea 4-2 includes replacement of existing gravity system with new low pressure sewers and grinder pumps.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: DPW Sewer Division
- Supporting: DPW Engineering Division
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget/FEMA, MVP Grants
- Cost Estimate: Significant
- Benefit: Improved capacity of sewer system, Minimized potential for environmental impacts
- Vulnerable Area: Municipally-owned Infrastructure

Action #40

...HW

Prepare an 'After the Storm Recovery Plan' for the Community.

The Town should utilize the opportunity of a disaster to improve its disaster

resilience. Once critical life and safety issues and vital public services have been addressed and re-established, emphasis should be placed on the long-term recovery of the community, balancing the need to rebuild rapidly and return to normal against the objective of building back better and stronger.

Additional items for consideration as part of the Plan's development should include:

- A. Completion of Community Assessments
 - B. Recovery and Reconstruction Bylaw
 - C. Debris Management Plan
- Action Type: Planning, Pre-Disaster/Post-Disaster
 - Priority Score: 28
 - Lead: Planning and Development
 - Supporting: DPW, Planning Board/Building Dept.
 - Time Frame: Medium Term
 - Financing Options: Municipal Operating Budget, FEMA/MVP Grants
 - Cost Estimate: Moderate
 - Benefit: Improved resiliency, accelerated recovery
 - Vulnerable Area: Emergency Response/Recovery

Section 5 Plan Implementation and Maintenance

5.1 Implementation, Evaluation, and Revision of Plan

Implementation

The HMPT realized that assigning a time frame to each recommended mitigation action is important so that activities can be coordinated with other important governmental functions, such as committee meetings and budget hearings. Assigned time frames also provide input to a project plan used for tracking the progress of all activities. Once the 2022 update receives FEMA's 'Approved Pending Adoption', the mitigation strategy will be put into motion and the Select Board will adopt the Plan (within one year of FEMA's approval). It is recognized that progress on plan implementation may vary dependent upon available funding and capacity of staff to complete assigned tasks.

Evaluation

The Town Administrator will bring the HMPT together annually to review the status of the mitigation actions. Within two months of this meeting, a status report will be given to the Planning Board and Select Board. Progress will be reviewed annually at advertised public hearings held by the Scituate Planning Board. It is advantageous the annual review be conducted prior to the Town's annual budget process so any locally funded projects can be considered in the budget process.

Revision

As per 44 CFR S 201.6(d)(3), the Plan will be reviewed and revised to reflect progress in local mitigation efforts and changes in priorities and resubmitted for approval within 5 years in order to continue to be eligible for mitigation project grant funding. In order to ensure that the plan remains current, the HMPT, which consists of representatives from the Planning Department, EMA, Public Works, Board of Health, and Conservation Commission will meet annually. The Plan will also be evaluated and updated after a disaster, or as funding opportunities arise for the actions and projects identified in the plan. Any updates will be reviewed and submitted to MEMA upon local approval to ensure that the state hazard mitigation strategy remains current.

The Town of Scituate Hazard Mitigation Plan will be incorporated into the Town's Comprehensive Emergency Management Plan (CEMP) when updated and for consistency.

5.2 Continued Public Involvement

The Town of Scituate will continue public involvement in the plan maintenance process by:

- The approved/adopted plan will be posted on the Town's web site;
- The annual meeting of the HMPT to review the implementation of the plan will be posted/advertised as a public meeting as per Town guidelines; and

- The HMPT will include the public in the preparation of the five-year update using the same public participation process as in the development of this update.

DRAFT

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Appendix A – Maps

Location Map (1-1)

Flood Hazard Areas (2-1)

Earthquakes (2-2)

Hurricanes/Tornadoes (2-3)

Average Annual Snowfall (2-4)

Critical Facilities/Vulnerable Populations (2-5)

Critical Facilities NW Quad (2-5.1)

Critical Facilities SW Quad (2-5.2)

Critical Facilities NE Quad (2-5.3)

Critical Facilities SE Quad (2-5.4)

Vulnerable Populations NW Quad (2-5.5)

Vulnerable Populations SW Quad (2-5.6)

Vulnerable Populations NE Quad (2-5.7)

Vulnerable Populations SE Quad (2-5.8)

Sea Level Rise Various Scenarios (2-6)

Sea Level Rise Scenarios NW Quad (2-6.1)

Sea Level Rise Scenarios SW Quad (2-6.2)

Sea Level Rise Scenarios SNE Quad (2-6.3)

Sea Level Rise Scenarios SE Quad (2-6.4)

SLOSH (2-7)

SLOSH NW Quad (2-7.1)

SLOSH SW Quad (2-7.2)

SLOSH NE Quad (2-87.3)

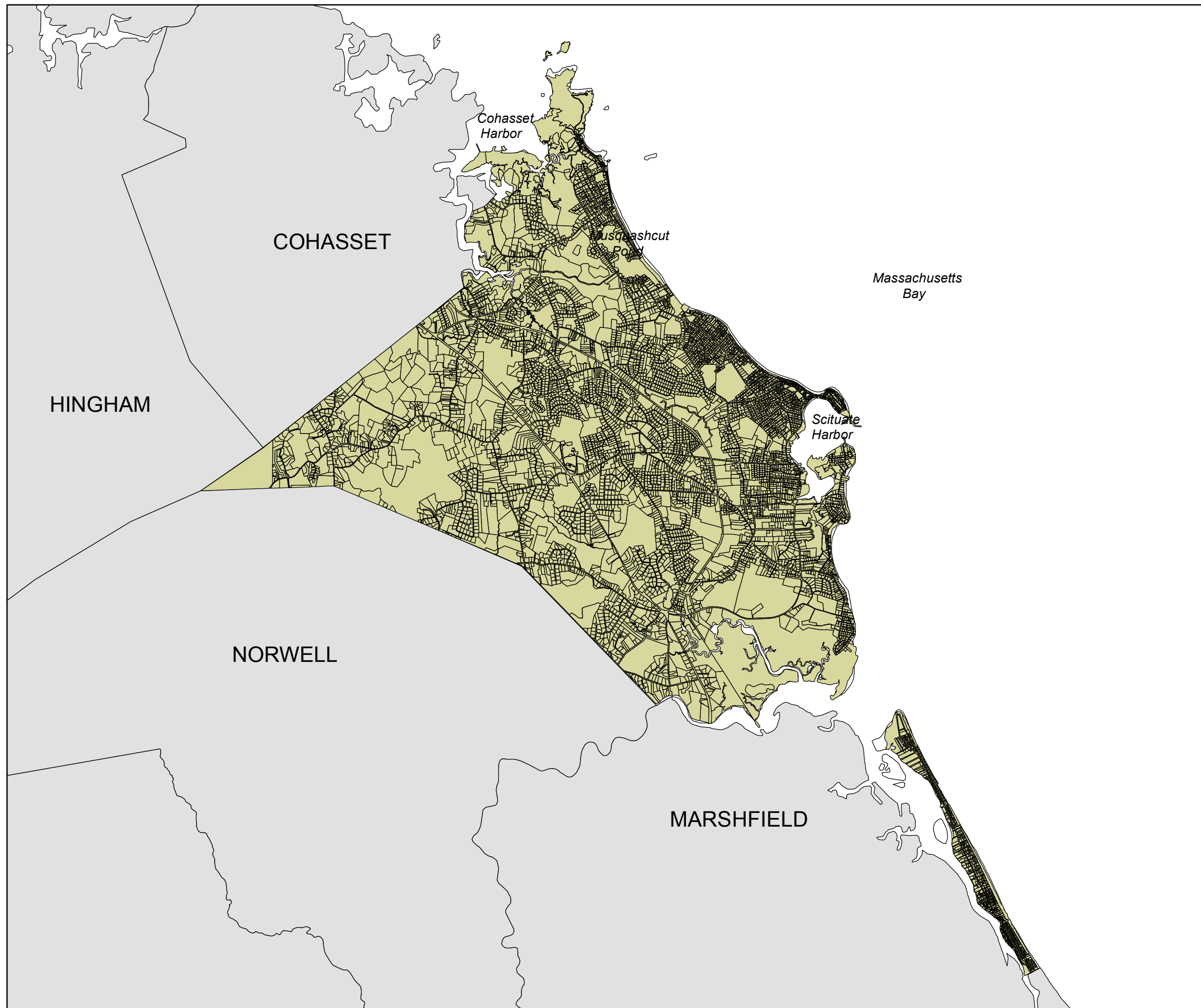
SLOSH SE Quad (2-7.4)

Table A-1 Critical Facilities

ID	Site Name	ID	Site Name	ID	Site Name
1	Us Post Office	33	Cudward Cemetery	66	Well #19
2	Fire Station/Alternate EOC	34	Fairview Cemetery	67	Well #17A
3	Fire Station	35	Union Cemetery	68	Well #22
4	US Post Office	36	Old St. Mary's Cemetery	69	Chain Pond Pump Station
5	Bell Atlantic	37	Herring Brook Reservoir Dam	70	Sand Hills Pump Station
6	Scituate Town Hall	38	Hunters Pond Dam	71	First Parish Pump Station
7	Environmental Police	39	Scituate Harbor Yacht Club	72	Country Way Pump Station
8	Police Dept.	40	Satuit Boat Club	73	Herring Brook Pump Station
9	Fire Station	41	State Launch Ramp	74	Collier Road Pump Station
10	US Post Office	42	Scituate Harbor Marina	75	Peggotty Beach Pump Station
		43	Satuit Water Front Club	76	First Cliff Pump Station
12	US Post Office	44	Cole Park Way Launching Ramp	77	Transfer Station
13	North River Waste Water Pollution Control Plant	45	Driftway Park Launching Ramp	78	Pincin Hill Standpipe
14	Heliport	46	North River Marina	79	Walnut Hill Booster Pump Station
15	North Scituate Sub Station	47	Scituate Animal Shelter	80	Wind Turbine
16	Scituate Sub Station	48	Driftway Animal Hospital	81	MBTA North Scituate Station
17	Scituate WWTP	49	Francis R. Powers Bridge	82	Well 18B
18	DPW Garage	50	Sea St. Bridge	83	Water Dept. Business Office
19	Scituate Public Library	51	Cell Towers	84	Mann Lot Booster Station
20	Harbor Master	52	Cell Towers	85	Humarock Post Office
21	Coast Guard	53	Cell Towers	86	Village at South River Marina
22	Anderson Fuel	54	Mount Hope Cemetery	87	MBTA Commuter rail tracks
23	Stand Pipe	56	Groveland Cemetery	88	Seawalls
24	Fitts Mill	57	Scituate Reservoir	89	Water Division Standpipe
25	MBTA Greenbush Layover Station	58	Boat Launch	90	Musquashicut Ave. Pump Station
26	Cell Towers	59	Scituate Marine Park	91	Old Oaken Bucket Pond Dam
27	North River Bridge	60	Driftway Medical Facility Center	92	Edward Foster Bridge
28	Town Pier	61	Jacob Hatch Building	95	NOAA Facility
29	Village Market	62	Pier 44 (Town-owned)	93	Susan Phippen House
30	Watson Family Hardware	63	Ellis House	94	Scituate Senior Center/Food Pantry
31	CVS	64	Well #10	97	Front St. Sewer Interceptor
32	Scituate Pharmacy	65	Well #11	96	Scituate Public Safety Complex

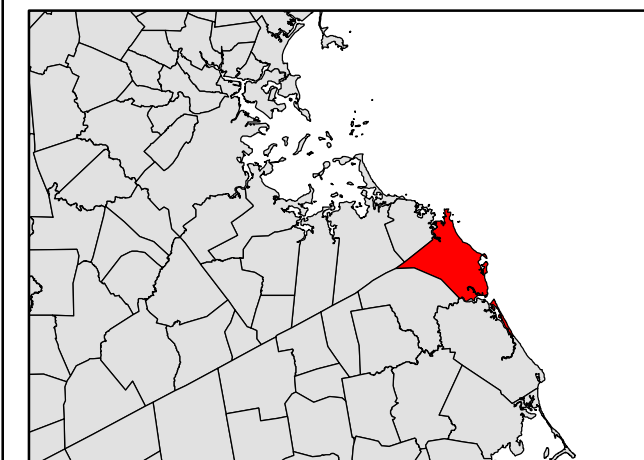
Table A-2 Vulnerable Populations

ID	Site Name	ID	Site Name
1	Community Residence	16	Central Park Housing/Lawson Green
2	Community Residence	17	Wheeler Park 2
3	Community Residence	18	Wheeler Park I
4	DDS Group Home	19	Cardigan Nursing Home
5	St Mary's Hall	20	Life Care Center
6	St Mary's Church	21	Environmental Police
7	Harbor United Methodist Church		
8	First Parish Unitarian Church	23	Hatherly School
9	First Baptist Church	24	Wampanoag Elementary School
10	First Trinitarian Congregational Church	25	Cushing Elementary School
11	Christ Lutheran Church	26	Gates Jr. High School
12	Saint Francis Cabrini Church	27	Scituate High School
13	Union Chapel	28	Montessori Community
14	St. Lukes Church	29	Jenkins Elementary School
15	Lincoln Park Elder Housing	30	Meeting House Estates



Scituate, MA

0 5 10 20
Miles



Map 1-1 Location Map Scituate, MA

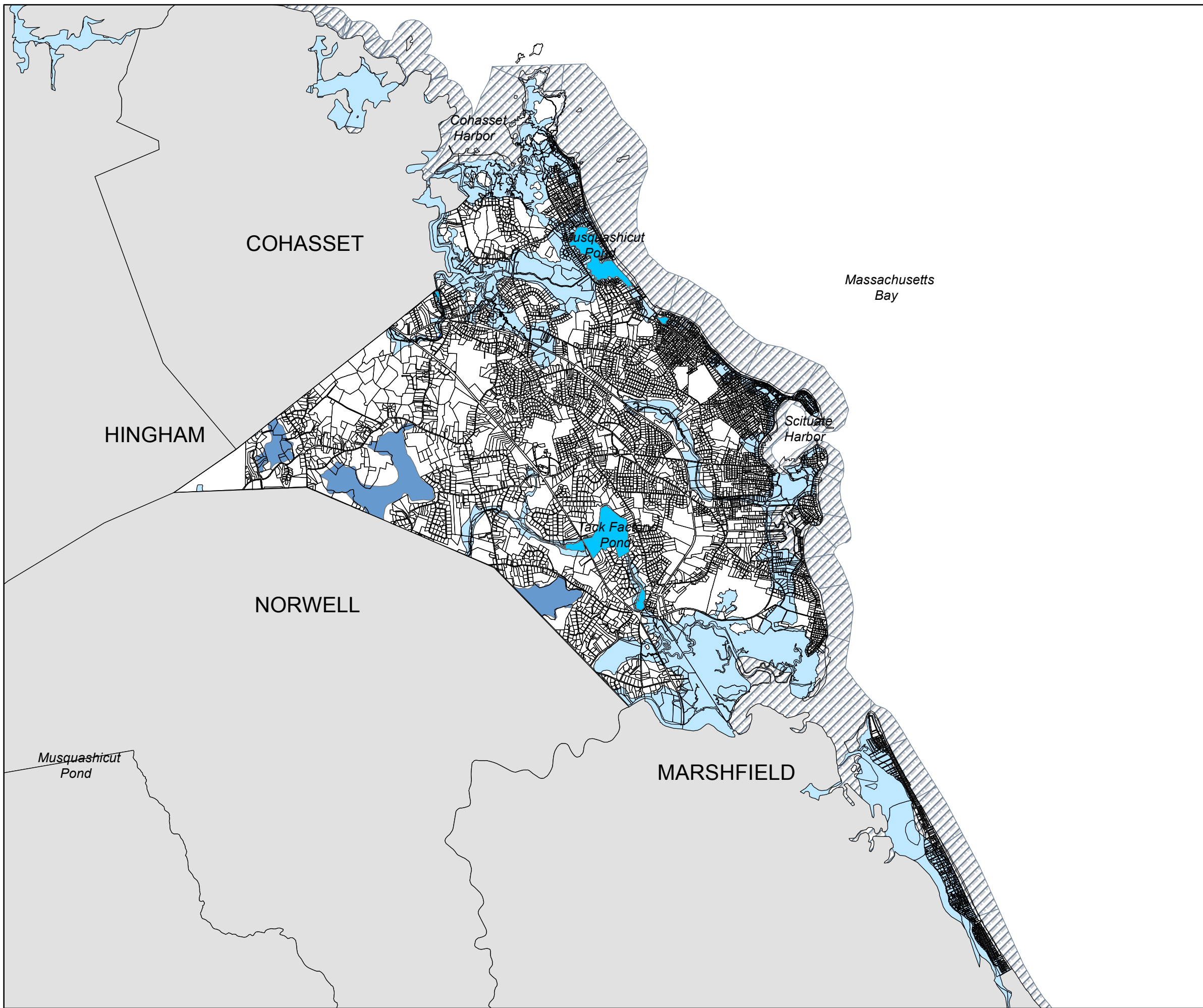
January 12, 2021 CSP
Source: MassGIS/Town of Scituate

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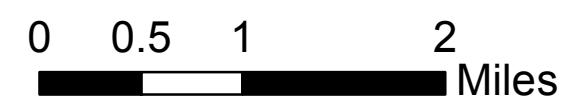
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Scituate, MA



Legend

-  Repetitive Loss Area
- FEMA Flood Zones
 -  100-Year Flood Zone
 -  500-Year Flood Zone
 -  Velocity Zone

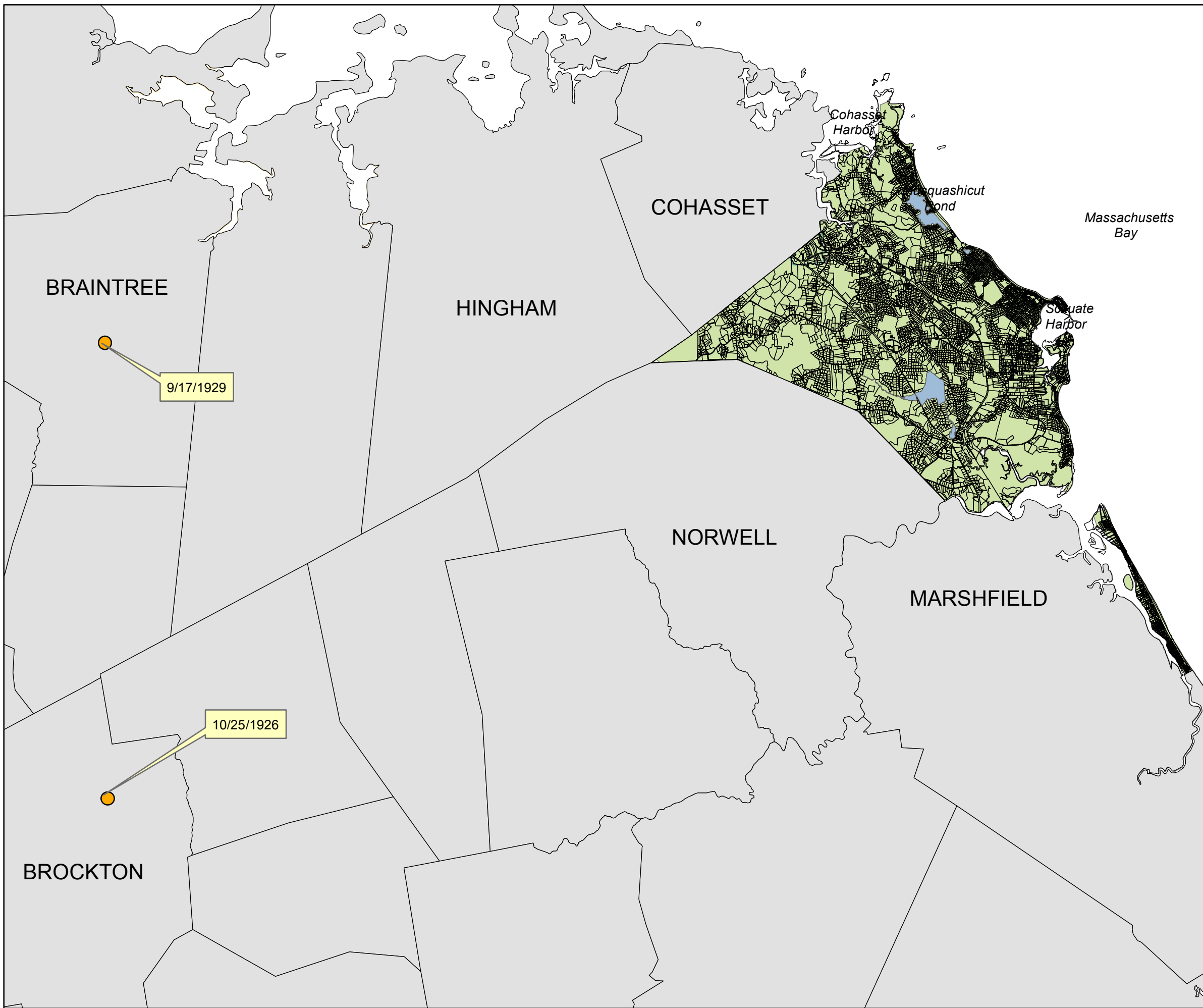
**Map 2-1
Flood Hazard Areas
Scituate, MA**

January 12, 2021 CSP
Source: MassGIS/Town of Scituate

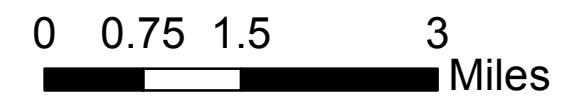
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-  Earthquake Points

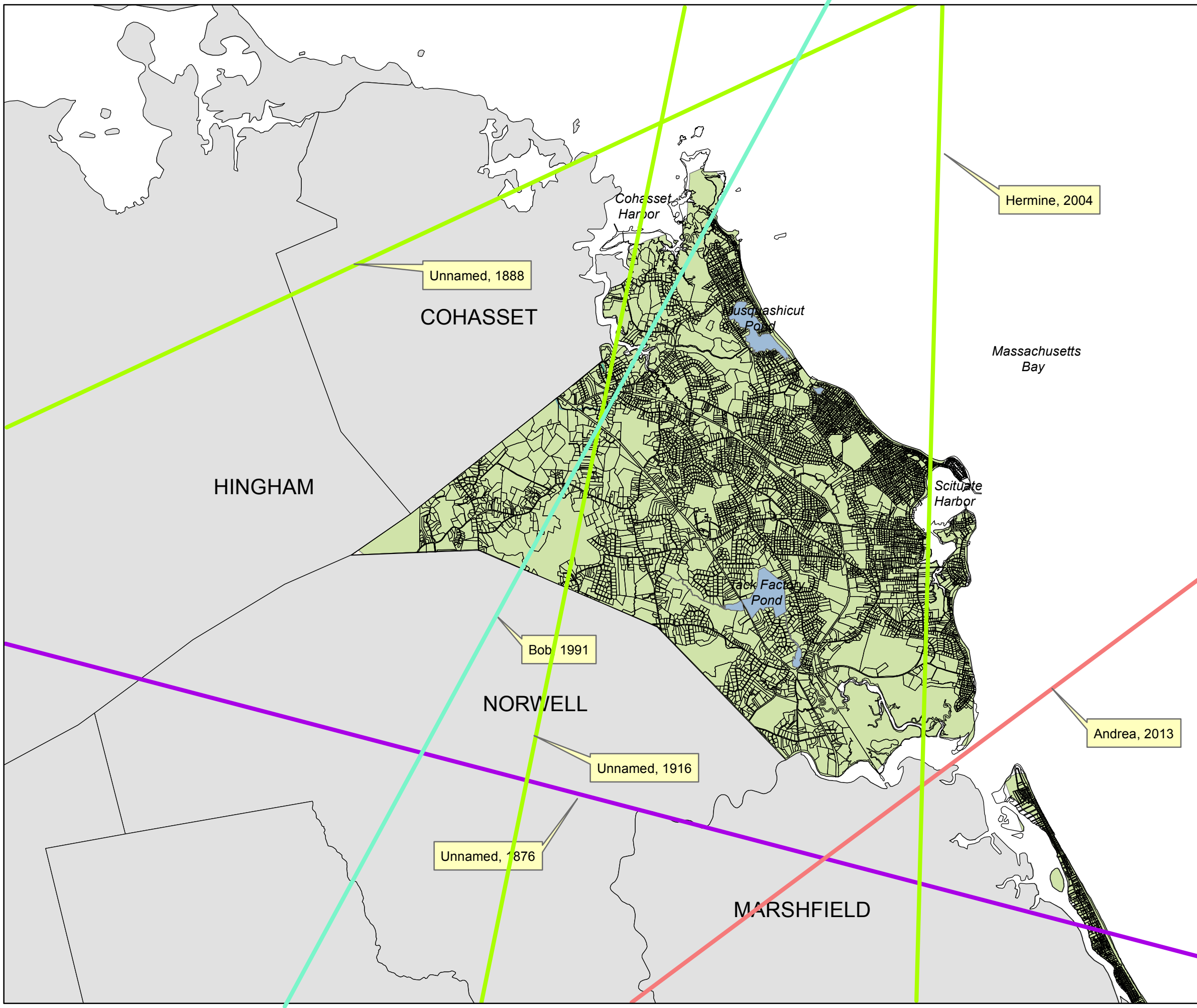
**Map 2-2
Earthquakes
Scituate, MA**

January 12, 2021 CSP
Source: MassGIS, NOAA

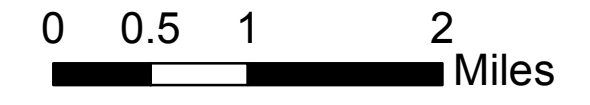
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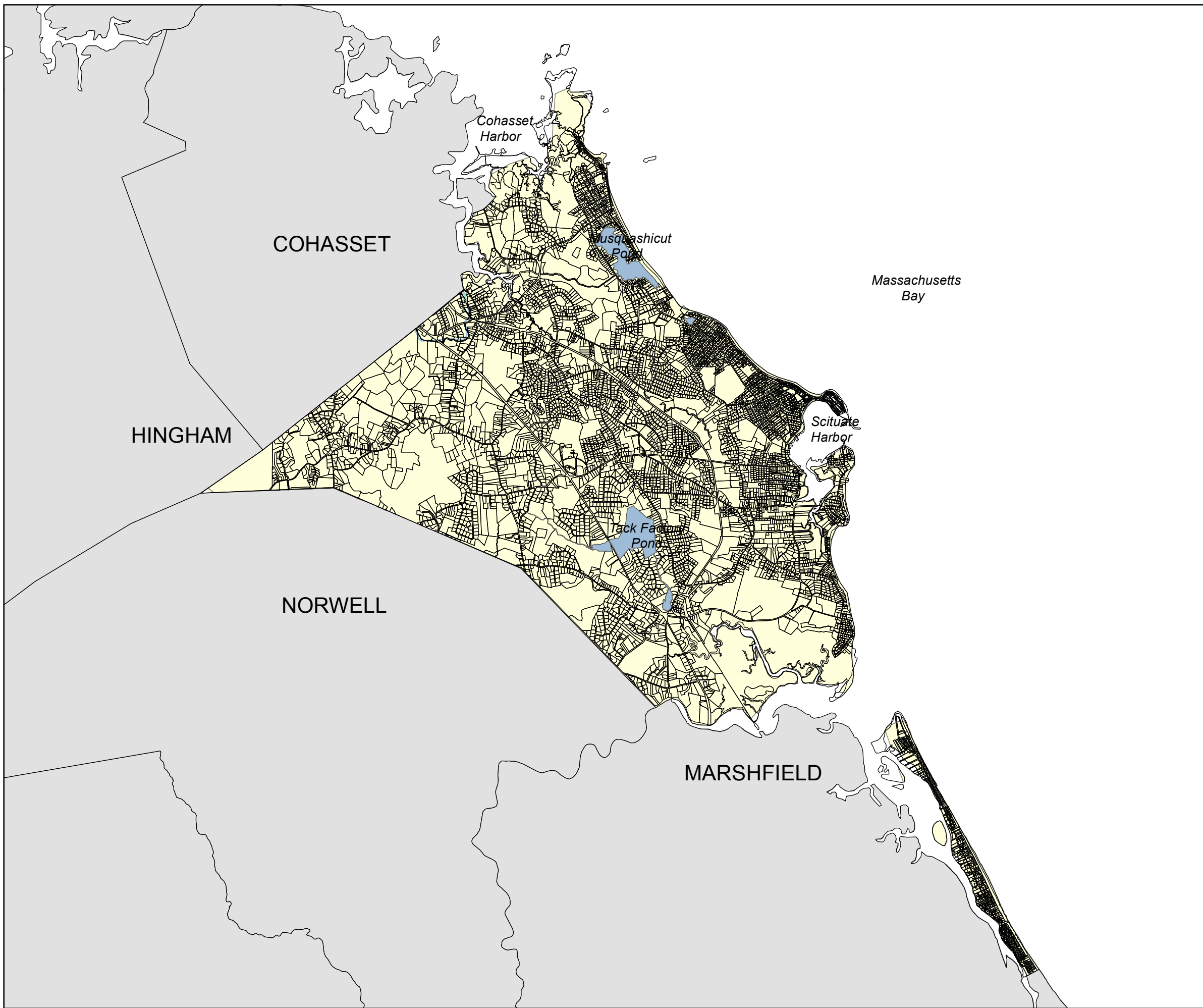
- Tornado Path
- Hurricane Tracks Category
 - Tropical Depression
 - Tropical Storm
 - Extratropical Storm
 - Category 2 Hurricane
- Wind Zone
 - Zone II (160 mph)

Map 2-3 Hurricanes/Tornadoes Scituate, MA

January 12, 2021 CSP
Source: MassGIS, NOAA

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Scituate, MA



Legend

Average Annual Snowfall

24.1 to 36.0 Inches

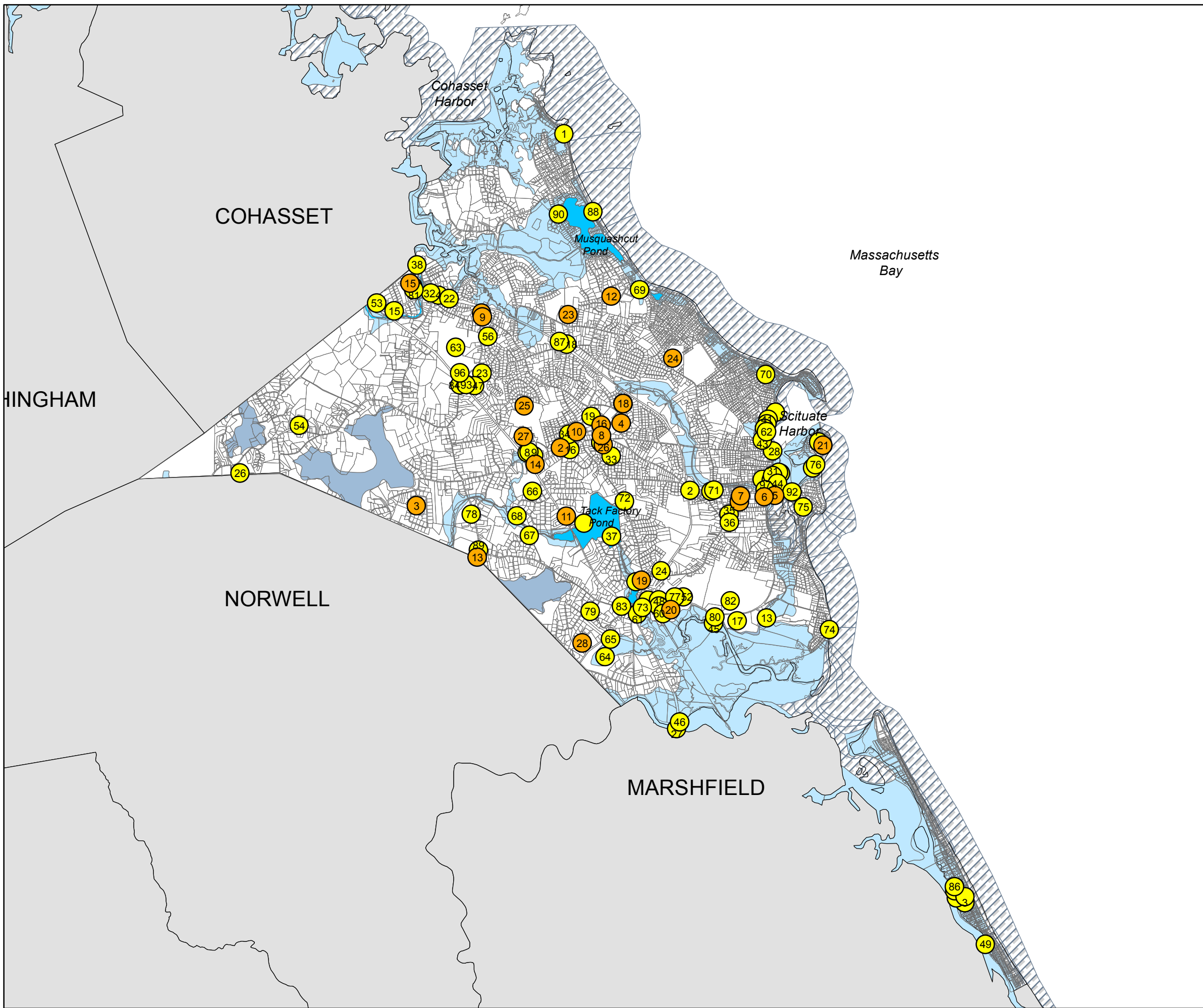
Map 2-4 Average Annual Snowfall Scituate, MA

January 12, 2021 CSP
Source: MassGIS/Town of Scituate

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Scituate, MA



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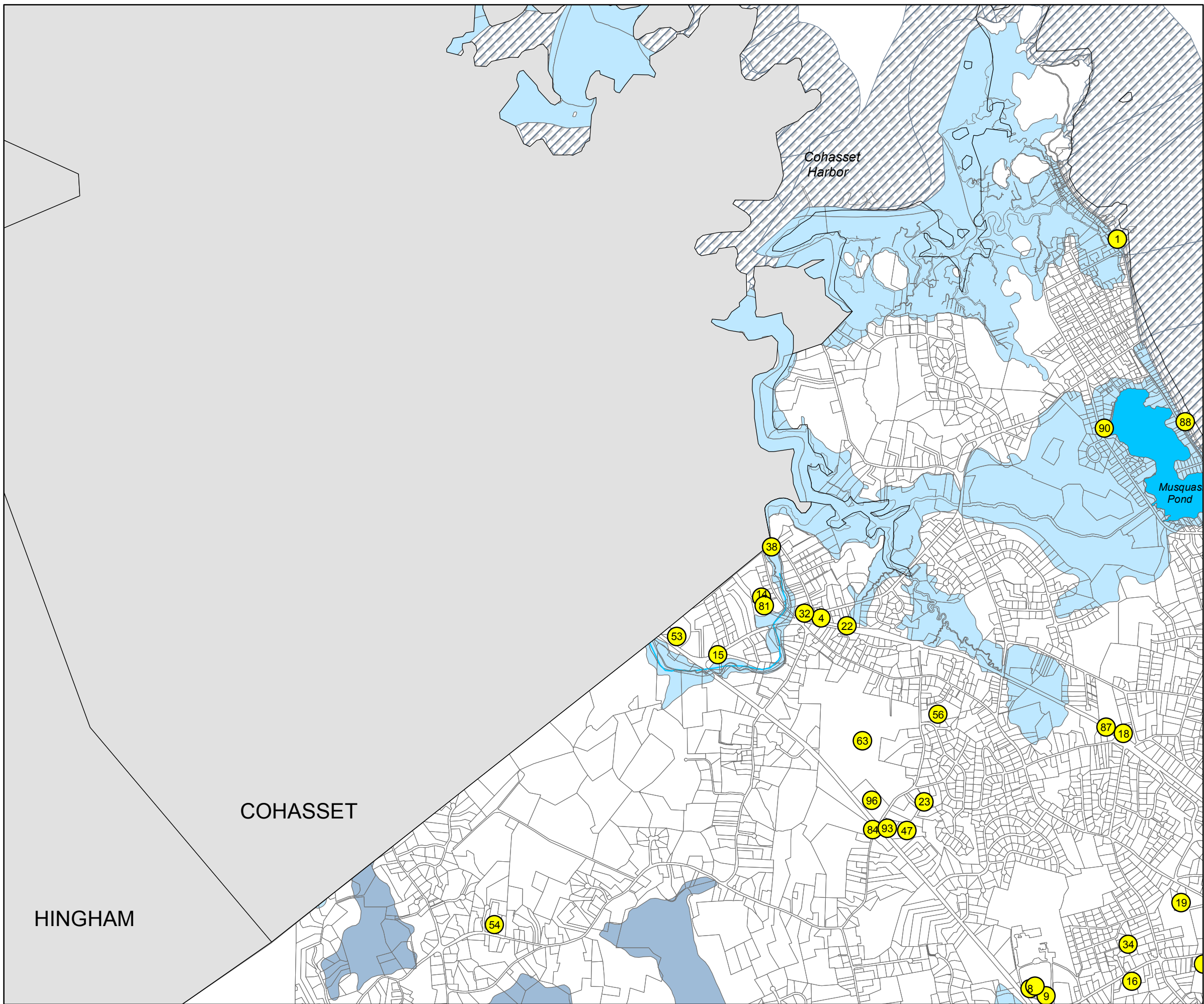
- 1 Critical Infrastructure
- 1 Vulnerable Populations
- Waterbody
- FEMA Flood Zones
 - 100-Year Flood Zone
 - 500-Year Flood Zone
 - Velocity Zone

Map 2-5 Critical Facilities and Vulnerable Populations Scituate, MA

September 3, 2021 CSP
Source: MassGIS/Town of Scituate

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Scituate, MA



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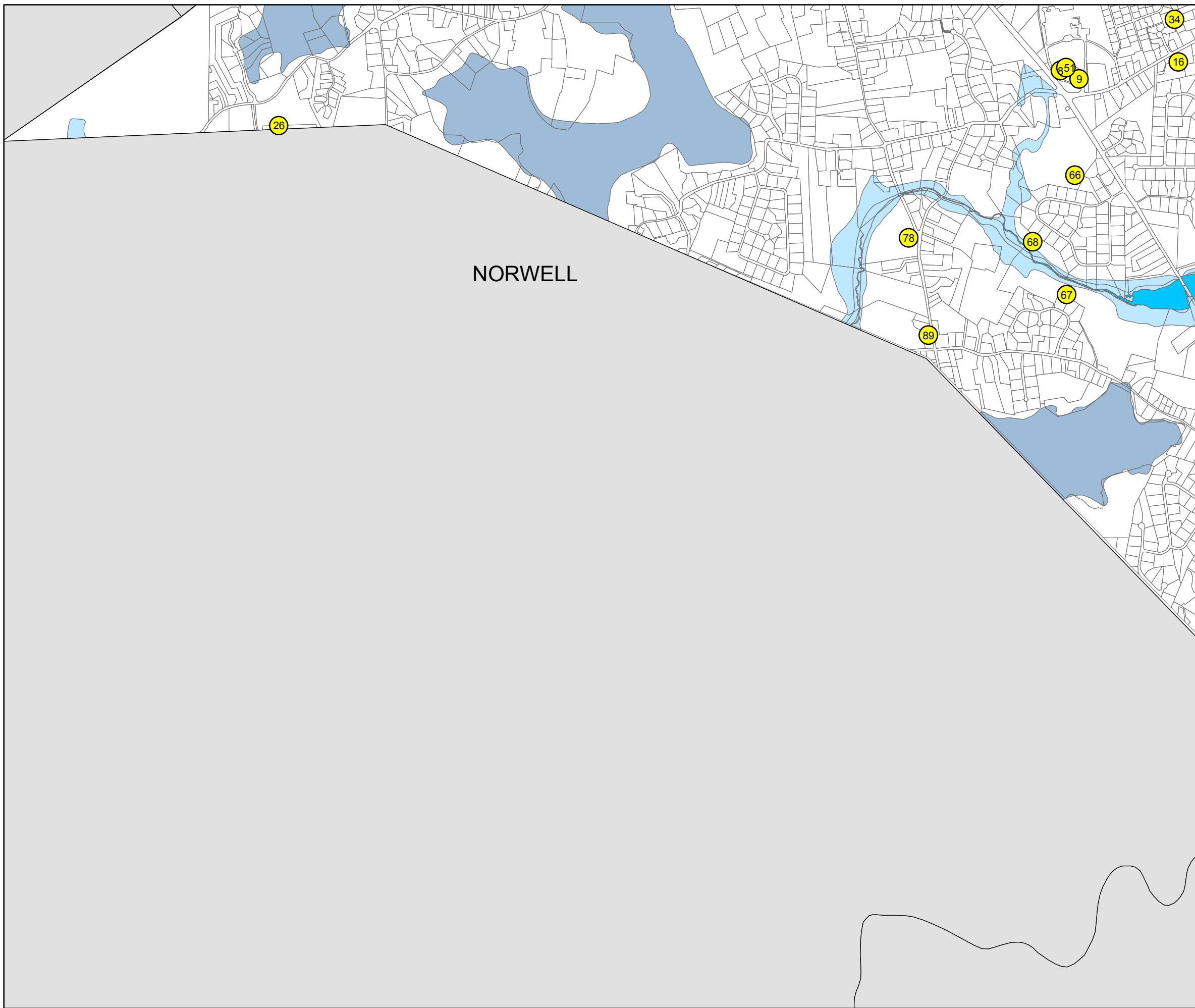
- 1 Critical Infrastructure
- Waterbody
- FEMA Flood Zones
 - 100-Year Flood Zone
 - 500-Year Flood Zone
 - Velocity Zone

**Map 2-5.1
Critical Facilities
NW Quad
Scituate, MA**

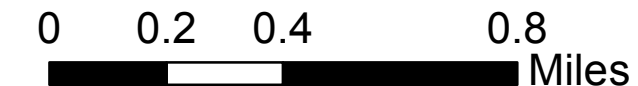
September 3, 2021 CSP
Source: MassGIS/Town of Scituate

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Scituate, MA



Legend

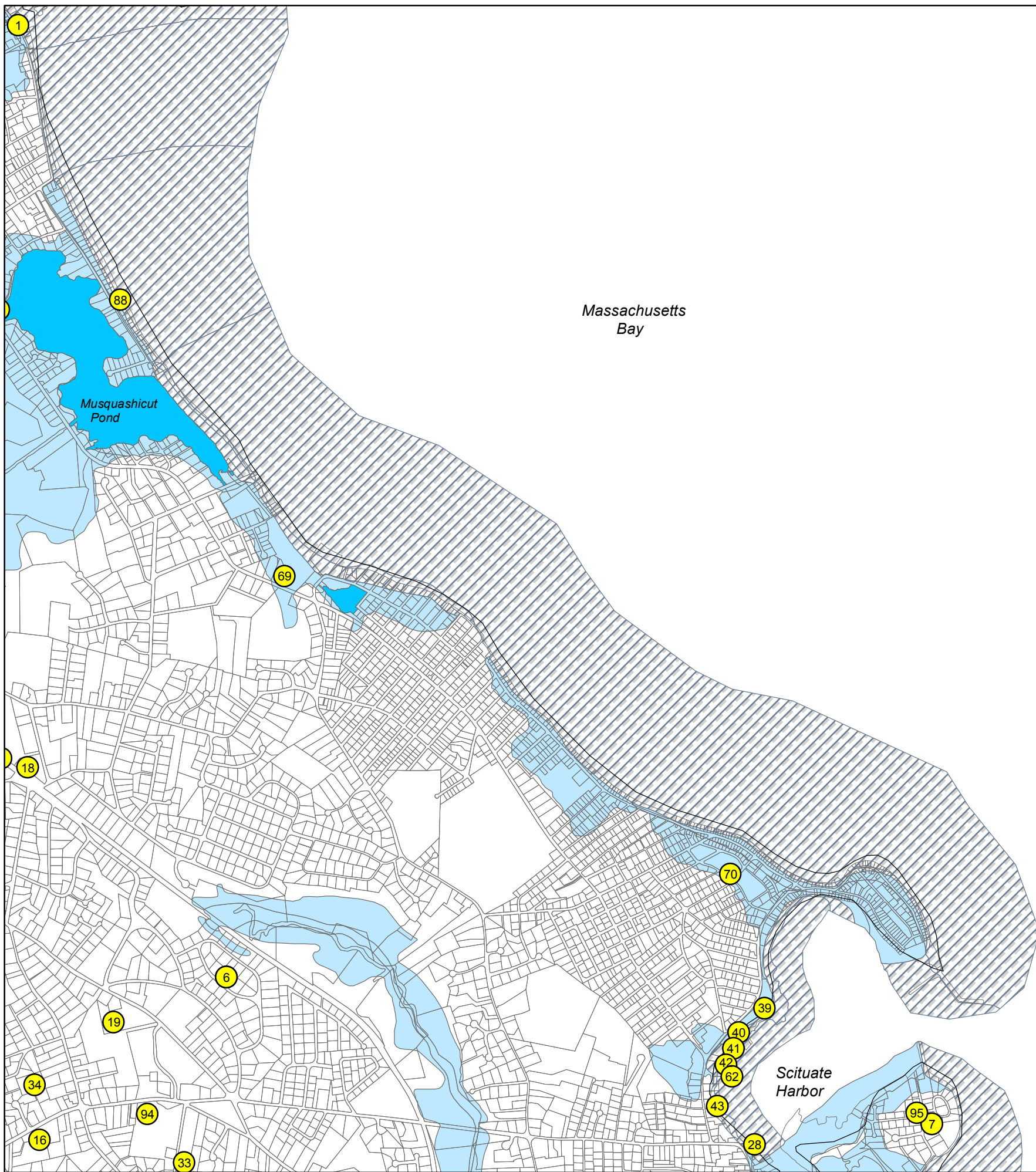
- 1 Critical Infrastructure
- Waterbody
- FEMA Flood Zones
 - 100-Year Flood Zone
 - 500-Year Flood Zone
 - Velocity Zone

**Map 2-5.2
Critical Facilities
SW Quad
Scituate, MA**

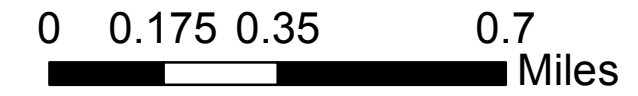
September 3, 2021 CSP
Source: MassGIS/Town of Scituate

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Scituate, MA



Legend

- 1 Critical Infrastructure
- Waterbody
- FEMA Flood Zones
 - 100-Year Flood Zone
 - 500-Year Flood Zone
 - Velocity Zone

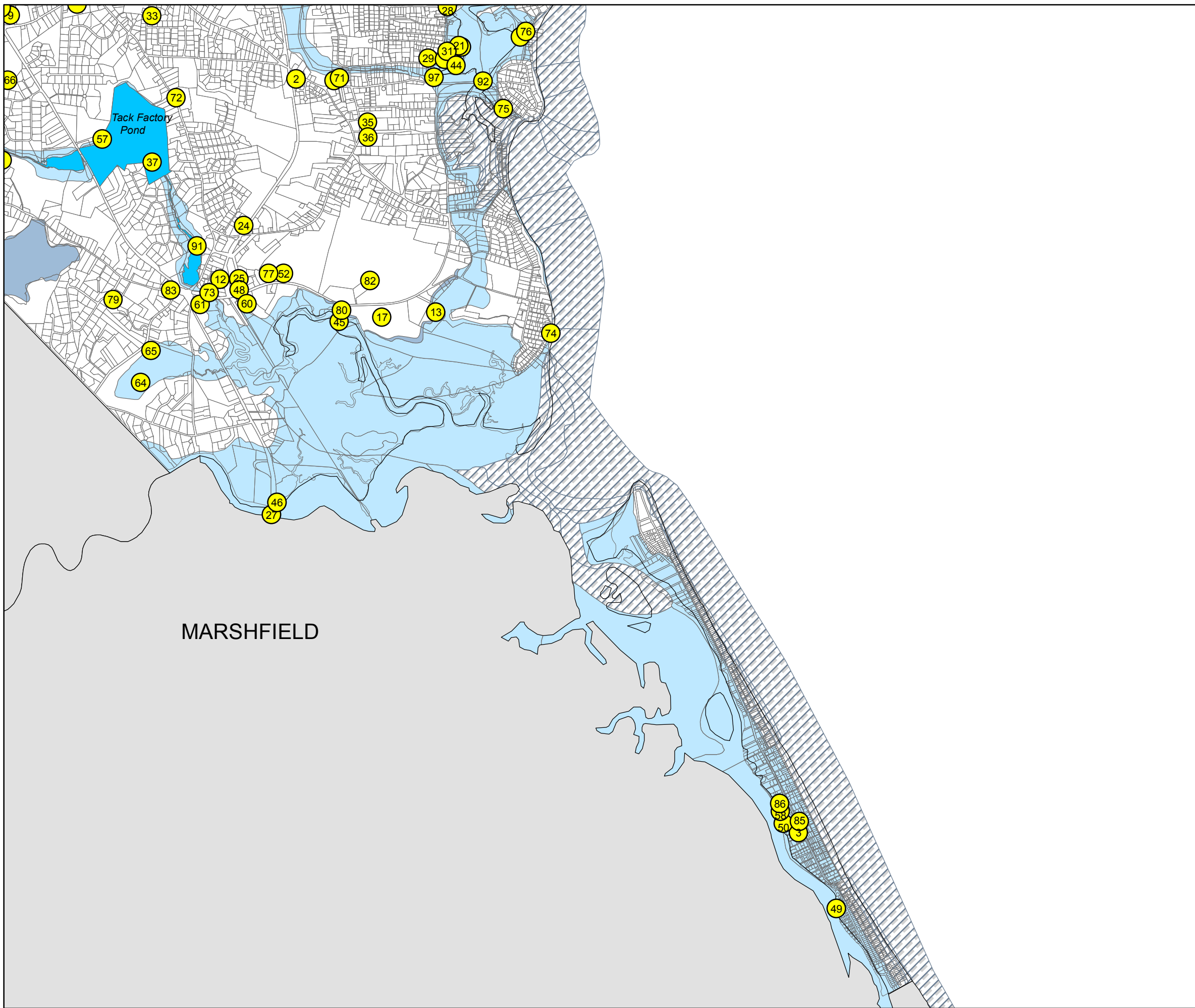
Map 2-5.3 Critical Facilities NE Quad Scituate, MA

September 3, 2021 CSP
Source: MassGIS/Town of Scituate

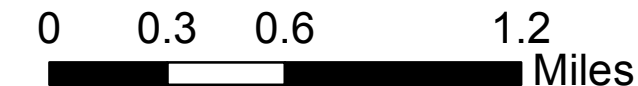
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Scituate, MA



Legend

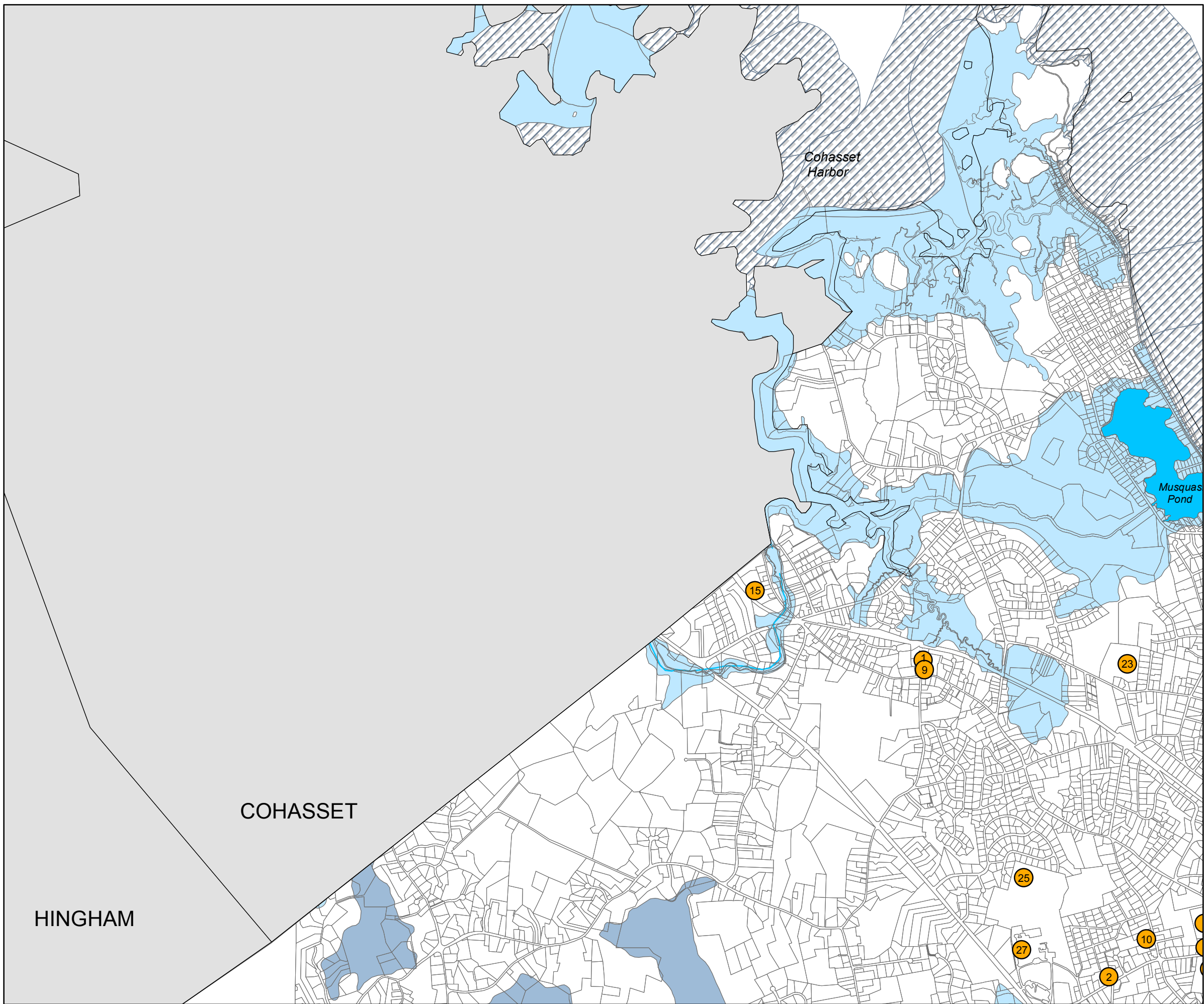
- 1 Critical Infrastructure
- Waterbody
- FEMA Flood Zones
 - 100-Year Flood Zone
 - 500-Year Flood Zone
 - Velocity Zone

**Map 2-5.4
Critical Facilities
SE Quad
Scituate, MA**

September 3, 2021 CSP
Source: MassGIS/Town of Scituate

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Scituate, MA



Legend

- 1 Vulnerable Populations
- Waterbody
- FEMA Flood Zones
- 100-Year Flood Zone
- 500-Year Flood Zone
- Velocity Zone

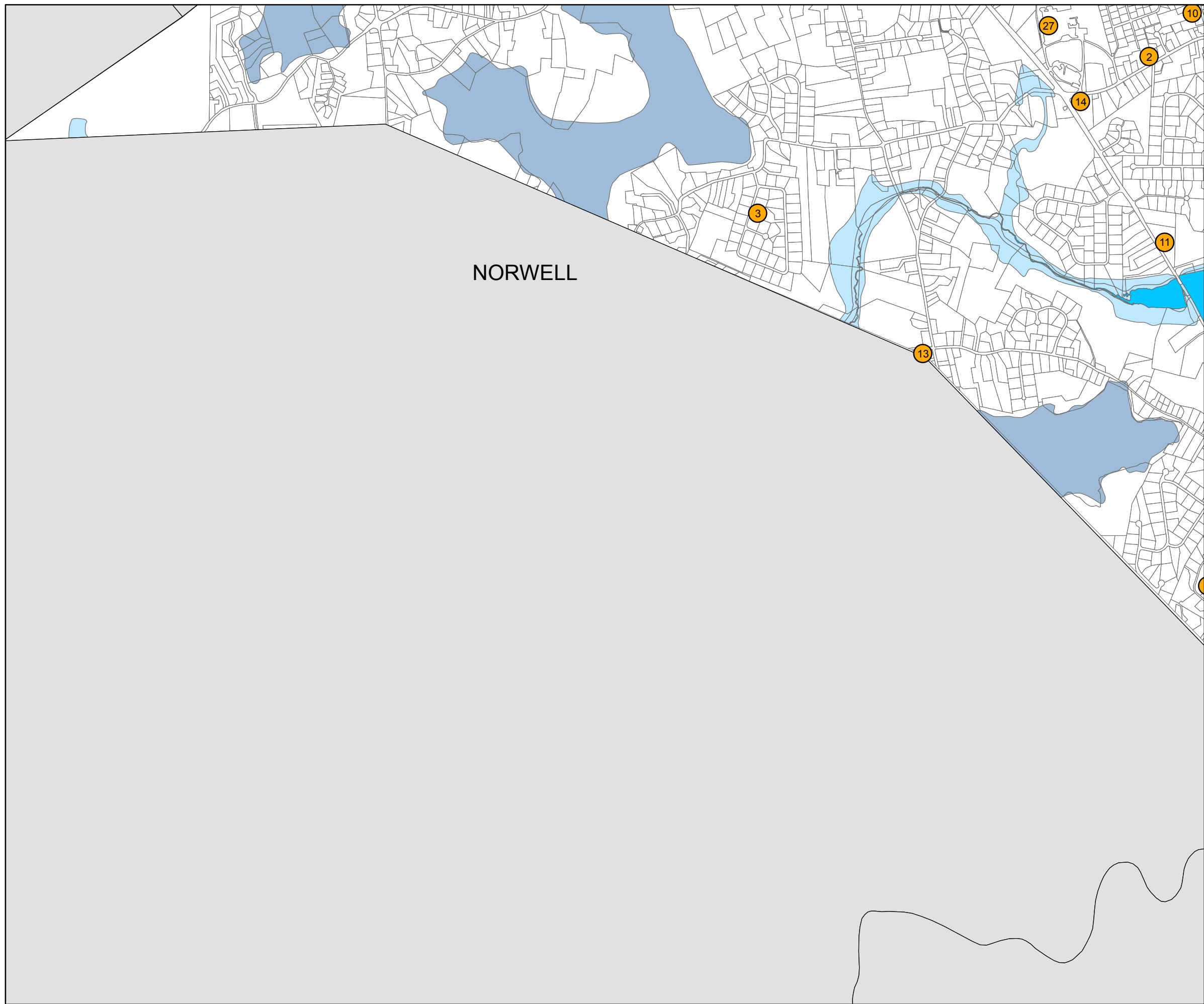
Map 2-5.5 Vulnerable Populations NW Quad Scituate, MA

September 3, 2021 CSP
Source: MassGIS/Town of Scituate

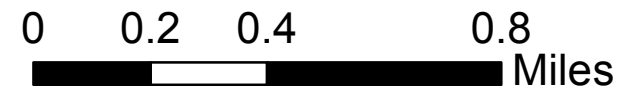
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Scituate, MA



Legend

- 1 Vulnerable Populations
- Waterbody
- FEMA Flood Zones
- 100-Year Flood Zone
- 500-Year Flood Zone
- Velocity Zone

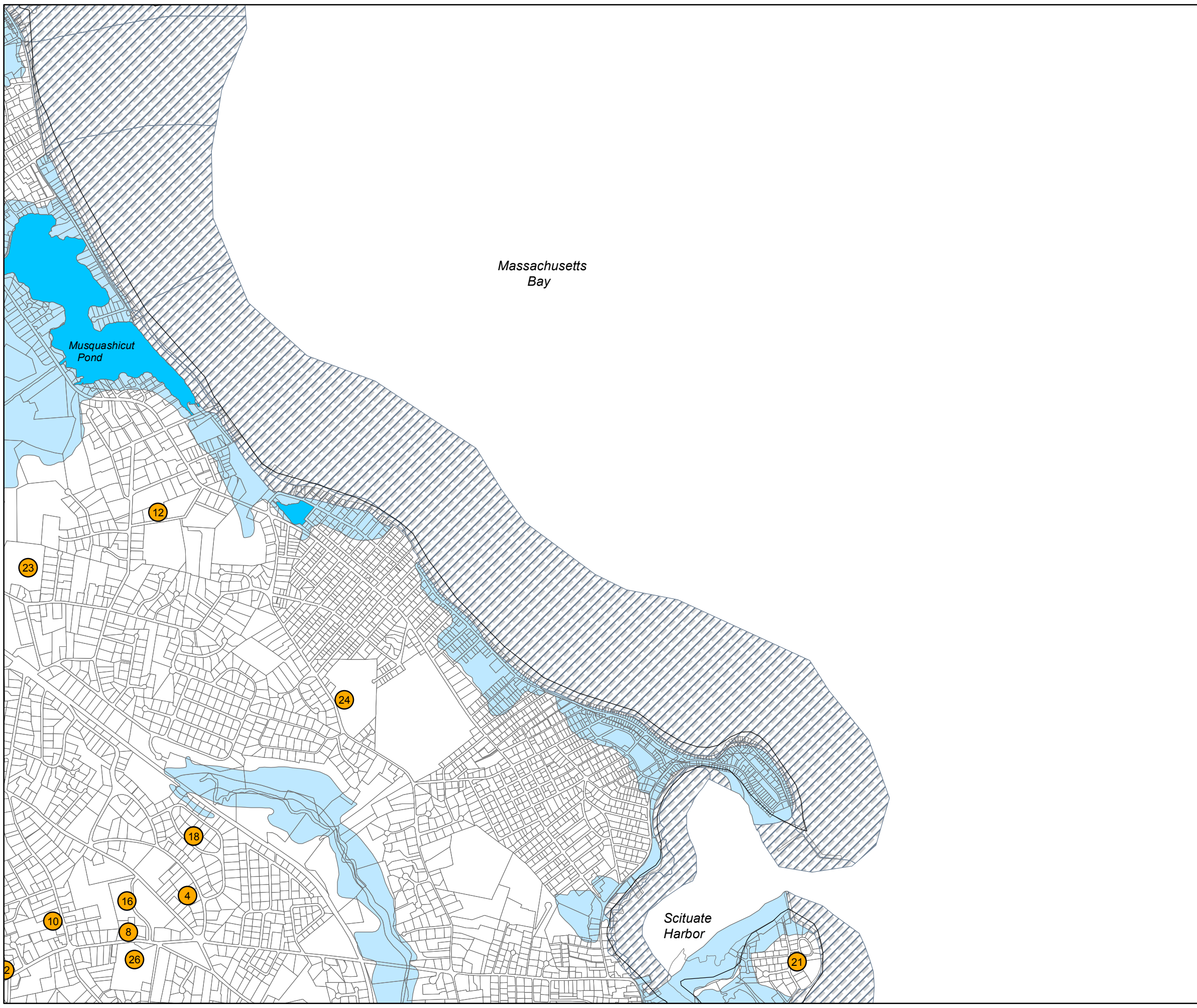
**Map 2-5.6
Vulnerable Populations
SW Quad
Scituate, MA**

September 3, 2021 CSP
Source: MassGIS/Town of Scituate

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Scituate, MA



Legend

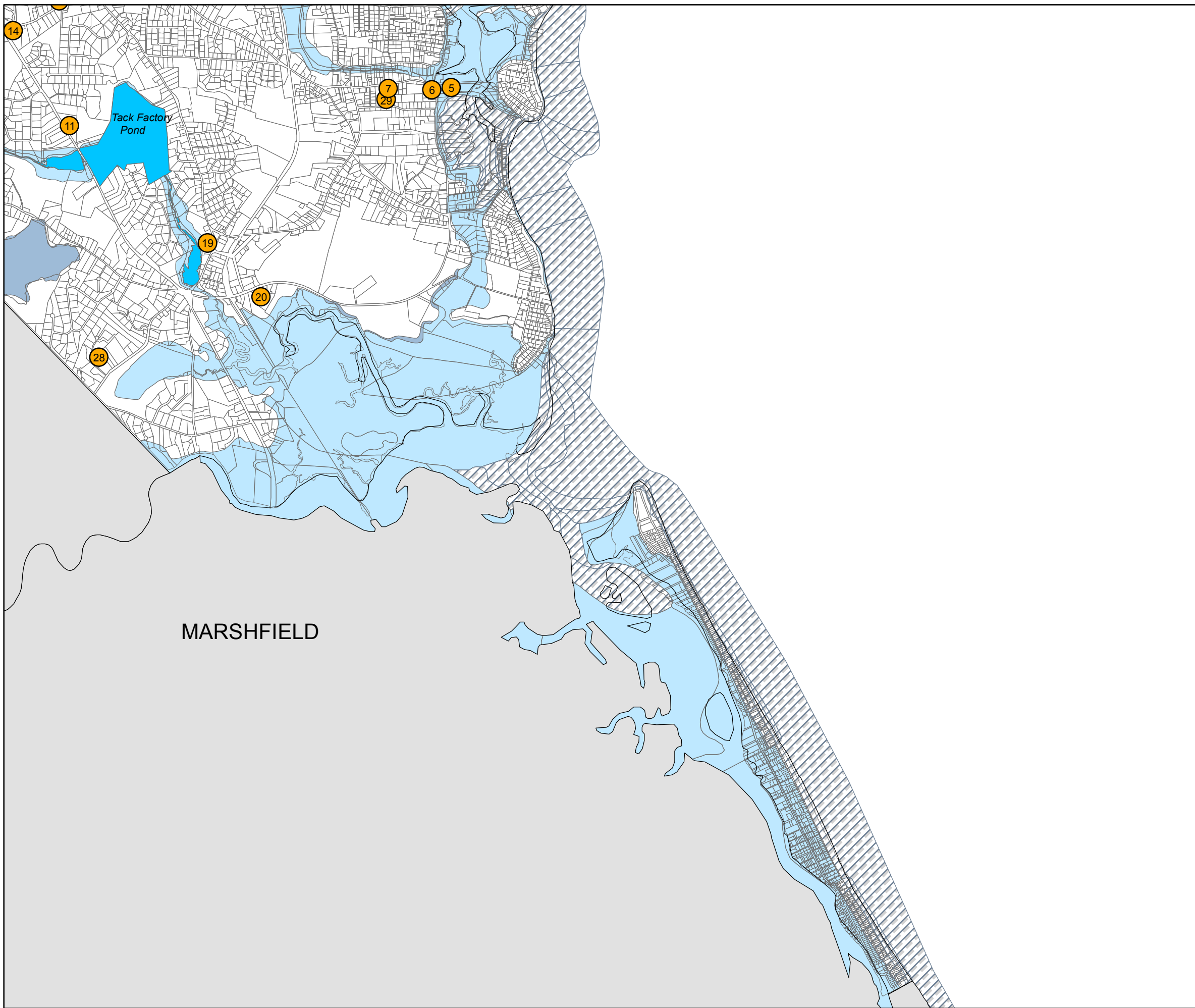
- 1 Vulnerable Populations
- Waterbody
- FEMA Flood Zones
- 100-Year Flood Zone
- 500-Year Flood Zone
- Velocity Zone

Map 2-5.7 Vulnerable Populations NE Quad Scituate, MA

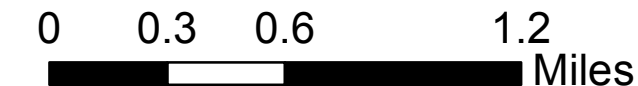
September 3, 2021 CSP
Source: MassGIS/Town of Scituate

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Scituate, MA



Legend

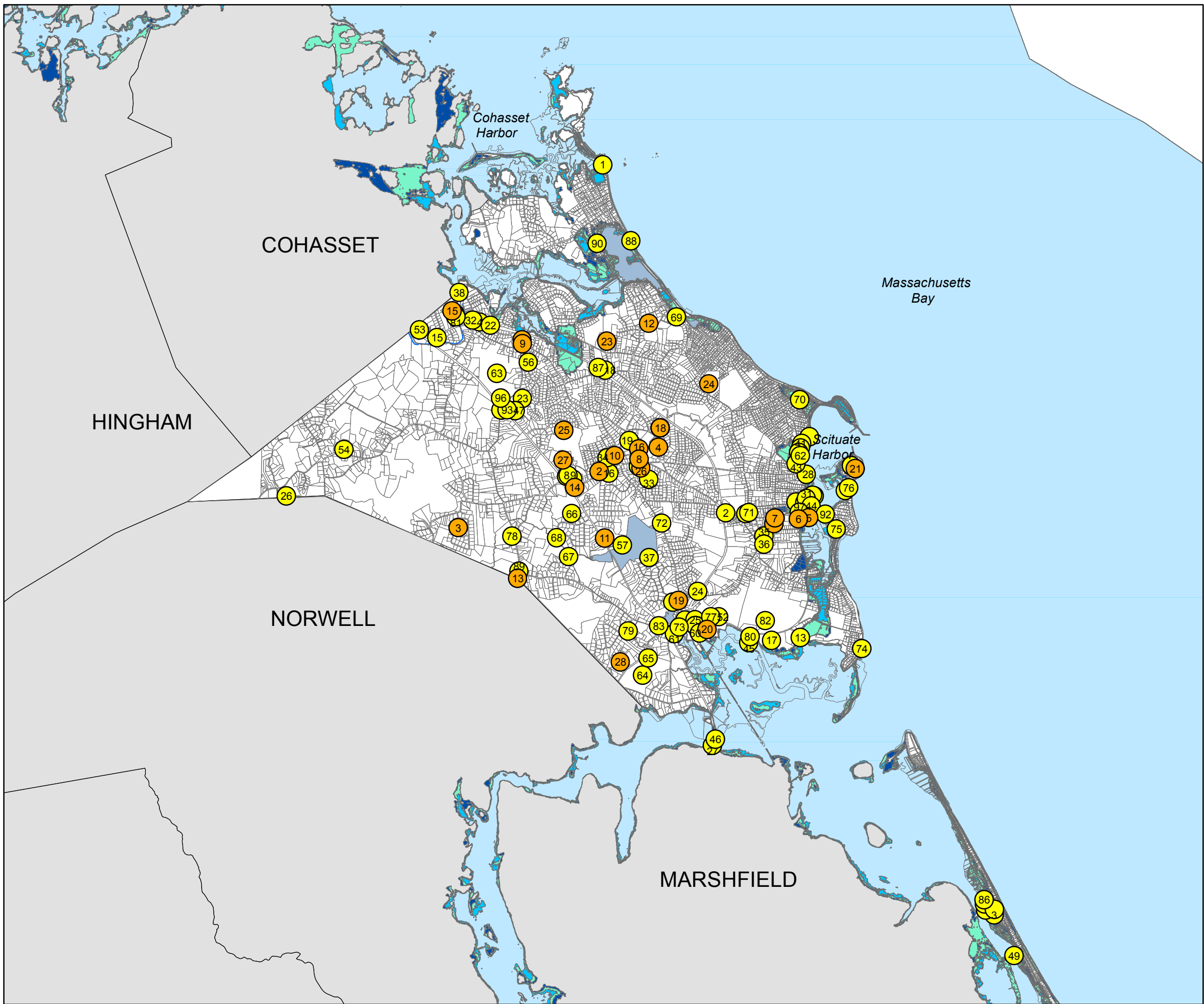
- 1 Vulnerable Populations
- Waterbody
- FEMA Flood Zones
- 100-Year Flood Zone
- 500-Year Flood Zone
- Velocity Zone

**Map 2-5.8
Vulnerable Populations
SE Quad
Scituate, MA**

September 3, 2021 CSP
Source: MassGIS/Town of Scituate

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Scituate, MA



Legend

Sea Level Rise Scenarios

- + One Foot
- + Three Feet
- + Five Feet
- + Seven Feet
- Water
- 1 Critical Infrastructure
- 1 Vulnerable Populations

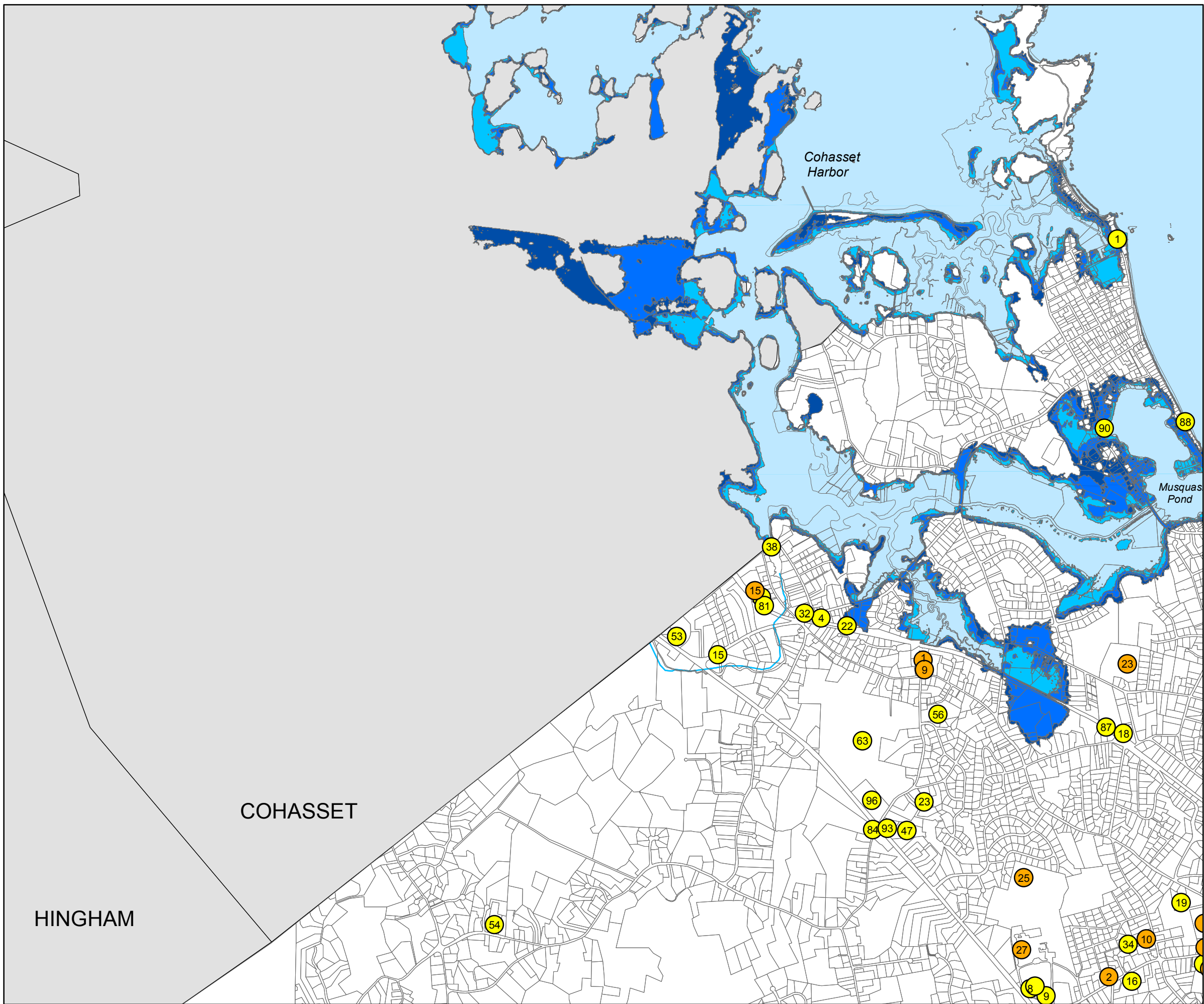
Map 2-6 Sea Level Rise Various Scenarios Scituate, MA

August 24, 2021 CSP
Source: MassGIS/Town of Scituate

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Scituate, MA



Legend

Sea Level Rise Scenarios

- + One Foot
- + Three Feet
- + Five Feet
- + Seven Feet

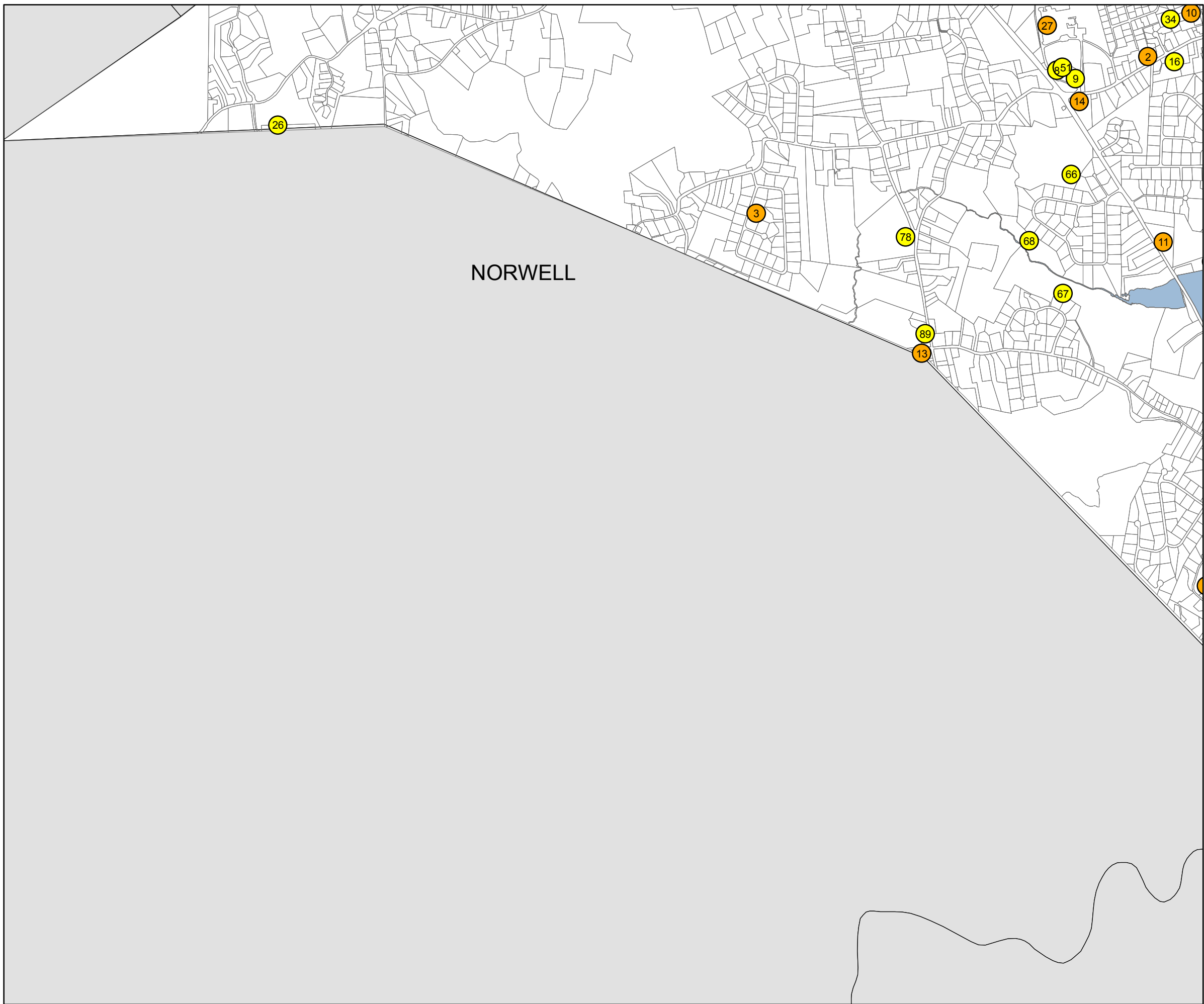
- Water
- 1 Critical Infrastructure
- 1 Vulnerable Populations

Map 2-6.1 Sea Level Rise - Various Scenarios NW Quad Scituate, MA

September 3, 2021 CSP
Source: MassGIS/Town of Scituate

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Scituate, MA



Legend

Sea Level Rise Scenarios

- + One Foot
- + Three Feet
- + Five Feet
- + Seven Feet

Water

- 1 Critical Infrastructure
- 1 Vulnerable Populations

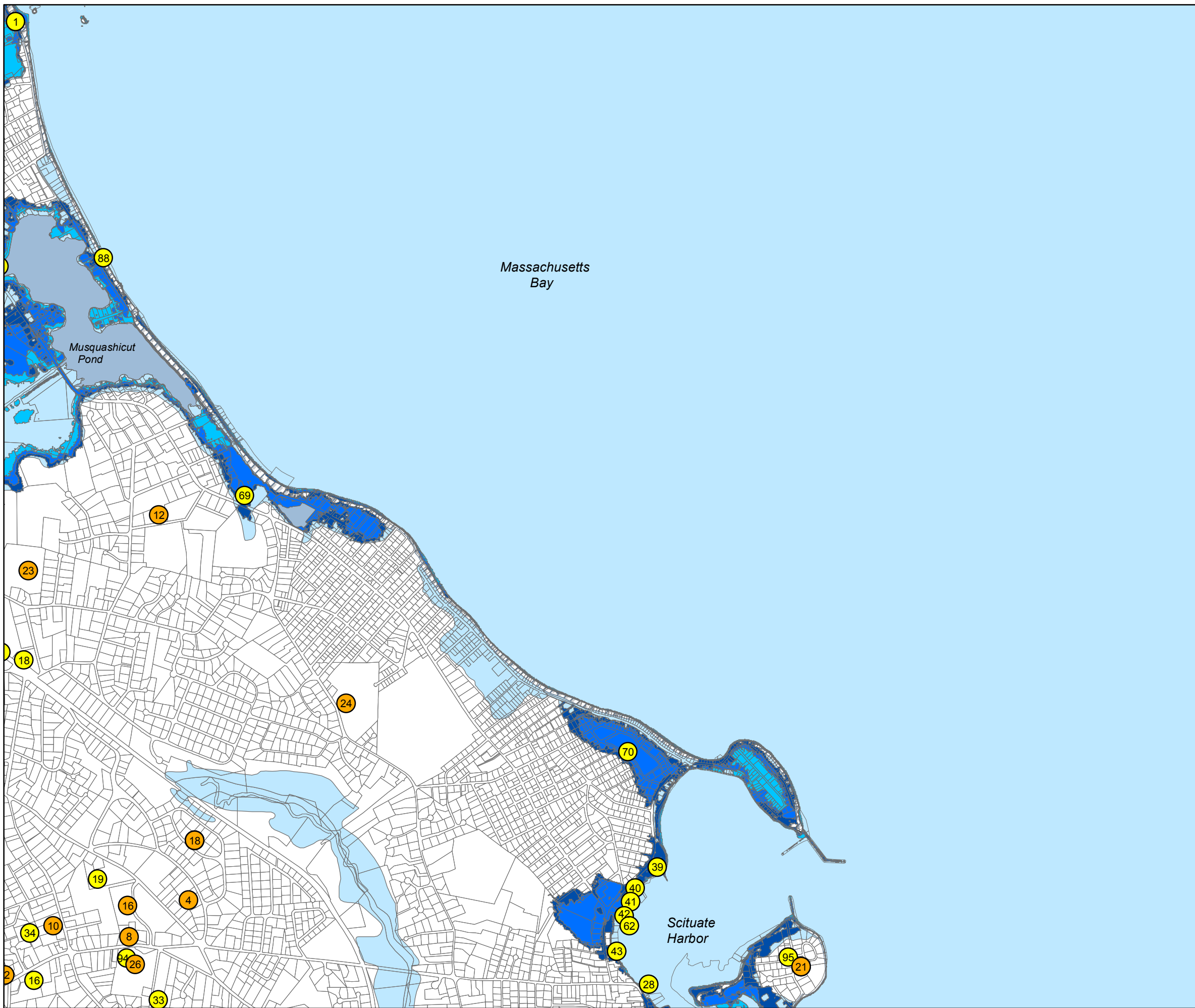
**Map 2-6.2
Sea Level Rise - Various Scenarios
SW Quad
Scituate, MA**

September 3, 2021 CSP
Source: MassGIS/Town of Scituate

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Scituate, MA



Legend

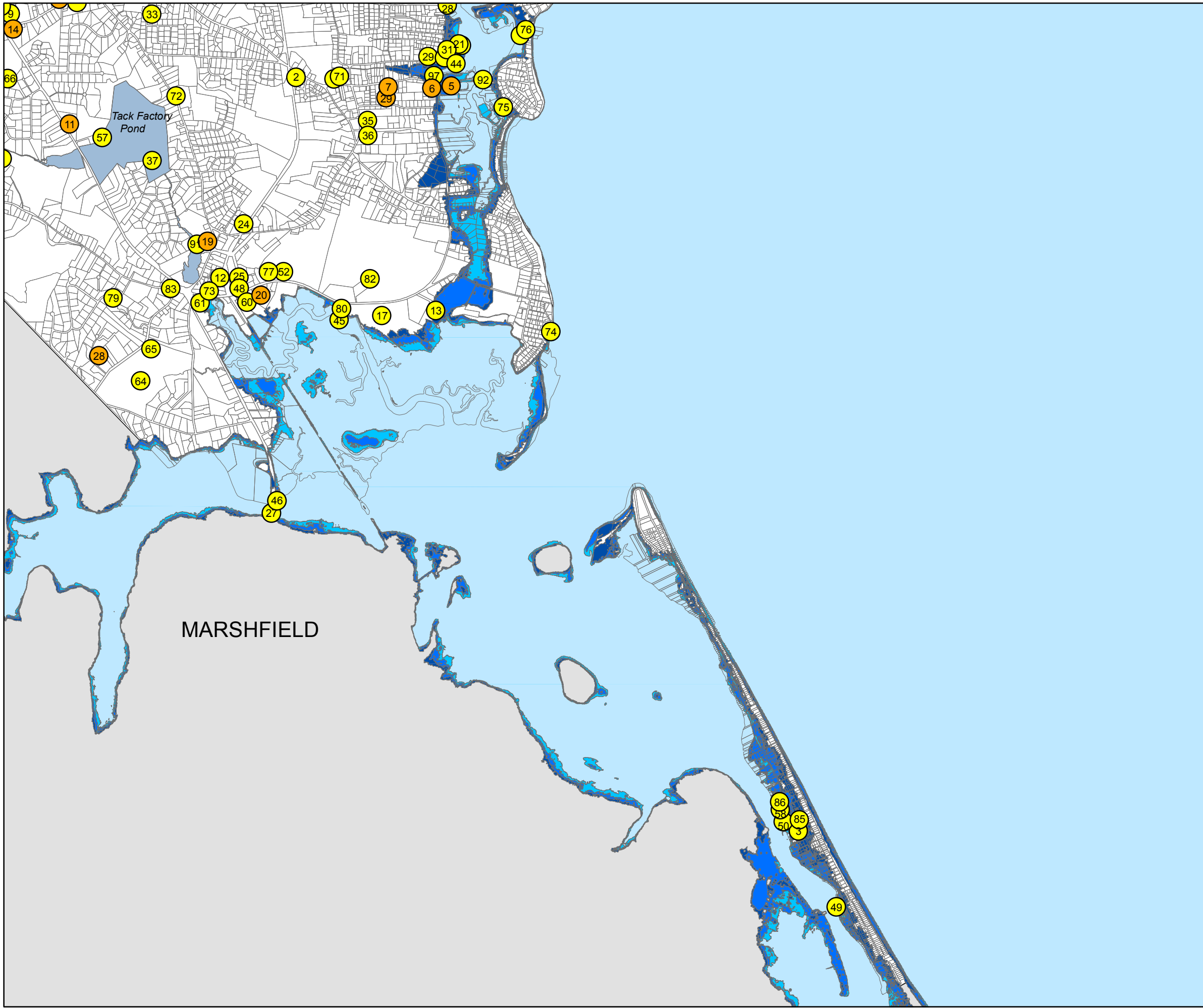
- Sea Level Rise Scenarios
- + One Foot
 - + Three Feet
 - + Five Feet
 - + Seven Feet
 - Water
 - 1 Critical Infrastructure
 - 1 Vulnerable Populations

Map 2-6.3 Sea Level Rise - Various Scenarios NE Quad Scituate, MA

September 3, 2021 CSP
Source: MassGIS/Town of Scituate

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Scituate, MA



Legend

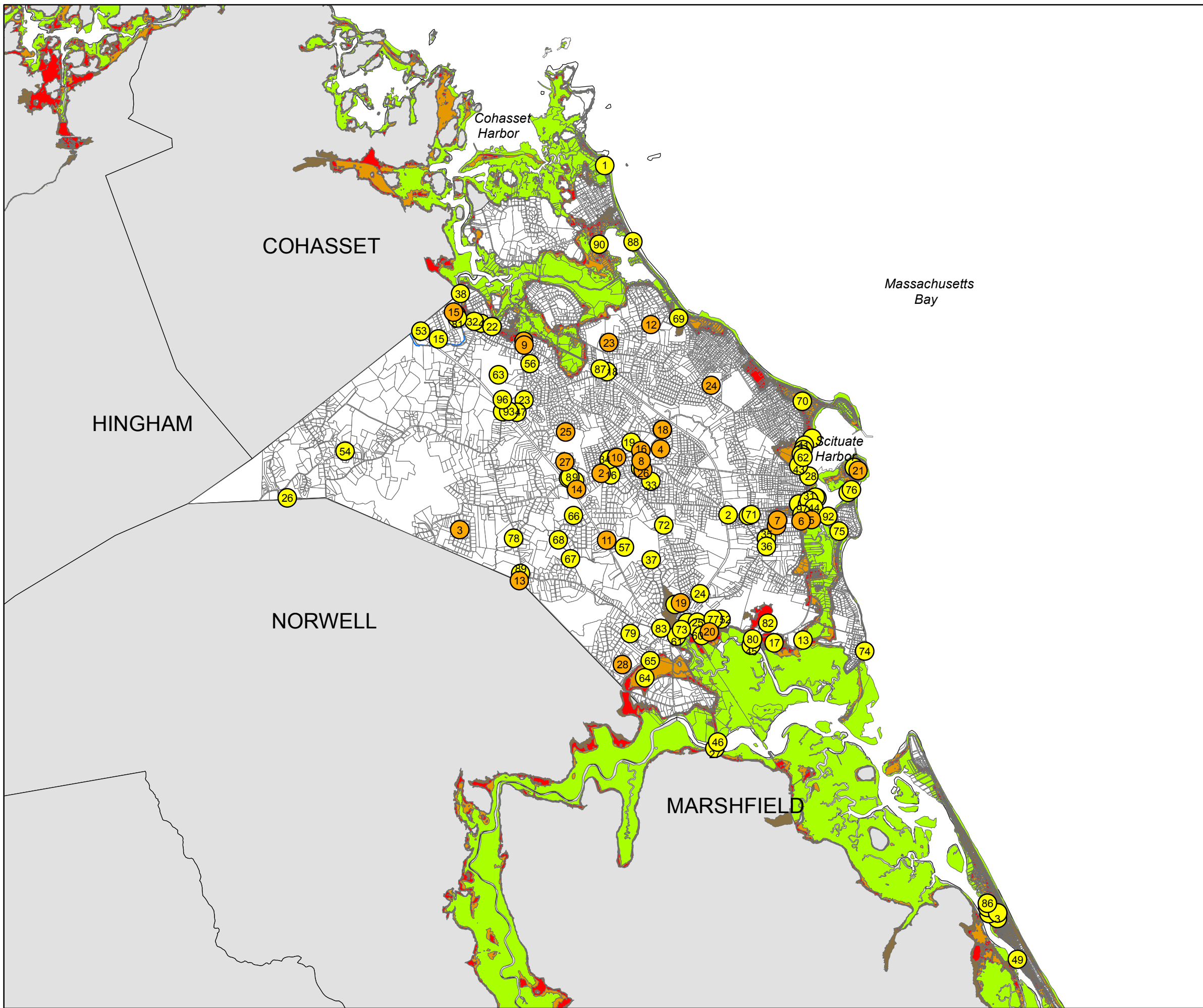
- Sea Level Rise Scenarios
- + One Foot
 - + Three Feet
 - + Five Feet
 - + Seven Feet
 - Water
 - 1 Critical Infrastructure
 - 1 Vulnerable Populations

**Map 2-6.4
Sea Level Rise - Various Scenarios
SE Quad
Scituate, MA**

September 3, 2021 CSP
Source: MassGIS/Town of Scituate

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Scituate, MA



Legend

-  Critical Facility
-  Vulnerable Population
- Hurricane Categories
 -  Category 1
 -  Category 2
 -  Category 3
 -  Category 4

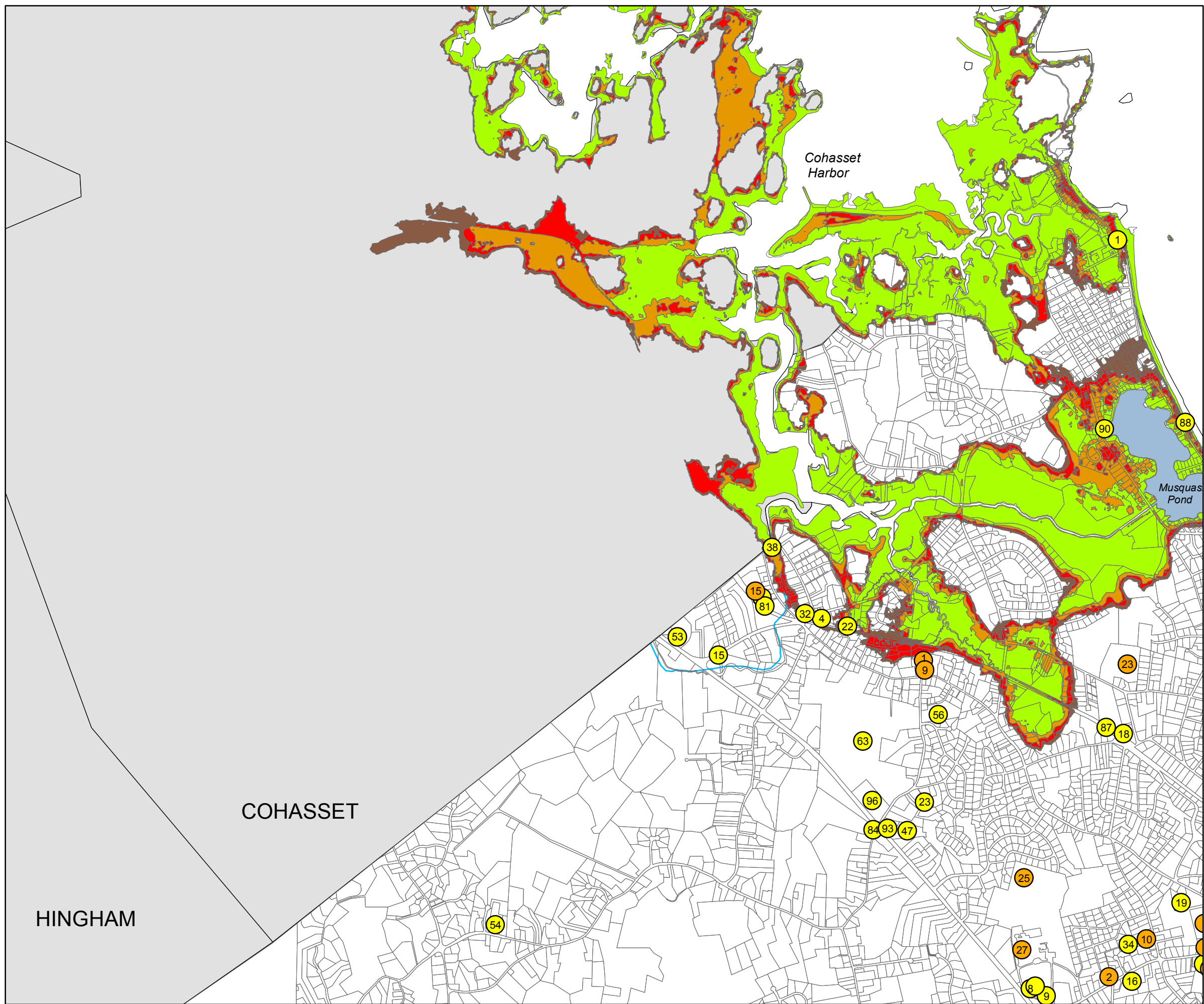
Map 2-7 Hurricane Inundation Zones Scituate, MA

August 24, 2021 CSP
Source: MassGIS/Town of Scituate

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Scituate, MA



Legend

-  Critical Facility
 -  Vulnerable Population
- Hurricane Categories
-  Category 1
 -  Category 2
 -  Category 3
 -  Category 4

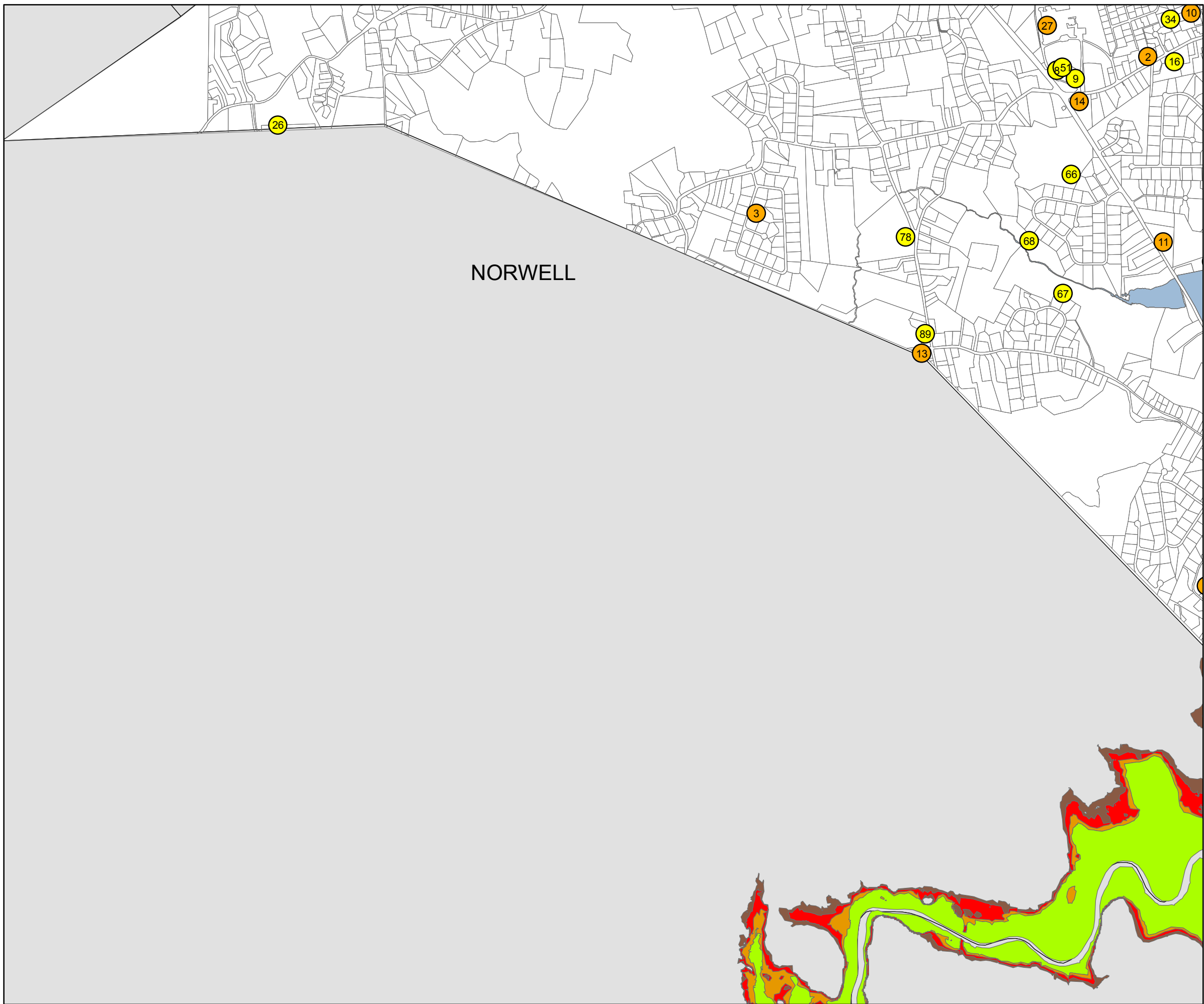
Map 2-7.1 Hurricane Inundation Zones NW Quad Scituate, MA

September 3, 2021 CSP
Source: MassGIS/Town of Scituate

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Scituate, MA



Legend

-  Critical Facility
-  Vulnerable Population
- Hurricane Categories
 -  Category 1
 -  Category 2
 -  Category 3
 -  Category 4

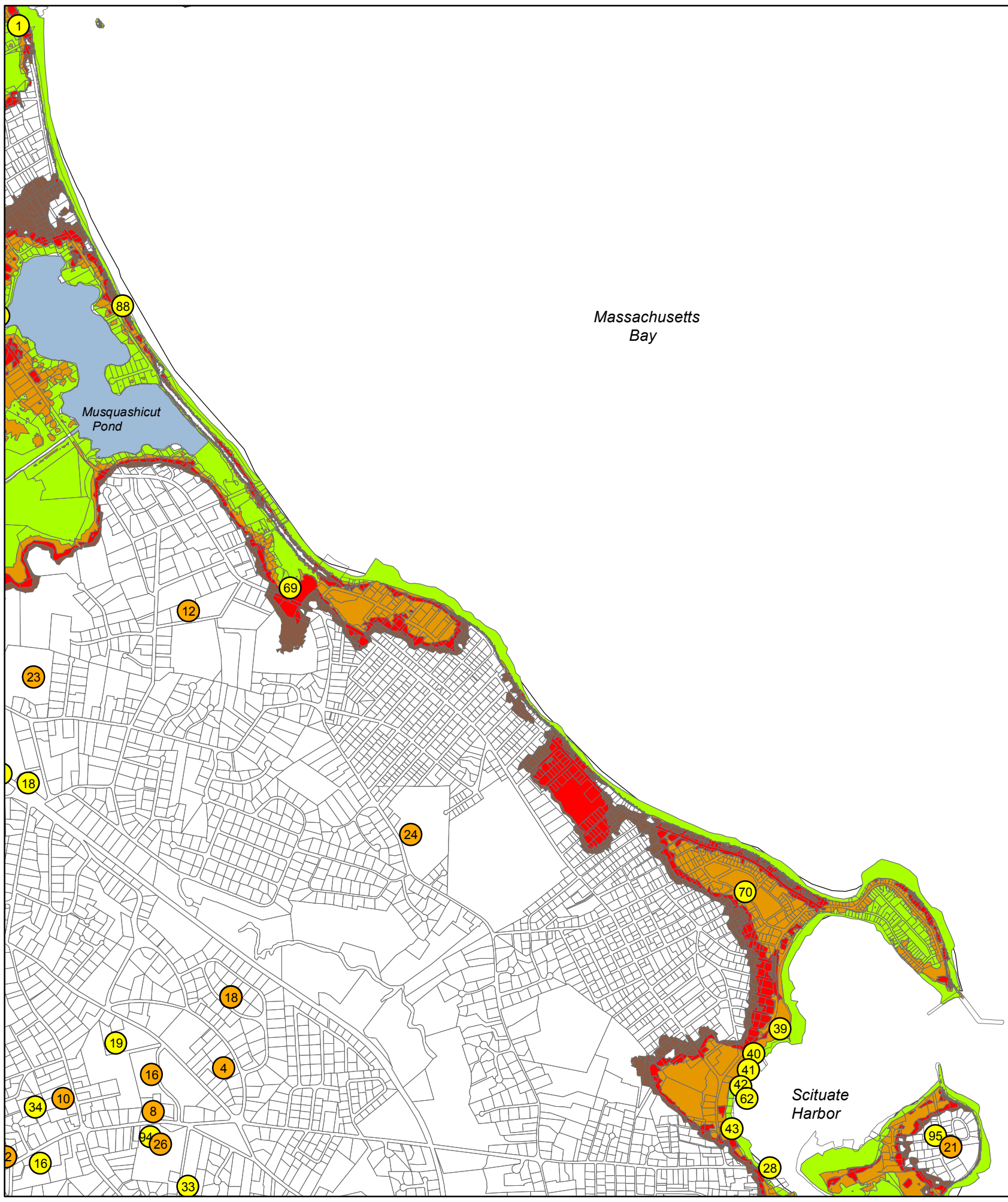
**Map 2-7.2
Hurricane Inundation Zones
SW Quad
Scituate, MA**

September 3, 2021 CSP
Source: MassGIS/Town of Scituate

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Scituate, MA



Legend

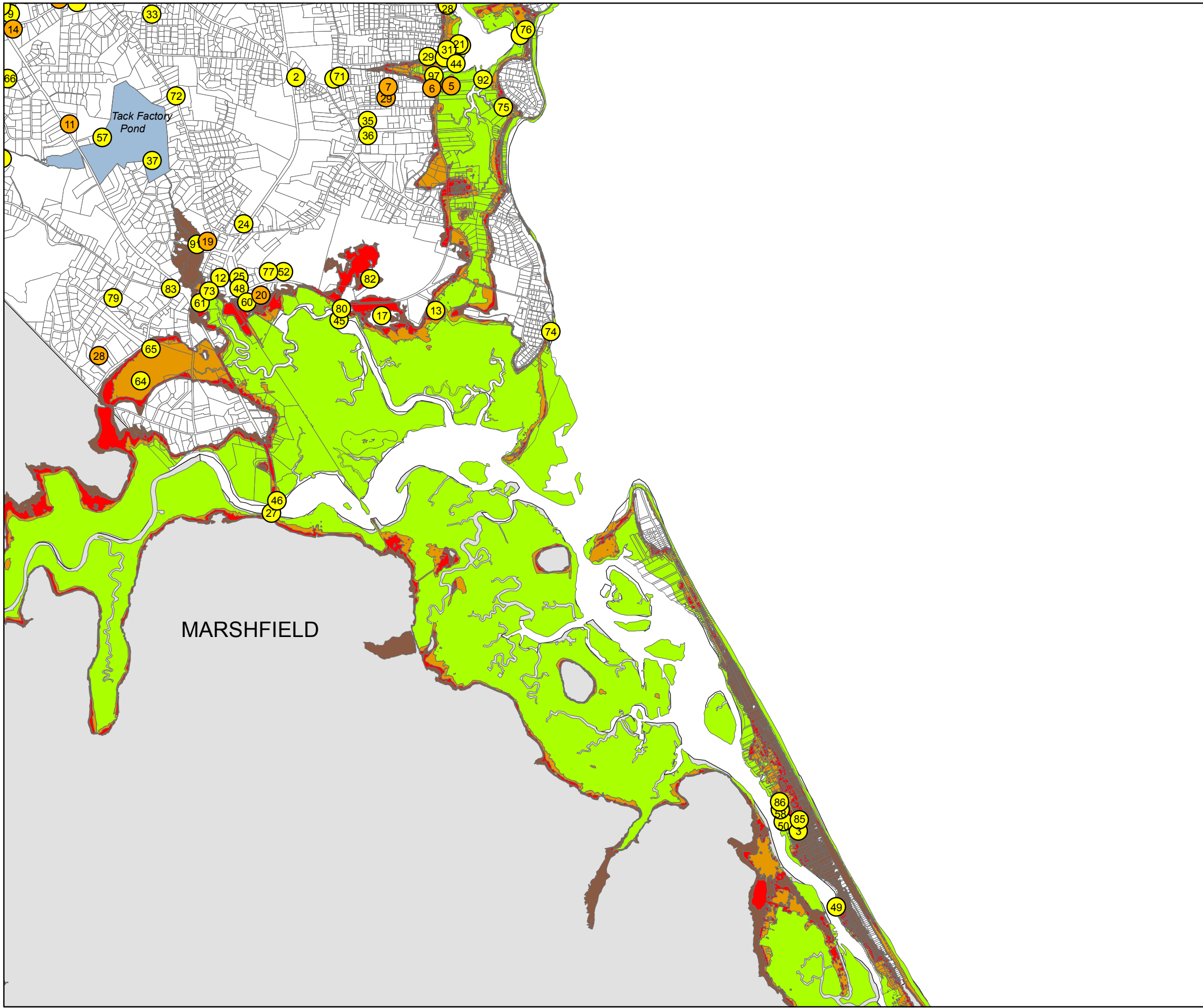
- 2 Critical Facility
 - 2 Vulnerable Population
- Hurricane Categories
- Category 1
 - Category 2
 - Category 3
 - Category 4

Map 2-7.3 Hurricane Inundation Zones NE Quad Scituate, MA

September 3, 2021 CSP
Source: MassGIS/Town of Scituate

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Scituate, MA



Legend

-  Critical Facility
 -  Vulnerable Population
- Hurricane Categories
-  Category 1
 -  Category 2
 -  Category 3
 -  Category 4

MARSHFIELD

**Map 2-7.4
Hurricane Inundation Zones
SE Quad
Scituate, MA**

September 3, 2021 CSP
Source: MassGIS/Town of Scituate

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Appendix B – Public Information and Outreach

Project Webpage

Project Kickoff Meeting: August 27, 2020

Local Hazard Mitigation Committee Meeting #1: November 18, 2020

Local Hazard Mitigation Committee Meeting #2: April 29, 2021

Public Workshop #1: July 27, 2021

Local Hazard Mitigation Committee Meeting #3: October 5, 2021

Local Hazard Mitigation Committee Meeting #4: February 1, 2022

Public Workshop #2: _____

On-Line Survey

Project Webpage

Town of Scituate

Hazard Mitigation Plan Update

FEMA defines hazard mitigation as:

A series of actions and policies designed to reduce and/or eliminate the impacts of naturally occurring disasters on people and property.



About the Scituate Hazard Mitigation Plan Update Project

The Town of Scituate has hired the Horsley Witten Group, Inc. to assist with the development of the Scituate Hazard Mitigation Plan Update.

Why is this important? Hazard mitigation planning enables municipalities to identify risks and vulnerabilities associated with natural hazards and develop long-term strategies for protecting people and property from future hazard events. Further information is available on FEMA's Hazard Mitigation Planning page: <http://www.fema.gov/hazard-mitigation-planning>.

A hazard mitigation plan should be considered a living document that must grow and adapt, keeping pace with a community's growth and change. The Disaster Mitigation Act of 2000 (DMA) places high priority on the continuation of the planning process after the initial submittal, requiring communities to seek and receive re-approval from FEMA in order to remain eligible for financial assistance.

The approach for this plan development is premised on four primary methods, all geared towards meeting the requirements of the DMA 2000 Public Law 106-390, October 10, 2000:

- Planning Process—Outreach and Stakeholder Coordination
- Risk Assessment—Identifying Hazards and Estimating Losses
- Mitigation Strategy— Identifying Mitigation Actions and Implementation Strategies
- Plan Maintenance—Implementation, Evaluation and Revision/Update

Contacts

Kyle Boyd
Town of Scituate
Coastal Management Officer
kboyd@scituatema.org
(781) 545-8808

Craig Pereira
Horsley Witten Group, Inc.
Project Manager
cpereira@horsleywitten.com
(401) 272-1717

[Stay tuned for more information on how to get involved!](#)

Project Kickoff Meeting: August 27, 2020



Memorandum of Meeting

To: Kyle Boyd

From: Craig Pereira

Date: August 27, 2020

Re: Scituate Hazard Mitigation Plan Update Kickoff Call

Craig Pereira and Kyle Boyd conducted a project kickoff call for the Scituate Hazard Mitigation Plan Update. The following items were discussed and include follow up items:

1. Establishment of the Scituate Hazard Mitigation Planning Team (HMPT)...Kyle

- As this project includes required elements of the CRS Activity 510 for Floodplain Management, the following steps must occur prior to the first HMPT meeting:
 - Assemble the HMPT from various municipal departments:
 - Police
 - Fire
 - Emergency Management
 - Planning/Community Development
 - Engineering
 - Public Works
 - Sewer/Water
 - Conservation Agent
 - Public Health Agent
 - Housing
 - Incorporate members of the general public not directly affiliated with any municipal/governmental position (target is for 50% of the HMPT here, for full credit):
 - Residents
 - Businesses
 - Developers/Contractors
 - Environmental Groups
 - Non-Profits
 - Academia
 - Once membership is confirmed, the Board of Selectmen to officially recognize the HMPT through resolution (only 2 points credited for this, so if it slows the process down, not a requirement). Resolution should include person responsible for developing the plan and the timeline for completion (Kyle Boyd/May 1, 2021).
 - Meeting schedule must be publicly posted and open to the public.

2. Project Webpage/Kickoff Announcement...Craig to develop static PDF, Kyle to post it to Town's website

- Craig will develop a static PDF announcing the project. This should remain live throughout the duration of the project and serve as a repository of data for the general

public to include meeting minutes, presentations and draft update sections (as available).

- Once the HMPT is confirmed, an interdepartmental memo/email should go out to municipal employees announcing the project kickoff and drive folks to the project webpage...Kyle
3. 2016 Mitigation Action Strategy...Kyle
- The emphasis for the HMPT meeting #1 will be to develop a 'Report Card' on the 2016 Mitigation Strategy. Need to identify what actions were accomplished, responsible party, date and funding mechanism. This will also be the emphasis of the first public workshop.
4. Data Collection...Kyle
- Craig will need all available mapping and GIS data available for the Town.
 - Craig will need a copy of the existing 2016 plan in native format (Microsoft Word)
 - Data Collection
 - Existing ECEMP
 - MVP Final Report/Mapping data sets
 - Emergency Action Plans for High/Significant dams
 - Phase I inspection reports for dams
- HMPT members can upload large documents to HW's FTP site by:
- Go to <http://www.horsleywitten.com>
 - On the lower right-hand side of the webpage, click on 'Click here to send us your large files'
 - Enter your email address
 - Enter recipient at HW (Craig Pereira)
 - Password is StormWater (case sensitive)
 - Browse the files you would like to send
 - Click on 'Send this File'
5. Coordination with State Floodplain Coordinator for NFIP data...Kyle
Joy Duperrault, CFM
State NFIP Coordinator & Deputy Hazard Mitigation Officer
joy.duperrault@mass.gov (no desk phone available during COVID 19)
Information requested includes:
- Total number of active flood insurance policies
 - Total coverage value
 - Number of policies in VE, A zone
 - Number and value of claims since 1978
6. Coordination with FEMA on Repetitive Flood Loss Properties (ISAA Agreement)...Kyle
Garrett Fish
Emergency Management Specialist
FEMA Region I
99 High St
Boston, MA 02110
202-957-4109
garrett.fish@fema.dhs.gov
Information requested includes:
- Physical Address
 - Building Type/Use...commercial, residential, etc.

Local Hazard Mitigation Committee Meeting #1: November 18, 2020



Scituate Hazard Mitigation Plan Update

Hazard Mitigation Planning Team Meeting #1

Virtual Zoom Call

<https://us02web.zoom.us/j/81893014470?pwd=T2l5RE9xUG9nemE5eFlaOFA2NmK3QT09>

Meeting ID: 818 9301 4470

Passcode: 164833

By Phone:

Dial 1-312-626-6799

Enter Meeting ID: 818 9301 4470

When prompted for Participant ID number PRESS #

Enter Passcode: 164833

November 18, 2020 2:00 – 4:00 PM

Agenda

1. Introductions
2. Project Coordination
 - a. Scope
 - b. Schedule
 - c. Proposed Layout
 - d. Public Outreach
 - i. Project Webpage
 - ii. Interdepartmental memo/email: Project kickoff
 - e. Data Collection
 - i. HW FTP access/instructions
 - ii. 2016 Plan in native format
 - iii. Parcel data set with recent CAMA export
 - iv. Critical Facilities confirmation
 - v. GIS Mapping (data sets/project files)
3. Hazard Index
4. 2016 Mitigation Actions (Report Card)



5. Municipal Interviews

6. Agenda/Logistics for Public Workshop #1

- a. Date/Time/Venue (January 2021)
- b. Agenda
 - i. Overview
 - ii. Why Hazard Mitigation Planning
 1. Mitigation Process
 2. Mitigation Goals
 3. Mitigation Actions
 - iii. 2016 Mitigation Actions
 - iv. Questions/Comments
- c. Online Survey kickoff



Memorandum of Meeting

To: Kyle Boyd

From: Craig Pereira

Date: November 18, 2020

Re: Scituate Hazard Mitigation Plan Update: Hazard Mitigation Planning Team Meeting #1

In attendance:

John Murphy – Fire Chief/Emergency Management Director

Karen Joseph - Planning/Community Development

Sean McCarthy – Engineering/Public Works

Amy Walkey - Conservation

Margaret Loughlin - Resident

Ben Haskell – Environmental/NOAA

James Canavan – Academia

Kyle Boyd - Coastal Management Officer

Paul Norton – Police

Dan Smith - Engineering

Consultant Team

Craig Pereira, Project Manager - Horsley Witten Group, Inc. (HW)

The first Hazard Mitigation Planning Team (HMPT) meeting was held November 18, 2020. The following items were discussed and include follow up items highlighted in yellow:

1. Introductions/HMPT Membership

As this was the HMPT's first meeting together, introductions and an overview of the HMPT's charge was requested and conducted.

- Kyle will continue to seek additional members from the general public not directly affiliated with any municipal/governmental position (target is for 50% of the HMPT here, for full credit):
 - Business
 - Non-profit
- Kyle will seek resolution from the Board of Selectmen to officially recognize the HMPT through resolution (December 15, 2020). Resolution should include person responsible for developing the plan and the timeline for completion (Kyle Boyd/May 1, 2021...may change due to extension request).
- Meeting schedule must be publicly posted and open to the public...once project tab is added to HMP webpage and schedule is updated.

2. Scope

- Craig provided a brief overview of the scope of work (attached).

3. Schedule

- Craig and Kyle previously discussed request an extension due to a later than expected start date.
 - Craig indicated that MEMA will be working on requests after the first of the new year. Kyle to reach out to David Woodbury and make extension request.
 - 4. Proposed HMP update layout
 - Craig presented a proposed plan update layout. It is very similar to the existing 2016 plan, with a few refinements (attached).
 - All HMPT members should review and provide comment (s) by December 2, 2020.
 - 5. Public Outreach
 - Project Webpage/Kickoff Announcement
 - Kyle will coordinate with Town's IT/website to add a tab to the HMP page for this project. Craig developed a static PDF announcing the project (attached). This should remain live throughout the duration of the project and serve as a repository of data for the general public to include meeting minutes, presentations and draft update sections (as available).
 - Once the HMPT is confirmed, an interdepartmental memo/email should go out to municipal employees/Department chairs announcing the project kickoff and drive folks to the project webpage...Kyle (please copy Craig on this email).
 - 6. Data Collection
 - Craig requested all available mapping and GIS data available for the Town.
 - Includes:
 - Parcel Dataset with current CAMA data export from Assessor's office.
 - Kyle to provide dataset.
 - Craig to request CAMA export, if not already included.
 - Critical Facilities dataset.
 - Chief Murphy to confirm list of critical facilities (attached).
 - Kyle to reach out to MAPC.
 - MVP Project files.
 - Kyle to reach out to MAPC.
 - Craig requested a copy of the existing 2016 plan in native format (Microsoft Word)...Kyle will look to provide this.
 - Additional data (as available):
 - Existing ECEMP
 - Emergency Action Plans for High/Significant dams
 - Phase I inspection reports for dams
 - Stormtide Pathways Analysis...Kyle to provide
 - Recent CRS report...Kyle to provide
- HMPT members can upload large documents to HW's FTP site by:
- Go to <http://www.horsleywitten.com>
 - On the lower right-hand side of the webpage, click on 'Click here to send us your large files'
 - Enter your email address
 - Enter recipient at HW (Craig Pereira)
 - Password is StormWater (case sensitive)

- Browse the files you would like to send
- Click on ‘Send this File’

- Coordination with State Floodplain Coordinator and FEMA Region 1 for NFIP data...Kyle to reach out to both.

Joy Duperault, CFM

State NFIP Coordinator & Deputy Hazard Mitigation Officer

joy.duperault@mass.gov (no desk phone available during COVID 19)

Information requested includes:

- Total number of active flood insurance policies
- Total coverage value
- Number of policies in VE, A zone
- Number and value of claims since 1978
- Coordination with FEMA on Repetitive Flood Loss Properties (ISAA Agreement)

Garrett Fish

Emergency Management Specialist

FEMA Region I

99 High St

Boston, MA 02110

202-957-4109

garrett.fish@fema.dhs.gov

Information requested includes:

- Physical Address
- Building Type/Use...commercial, residential, etc.

7. Hazards to be included:

- Everything included from the 2016 plan, with the addition of drought, extreme heat, hail, and invasive species.
- Climate change will be included in each hazard profile as a separate section entitled, ‘Climate change impacts on...’
- HW completed a review of NOAA’s National Climatic Data Center/Severe events database and recorded events (date/severity/impact) for all hazards considered. Utilizing FEMA’s hazard index criteria (attached), Craig developed the draft Hazard Index (attached).

- All HMPT members should review and provide comment (s) by December 2, 2020. If there is a requested revision to any category, please provide justification.

8. 2016 Mitigation Actions Report Card

- Craig reviewed the 2016 Mitigation Actions (attached). The emphasis for the first public workshop will be a ‘Report Card’ on the 2016 Mitigation Strategy (what has been accomplished - remove, not accomplished – carry forward, not accomplished – no longer relevant/remove.
 - All HMPT members should review the document to identify what actions were accomplished, responsible party, date and funding mechanism/amount.

9. Municipal Interviews

- In a few weeks, Craig will reach out to members of this committee and other municipal department representatives to conduct interviews on the Town’s

preparedness and highest priorities for mitigation. Craig will reach out and ask if a phone or email interview is preferred and follow through accordingly. This will be brief (15 minutes).

10. Public Workshop

- As of this memo, Craig is anticipating a mid-January date for the Public Workshop. Craig will coordinate further with Kyle on this.

3.3.1.7 Critical Facilities

Each jurisdiction classifies “critical facilities” based on the relative importance of that facility’s assets for the delivery of vital services, the protection of special populations, and other important functions. If damaged, the loss of that critical facility would present an immediate threat to life, public health, and safety. Protection of critical facilities is also important for rapid response and recovery of a community, its neighborhoods, and its businesses. In Scituate, the following critical facilities have been identified (Table 19):

Table 19. Critical Facilities

Name	Address	Type
Central Park Housing	Central Park Dr.	Elderly Housing
Lincoln Park Elderly Housing	791 Country Way	Elderly Housing
Wheeler Park I	9 Common St.	Elderly Housing
Wheeler Park II	9 Common St.	Elderly Housing
Meeting House Estates	12 Meeting House Lane	Independent Living (Elderly)
Community Residence	412 First Parish Rd.	Assisted Living – persons with disabilities
Community Residence	664 Country Way	Assisted living – persons with disabilities
Community Residence	129 Vernon Rd.	Assisted living – persons with disabilities
DDS Group Home	31 Lawson Rd.	Assisted living – persons with disabilities
Scituate High School	606 Chief Justice Cushing Hwy.	School/Emergency Shelter
Gates Jr. High School	327 First Parish Rd.	School
Wampanoag Elementary School	266 Tilden Rd.	School
Cushing Elementary School	1 Aberdeen Dr.	School
Jenkins Elementary School	61 First Parish Rd.	School
Hatherly School	72 Ann Vinal Rd.	School
INLY School	46 Watch Hill Drive	School
Police Dept.	604 Chief Justice Cushing Hgwy.	Police Station
Fire Dept.	596 Chief Justice Cushing Hgwy.	Fire Station
Fire Dept.	143 First Parish Rd.	Fire Station
Fire Dept.	4 River St. Humarock	Fire Station
Scituate Reservoir	Chief Justice Cushing Highway	Surface Drinking Water Supply
Scituate Water Treatment Plant	Chief Justice Cushing Hwy.	Water Treatment Plant
Walnut Hill Booster Pump Station	27 Woodworth Lane	Water Booster Pump Station
Mann Lot Booster Station	Mann Lot Rd. & Creelman Dr.	Water Booster Pump Station

Name	Address	Type
Well #10	87A Corner Stetson Rd.	Public Drinking Water Well
Well #11	87 Corner Stetson Rd.	Public Drinking Water Well
Well #18B	Widow's Walk Golf Course	Public Drinking Water Well
Well #19	381 Chief Justice Cushing Highway	Public Drinking Water Well
Well #17A	98 Tack Factory Pond Rd.	Public Drinking Water Well
Well #22	66 Old Forge Rd.	Public Drinking Water Well
Water Division Standpipe	164 Maple St.	Drinking Water Storage
Water Division Standpipe	Mann Lot Rd. & Creelman Dr.	Drinking Water Storage
North River Waste Water Pollution Control Plant	161 Driftway	Sewer Treatment Facility
Chain Pond Pump Station	42°13'13.42"N, 70°44'52.76"W	Sewer Pump Station
Musquashicut Ave Pump Station	42°13'47.08"N, 70°45'46.71"W	Sewer Pump Station
Otis Road Pump Station	42°12'29.07"N, 70°43'33.07"W	Sewer Pump Station
First Parish Pump Station	42°11'48.51"N, 70°46'6.11"W	Sewer Pump Station
Country Way Pump Station	42°11'29.11"N, 70°45'5.43"W	Sewer Pump Station
Herring Brook Pump Station	42°10'35.99"N, 70°44'54.16"W	Sewer Pump Station
Collier Road Pump Station	42°10'28.42"N, 70°42'53.17"W	Sewer Pump Station
Peggotty Beach Pump Station	42°11'23.82"N, 70°43'9.13"W	Sewer Pump Station
Edward Foster Pump Station	42°11'47.90"N, 70°42'58.94"W	Sewer Pump Station
Transfer Station	280 Driftway	Solid Waste Transfer Station
Old Oaken Bucket Pond Dam	Country Way	Holds back Old Oaken Bucket Pond
Herring Brook Reservoir Dam	Chief Justice Cushing Highway	Protects state highway
Hunters Pond Dam	Mordecai Lincoln Rd.	Holds back waters of Hunters Pond, also is part of Mordecai Lincoln Rd.
State Launch Ramp	Between 44 & 66 Jericho Road	Emergency Boat Access
Cole Parkway Launching Ramp	Cole Parkway	Emergency Boat Access
MBTA Greenbush Station	Off Driftway	Transportation Facility; Layover for Greenbush line
Sea St. & Francis R. Powers Bridges	Marshfield Ave. & Julian St., Humarock	Access to Humarock
Edward Foster Bridge	Edward Foster Road	Access to First and Second Cliffs
Cell Towers	600 & 1010 Chief Justice Cushing Highway 1010, 143 First Parish Rd., off Thomas Clapp Rd.	Citizen & Emergency Communication
CVS Pharmacy	92 Front Street	Pharmacy
Scituate Pharmacy	372 Gannet Street	Pharmacy
Scituate Marketplace	71 Front Street	Food Market
St Mary's Hall	2 Edward Foster Road	Church/ Possible Shelter (to be explored)

Name	Address	Type
St Mary's Church	1 Kent St.	Church/ Possible Shelter (to be explored)
Christ Lutheran Church	460 Chief Justice Cushing Highway	Church/ Possible Shelter (to be explored)
St. Luke's Church	465 First Parish Rd.	Church/ Possible Shelter (to be explored)
First Parish Unitarian Universalist Church	330 First Parish Rd.	Church/ Possible Shelter (to be explored)

3.4 Risk Analysis and Assessment

The Scituate Hazard Mitigation Committee assessed the town's risks to natural disasters in terms of population, property, economic resources, and probability of occurrence. The committee considered public health/safety, structural damage, area or town-wide evacuation, and structures that house people with special needs. The committee began by identifying specific areas and structures that are vulnerable to natural hazards.

Vulnerable areas were determined by considering past and potential natural hazards that pose a threat to the population, property, and economic resources of the town. For example, the town's population, residential/commercial properties, schools, bridges and historical buildings were identified as vulnerable areas to natural hazardous events.

The rankings were determined by considering the historical or potential occurrence of natural disasters, the primary threat to the town, and the mitigation benefit that would be received if an appropriate mitigation action was implemented.

3.4.1 Methodology

Evaluating the number of times that the natural hazard has impacted Scituate in the past provides a measure of the likelihood of the event occurring again in the future. This rating is derived from an investigation of trends in the long-term (30 years at least) data (Table 20). Examination of past events helps to determine the probability of similar events occurring in the future. This evaluation also considered the effects of changes in the regional climate.

FEMA's Frequency and Severity categorization/methodology (Hazard Index)

Criteria for Frequency Categorization:

- Very low frequency:* events that occur less frequently than once in 1,000 years (less than 0.1% per year). (1)
- Low frequency:* events that occur from once in 100 years to once in 1,000 years (0.1% to 1% per year). (2)
- Medium frequency:* events that occur from once in 10 years to once in 100 years (1% to 10% per year). (3)
- High frequency:* events that occur more frequently than once in 10 years (greater than 10% per year). (4)

The criteria used for severity categorization, based on past hazard events includes:

Criteria for Severity Categorization (based on past hazard events):

- Minor:* Limited and scattered property damage; no damage to public infrastructure; contained geographic area; essential services not interrupted; no injuries or fatalities. (1)
- Serious:* Scattered major property damage; some minor infrastructure damage; wider geographic area; essential services are briefly interrupted; some injuries/fatalities. (2)
- Extensive:* Consistent major property damage; major damage to public infrastructure; essential services are interrupted for several hours to several days; many injuries and fatalities. (3)
- Catastrophic:* Property and public infrastructure destroyed; essential services stopped; thousands of injuries and fatalities. (4)

<i>Natural Hazard</i>	<i>Frequency (i.e. Very Low, Low, Medium, High)</i>	<i>Location (i.e. small/local, medium/regional, large/multiple communities)</i>	<i>Severity (i.e. minor, serious, extensive, catastrophic)</i>	<i>Hazrd Index (i.e. ranked by combining frequency and severity; 10 - high, 1 - low)</i>
Flood-Related Hazards				
- Riverine/Flash Flooding	High	Medium/Regional	Serious	6
- Inland/Urban Flooding/Heavy Rain	High	Medium/Regional	Extensive	7
- Climate Change	Medium	Large/Multiple	Serious	5
- Dam Failures				
- Coastal Flooding	High	Medium/Regional	Extensive	7
- Sea Level Rise	High	Large/Multiple	Serious	6
- Storm Surge	High	Small/Local	Minor	5
- Coastal Erosion/Shoreline Change	High	Medium/Regional	Extensive	7
Winter-Related Hazards				
- Blizzards/Snow/Nor' easter	High	Large/Multiple	Extensive	8
- Ice	Very Low	Medium/Regional	Minor	2
- Extreme Cold	High	Small/Local	Minor	5
Wind-Related Hazards				
- Hurricanes	High	Large/Multiple	Extensive	7
- Tornadoes	High	Medium/Regional	Serious	6
- High Winds	High	Medium/Regional	Extensive	7
- Lightning/Thunderstorms	High	Medium/Regional	Serious	6
- Hail	High	Small/Local	Minor	5
- Tropical Storm	High	Large/Multiple	Serious	6
- Waterspout	Very Low	Small/Local	Minor	2
Geologic-Related Hazards				
- Earthquakes	Very Low	Medium/Regional	Serious	3
- Landslides	Very Low	Small/Local	Minor	2
Drought				
- Drought	High	Medium/Regional	Minor	5
- Extreme Heat	High	Small/Local	Minor	5
Urban Fire/Wildfire				
- Urban Fire/Wildfire				
Invasive Species				
- Multiple	Medium	Small/Local	Minor	4

FEMA's Frequency and Severity categorization/methodology (Hazard Index)

Criteria for Frequency Categorization:

- Very low frequency:* events that occur less frequently than once in 1,000 years (less than 0.1% per year). (1)
- Low frequency:* events that occur from once in 100 years to once in 1,000 years (0.1% to 1% per year). (2)
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- Catastrophic:* Property and public infrastructure destroyed; essential services stopped; thousands of injuries and fatalities. (4)

Scituate Hazard Mitigation Plan (proposed layout)

Section 1: Introduction

Overview

- Hazard mitigation planning in general

What Hazard Mitigation Can do for Scituate

- Benefits of hazard mitigation planning

Scituate Goals

- TBD...

Planning Process

- Overview of approach/process of the project
 - o Hazard Mitigation Planning Team Meetings
 - o Public Workshops
 - o Municipal Interviews
 - o Survey

Environmental Setting

- Geographic location
- History
- Government Structure

History of Disaster Declarations

- Federal Emergency and Major Disaster Declarations for the County

Recent Disaster Declarations

- Recent (2016 – forward) Federal Emergency and Major Disaster Declarations for the County

Section 2: Risk Assessment

Introduction

- Which hazards merit special attention
- What actions might be taken to reduce the impact(s) of those hazards
- What resources are likely to be needed

Hazard Identification

- Required to evaluate all hazards identified in the State Plan...anticipated list:
 - o Riverine/Flash Flooding
 - o Heavy Rain/Inland and Urban Flooding
 - o Climate Change
 - o Sea Level Rise
 - o Dam Failure
 - o Coastal Erosion/Shoreline Change
 - o Coastal Flooding
 - o Storm Surge
 - o Blizzards/Heavy Snow/Winter Weather/Nor'easters
 - o Ice Storms
 - o Extreme Cold
 - o Hurricanes
 - o Tornadoes/High Winds

- Lightning/Thunderstorms
- Hail*
- Earthquakes/Landslides
- Drought*
- Extreme Heat*
- Urban Fire/Wildfires
- Invasive Species
- Likely not to be addressed:
 - Avalanche
 - Expansive Soils
 - Land Subsidence
 - Volcanoes
 - Tsunamis

Hazard Profiles

- Review of NOAA's National Climatic Data Center (<http://www.ncdc.noaa.gov/>) 'Storm Events' database and develop tables based on hazard type, date, level/description and damages to develop a Hazard Index.
 - Flood Related
 - Winter Related
 - Wind Related
 - Geologic Related
 - Drought Related
 - Urban Fire/Wildfire Related
 - Invasive Species Related

- Evaluate the location/history/probability of future occurrence of hazards

Criteria for Frequency Categorization:

Very low frequency: events that occur less frequently than once in 1,000 years (less than 0.1% per year).

Low frequency: events that occur from once in 100 years to once in 1,000 years (0.1% to 1% per year).

Medium frequency: events that occur from once in 10 years to once in 100 years (1% to 10% per year).

High frequency: events that occur more frequently than once in 10 years (greater than 10% per year).

Criteria for Severity Categorization (based on past hazard events):

Minor: Limited and scattered property damage; no damage to public infrastructure; contained geographic area; essential services not interrupted; no injuries or fatalities.

Serious: Scattered major property damage; some minor infrastructure damage; wider geographic area; essential services are briefly interrupted; some injuries/fatalities.

Extensive: Consistent major property damage; major damage to public infrastructure; essential services are interrupted for several hours to several days; many injuries and fatalities.

Catastrophic: Property and public infrastructure destroyed; essential services stopped; thousands of injuries and fatalities.

- Mapping will also be developed
 - o Critical Facilities
 - o FEMA Flood Zones
 - o Snowfall, Hurricane paths, storm surge, etc.

Vulnerability

- Evaluates vulnerability of built environment, social and environment.

Development Trends

- o Changes over time, future development plans (residential/commercial/industrial)

Economic Vulnerability

- o Impacts of FEMA flood zones (Economic by land use type, land/building values)

Social Vulnerability

- o Impacts to built/natural environment and that relationship to the social structure of the community
- o Infrastructure/Emergency lifelines
- o Evacuation/Populations at risk

Environmental Vulnerability

FEMA Disaster Grant Assistance

- Has the Town received any financial assistance from MEMA/FEMA?

Section 3: Capability Assessment

Introduction

- Documents local, state and federal department, agency and program capabilities in terms of pre and post-disaster activities

Planning/Regulatory Capabilities

- Planning documents
- Regulations/Bylaws
- Building Code

Administrative Capabilities

- Emergency Management Plan
 - o Emergency Operations Center/Shelter
- Municipal Website
- Coordination with Neighboring Communities
- Municipal Structure/Staff

Financial Capabilities

- Federal/State Grant Opportunities

National Flood Insurance Program

- NFIP/Compliance with NFIP

Existing Protection Matrix

- Summary of all above

Section 4: Mitigation Strategy

Introduction

Mitigation Activities

- Requires an action for every vulnerability identified in the plan

Mitigation Action Plan

- Categories
 - Public Education and Awareness
 - Property Protection
 - Natural Resource Protection
 - Structural Projects
 - Emergency Services
 - Planning and Prevention
- Time Frame
 - Short Term = 0 to 6 Months
 - Medium Term = 6 to 18 Months
 - Long Term = 18 Months to 5 Years
- Cost Estimate
 - Staff Time – municipal personnel time
 - Minimal – less than \$5,000
 - Moderate – more than \$5,000, but less than \$25,000
 - Significant – over \$25,000
- Prioritization of Actions (abbreviated Benefit/Cost Analysis)
STAPLEE Criteria
 - **Social:** Is the action compatible with present and future local community needs and values?
 - **Technical:** Is the action feasible with available local resources (or as supplement by outside resources as necessary)?
 - **Administrative:** Does the community have the administrative capacity to implement the action?
 - **Political:** Is there strong public support to implement and maintain the action?
 - **Legal:** Does the community have the legal authority to implement the action?
 - **Economic:** Is the action cost-effective?
 - **Environmental:** Does the action impact environmental resources, and is the impact positive, negative, or neutral?
- Action Description
 - Action Type:
 - Priority Score:
 - Lead:
 - Supporting:
 - Time Frame:
 - Financing Options:

- Cost Estimate:
- Benefit:
- Vulnerable Area:

Section 5: Plan Implementation/Maintenance

Implementation/Evaluation/Revision

- Implementation
 - Following municipal adoption

- Evaluation
 - Annually

- Revision
 - Every 5 years/after a major event

Continued Public Involvement

- Posted on Town's website
- Annual Town Meeting

Town of Scituate, MA

HMPT Meeting #1



Virtual Zoom Call

<https://us02web.zoom.us/j/81893014470?pwd=T2l5RE9xUG9nemE5eFlaOFA2NmM3QT09>

Meeting ID: 818 9301 4470

Passcode: 164833

By Phone:

Dial 1-312-626-6799

Enter Meeting ID: 818 9301 4470

When prompted for Participant ID number PRESS #

Enter Passcode: 164833

November 18, 2020 2:00 PM - 4:00 PM

<u>Name</u>	<u>Email Address</u>
John Murphy	
Karen Joseph	
Sean McCarthy	
Amy Walkey	
Margaret Loughlin	
Ben Haskell	
James Canavan	
Kyle Boyd	
Paul Norton	
Dan Smith	
Craig Pereira	

Local Hazard Mitigation Committee Meeting #2: April 29, 2021



Scituate Hazard Mitigation Plan Update

Hazard Mitigation Planning Team Meeting #2

Virtual Zoom Call

<https://us02web.zoom.us/j/84248604279?pwd=RzJwNUpaV2RObFYwSUZ2enExV1I4Zz09>

Meeting ID: 842 4860 4279

Passcode: 614232

By Phone:

Dial: 1-301-715-8592

Enter Meeting ID: 842 4860 4279

When prompted for Participant ID number PRESS #

Enter Passcode: 614232

April 29, 2021 10:00 – 11:30 AM

Agenda

1. Data Collection
 - a. 2016 Plan Report Card
 - b. Hazard Index
 - c. Critical Facilities
 - i. Confirmation on facilities
 - ii. Shapefiles
 - iii. Dams
 - d. ECEMP
 - e. NFIP Coordination – Joy Duperault
 - f. FEMA Region 1 Coordination – Garrett Fish
 - g. Municipal Interviews
2. Mapping...to be developed
 - i. Locus
 - ii. FEMA Flood Hazard Areas
 - iii. Earthquakes/Landslides
 - iv. Average Annual Snowfall
 - v. Critical Facilities
 - vi. Traffic Control Points/Evacuation Routes
 - vii. Shoreline Change
 - viii. Sea Level Rise
 - ix. SLOSH



3. Public Workshop #1 - Agenda/Logistics
 - a. Target Date/Time
 - b. Agenda
 - i. Overview
 - ii. Why Hazard Mitigation Planning
 1. Mitigation Process
 2. Mitigation Goals
 3. Mitigation Actions
 - iii. 2016 Mitigation Actions
 - iv. Questions/Comments
 - c. Online Survey kickoff



Memorandum of Meeting

To: Kyle Boyd

From: Craig Pereira

Date: April 29, 2021

Re: Scituate Hazard Mitigation Plan Update: Hazard Mitigation Planning Team Meeting #2

In attendance:

John Murphy – Fire Chief/Emergency Management Director
Karen Joseph - Planning/Community Development
Sean McCarthy – Engineering/Public Works
Ben Haskell – Environmental/NOAA
Kyle Boyd – Director of Planning and Development
Lynda Ferguson – Business Owner
Andrew Scheele – Director, Board of Health
William Branton – Chief Operator, Scituate Wastewater Treatment Facility

Consultant Team

Craig Pereira, Project Manager - Horsley Witten Group, Inc. (HW)

The second Hazard Mitigation Planning Team (HMPT) meeting was held April 29, 2021. The following items were discussed and include follow up items highlighted in yellow:

1. 2016 Plan Report Card

Craig Pereira commented that all but two actions have been addressed:

Action 7: Implement Recommendations of Coastal Assessment

The comprehensive assessment of coastal erosion and engineering for flood protection measures along the entire coast will be completed in June, 2016. At that point the town will begin to identify funding sources for each of the actions outlined. Implement actions created from Assessing Coastal Erosion report.

Kyle Boyd: Elevation of/berm along Humarock Road was pursued but did not have public support so it was abandoned. Carry forward into plan update.

Action 10: Installation of generators

Installation of generators for critical municipal communication facilities to support continuity of operations and community emergency supportive measures.

HMPT unsure if completed...Kyle reached out to Kevin Kelly, Facilities Director:

Purchased generators:

All Six Schools - (Some partial, some Full)

Public Safety - Full
Town Hall – Full
Board of Health - Full (Same generator as Town hall)
Communications Shed- Full
Old Gates and Recreation – Partial
New Senior Center - Full
Library - In Design Phase
Highway - Partial
Station One – SFD - Full
Station Four – SFD – under construction and assumed there will be one.
Water Treatment – Full
Sewer Department – Full

2. Hazard Index

Craig stated that NOAA’s National Center for Environmental Information does not include data for dam failures or urban fire/wildfire (data source used to develop Hazard Index)

- Dam Failures: Craig stated the 2016 Plan indicated Low Frequency and Serious Severity.
 - Sean McCarthy indicated no dam failure incidents since 2016 and to carry forward the same hazard ranking.
- Urban Fire/Wildfires: Craig stated the 2016 Plan indicated Low Frequency and Minor Severity
 - Chief Murphy to weigh in here.

3. Critical Facilities Inventory

Craig needs confirmation on the Critical Facilities Inventory (name/location/type) as well as any additions. Also, a shapefile (if one exists).

- HMPT indicated there are some errors and missing facilities.
- Kyle to reach out to Darci Schofield (MAPC) to see if GIS shapefile is available from the 2018 MVP process.
- Ben Haskell requested to add NOAA’s facility at 175 Edward Foster Road, includes Fire/Police relay station.
- Lynda Ferguson requested the Inn at Scituate Harbor be added which serves as an emergency shelter/facility. Also Susan Phippen House 125 Mann Lot Road (SANDS operations), new Senior Center 333 First Parish Road and the Food Pantry 327 First Parish Road.
- All HMPT members to review list (attached) and provide feedback (corrections, additions).

Craig also needs information (Phase 1 Inspection Reports, Emergency Action Plans, O & M Plans) on existing dams in the community including:

- First Herring Brook Dam
- Mordecai Lincoln Road Dam: Sean indicated this dam was removed. Sean to provide brief summary on this.
- Old Oaken Bucket Pond Dam
- Bound Brook Control Dam (owned by Cohasset, but impacts Scituate)

Sean to provide to Craig: Phase 1 Inspection Reports, Emergency Action Plans, O & M Plans. Sean to look into data for Bound Brook Control Dam. Sean indicated that Reservoir Dam is under analysis. Sean to provide brief summary to Craig.

4. Emergency Management Plan

Craig requested a copy of the Town's ECEMP to review and for inclusion in Section 3 Capability Assessment. Specifically information on the following:

- Purpose Statement
- Goals
- Emergency Operations Shelter (Primary, Alternate/Mass Care Facilities)
- Mutual Aid Systems
- Emergency Alerts and Warnings

Chief Murphy to provide ECEMP data to Craig.

5. NFIP/NFIP Coordination

Craig asked the status of coordination with Joy Duperault and Garrett Fish. Kyle has the data needed and will provide to Craig.

6. Municipal Interviews

Craig will be reaching out to the HMPT and other municipal department representatives to conduct interviews on the Town's preparedness and highest priorities for mitigation. Craig will reach out and ask if a phone or email interview is preferred and follow through accordingly. This will be brief (15 minutes).

7. Mapping to be Developed

Standard required:

- Locus
- FEMA Flood Hazard Areas (with repetitive flood loss areas)
- Earthquakes/Landslides
- Average Annual Snowfall
- Critical Facilities (with FEMA Flood Zones)
- Evacuation Routes/Traffic Control Points
 - Chief Murphy to provide this data to Craig.
- Shoreline Change (Coastal Zone Management Office data)

As part of the Economic Vulnerability Assessment:

- FEMA Flood Zones
- Sea Level Rise (projected scenarios)
- SLOSH (Hurricane Inundation Zones)

Craig will merge GIS parcel data with a new CAMA export from the Assessor's Office, then overlay with the three GIS shapefiles above. Based on where parcels intersect, will develop a list of number of parcels impacted (by type) for each hazard scenario and the economic impacts (land, building, total value).

Craig commented that there are a number of sea level rise scenario projections out there. Given the planning horizon of this plan update, and the expected rise in sea level over time, Craig asked if utilizing the 1-foot (projected ± 2040) and 3-foot (projected ± 2070) rise would accommodate the needs of this analysis.

Lynda asked how this analysis relates to the work the Town has already done. Kyle stated it is similar, yet different and that there are a number of sea level rise projections that have been developed for planning use (Woods Hole Group). Craig commented that he has

completed a review of plans, studies and reports completed since the 2016 plan, and incorporated a summary and any recommendations for action into Section 3 Capability Assessment of the plan update. These same recommendations for action will be included when the HMPT meets to evaluate mitigation actions for inclusion in the plan update.

Kyle suggested checking with Darci Schofield at MAPC regarding sea level rise projections for use.

Ben asked if there is a prioritized list of roadway mitigation projects for the town, specifically Edward Foster Road and the causeway. Kyle and Chief Murphy stated there are some roadways under consideration for improvements that are vulnerable to flooding.

Craig also commented that as part of the Economic Vulnerability Analyses to be completed, roadways impacted by the various hazard scenarios will be included in the plan update. These lists can also be utilized by the Town to prioritize improvements.

8. Invasive Species

Craig commented that invasive species are being considered as a hazard for this plan update, as discussed at HMPT meeting #1. Craig has provided the MA State list of Invasive Species (attached) and requests that Amy Walkey identify those species impacting Scituate, as well as any recent/ongoing projects the Town is pursuing regarding mitigation (local/state/regional level).

9. Public Workshop

Craig stated we need to schedule Public Workshop #1 soon (virtual). This presentation will provide the following:

- Project Overview
- Why Hazard Mitigation Planning
 - Process
 - Goals
 - Actions
- 2016 Plan Report Card...what has the Town accomplished.
- Q & A
- Online Survey kickoff. Craig provided a brief overview of the draft survey that will help meet FEMA's outreach requirements.
 - All HMPT members should review and provide any feedback to Craig on the survey (attached). Craig will announce the online survey at the public workshop. Kyle will have the survey link posted to the project webpage.

Kyle suggested a Tuesday evening 6 – 7:30 pm and will check a few dates and get back to Craig. Craig will develop a Workshop flyer once the date has been finalized, which should also be posted on the project webpage and pushed out by all HMPT members.

10. General Information

HMPT members can upload large documents to HW's FTP site by:

- Go to <http://www.horsleywitten.com>
- On the lower right-hand side of the webpage, click on 'Click here to send us your large files'
- Enter your email address
- Enter recipient at HW (Craig Pereira)

April 29, 2021

- Password is StormWater (case sensitive)
- Browse the files you would like to send
- Click on 'Send this File'

Scituate, MA Hazard Mitigation Actions – 2016 Plan

Action 1: Elevate Repetitive Loss Structures

The Town has completed or permitted 69 homes and utility elevations to date. Eleven additional applications are pending. This program has proven generally popular and the Town plans to continue to offer funding obtained through FEMA grants. Grants to assist owners of Repetitive/Severe Repetitive Loss properties in elevating their homes and/or their utilities in order to reduce the vulnerability to flooding and storm surge. The program criteria will be modified as needed throughout the life of this plan.

Priority: High

Pre or Post Disaster: Pre-disaster

Type of Activity: Structure and Infrastructure Projects

Responsible Departments: Coastal Resources, Building Department, Planning Department, and Conservation Department

Funding Resources: FEMA Grant, Town Budget

Cost: Average cost per home elevation is \$145,000-\$175,000

Timeframe: Medium-term

Completed Yes or No: Yes

Month/Year: Ongoing

Responsible Party: Coastal Management Office

Funding mechanism/Grant amount: Hazard Mitigation/FMA grants totaling \$3,190,018

22 new elevations since the last HMP plan.

Action 2: Protect Key Roads, Bridges and Intersections

Elevate and enhance drainage, roads, bridges and/or flood prevention structures to facilitate ingress and egress during storm events. Some improvements to roads, bridges and intersections have been concluded, however the town needs to continue the program to support critical transportation networks in other areas.

Priority: Medium

Pre or Post Disaster: Pre-disaster

Type of Activity: Structure and Infrastructure Projects

Responsible Departments: Public Works, Coastal Resources, Conservation Department

Funding Resources: Town Operating Budget, FEMA Grants, Chapter 90 Program, MassDOT, MAPC

Cost: Cost to be determined by project

Timeframe: Near-term

Completed Yes or No: Partially...remains ongoing

Month/Year:

Responsible Party:

Funding mechanism/Grant amount:

Dan Smith 1/6/2021 email:

DPW constructed about 200 ft. of new seawall along Edward Foster Rd. across from the new Marine Park. The project helped protect the road and pump station from flooding.

Road elevations:

Elevating roads was one engineered shore protection approach evaluated in Applied Coastal's report. The report lays out the need and prioritization for the following road elevation projects:

- Bailey's Causeway
- Gilson Road
- Central Avenue (4,800 ft)
- Edward Foster Road between Front Street and Peggotty Beach Road (1,800 ft)
- Edward Foster Road between Crescent Road and Conroy Terrace (800 ft)

No design has started on any of the above proposed road elevation projects.

Applied Coastal's report points out the following 2 areas as High potential for road breach:

- North end of Central Avenue in Humarock before the hill leading to the military area.
- Lighthouse Road at the "neck" leading to Cedar Point.

Central Avenue: Preliminary design concluded with the result that the residents are unwilling to give up necessary public beach easements and therefore design was terminated

Lighthouse Road: The breach area currently is protected by a concrete seawall. The wall is in poor/failed condition but is currently in preliminary study, design and permitting stage by the USACOE as part of a Sand Hills seawall replacement project.

Action 3: Foreshore Protection

Repair and replace seawalls and revetments to improve resilience from storm surge, coastal flooding and sea level rise. Approximately 6 miles of protection currently require repair or replacement.

Priority: High

Pre or Post Disaster: Pre-disaster

Type of Activity: Structure and Infrastructure Projects Responsible Department: Public Works, Coastal Resources

Funding Resources: FEMA Grants, MEMA, EOEEA, CZM, Seawall and Dam Safety

Cost: Approximately \$4,000-\$7,000 per linear foot

Timeframe: Near-term

Completed Yes or No: Partially...remains ongoing

Month/Year:

Responsible Party:

Funding mechanism/Grant amount:

Dan Smith 1/6/2021 email:

DPW constructed about 200 ft. of new seawall along Edward Foster Rd. across from the new Marine Park. The project helped protect the road and pump station from flooding.

Completed Seawall Projects:

The DPW recently completed 3 seawall contracts along Oceanside Drive, seawall and drainage improvements constructed to date have reduced severity and duration of flooding in this isolated flood basin of Oceanside Drive.

- Reconstruction of the Mann Hill/ Egypt Beach Cobble Berm was recently completed.
- Cedar Point Revetment: The DPW recently completed reconstruction of the section of revetment protecting the historic lighthouse and park using state and local funding.
- North Jetty: Recently repaired by the USACOE

Future Seawall Projects

FEMA Funded:

The DPW is currently working with coastal consultants for design of foreshore improvements at the following locations:

- Minot Beach
- North Scituate Beach
- Shore Acres (Seaside Road)
- First Cliff
- Second Cliff
- Third Cliff

Town Funded:

Closing sections of seawall along Oceanside Drive are currently in final design and scheduled for construction summer 2021 using town and available grant funding assistance.

Army Corps of Engineers Funded:

Closing section of seawall from the town funded projects on Oceanside Drive/ Turner Road between Turner Road and #3 Rebecca Road are currently in design phase by the USACOE.

Action 4: Drainage and Culvert Repairs, Improvements and Upgrades

Upgrade, repair and improve undersized culverts and drainage systems to reduce or eliminate stormwater related flooding. Current priority is culvert on Oceanside Drive. The town recently submitted an HMGP grant application for Phase I, design and engineering for the Oceanside Drive drainage. Phase II will consist of implementation. The town continues to address drainage improvements due to the frequent flooding. There are other areas in town where drainage needs upgrades and improvements to provide the necessary mitigation from flooding.

Priority: Medium

Pre or Post Disaster: Both

Type of Activity: Structure and Infrastructure Projects

Responsible Department: Public Works, Coastal Resources, Conservation Department

Funding Resources: FEMA Grants, FHWA Grants, MassDOT, MEMA, Town Operating Budget

Cost: Oceanside Drive \$200,000

Timeframe: Medium-term

Completed Yes or No: Partially...remains ongoing

Month/Year:

Responsible Party:

Funding mechanism/Grant amount:

Dan Smith 1/6/2021 email:

Drainage:

- The DPW recently completed culvert upgrades at Bailey’s Causeway and Gilson Road. With upgraded capacity the roads were observed above board in two recent storms with surges that would have caused road flooding prior to the upgrades.
- The DPW recently refurbished the ocean outfall structure located on Oceanside Drive south of Seventh Avenue and removed and replaced the check valve with a more reliable rubber “duck bill” check.
- Will Branton worked with Brad Washburn on a study to identify improvements to reduce vulnerability of the wastewater treatment plant and pump stations from rising tides and storm surges. That report is complete. I am not aware of status of design of proposed improvements.

Action 5: CRS Participation/Implementation of Public Information Program

Improve the current Rate in the Community Rating System program by implementing PPI Actions related to flood awareness and prevention as outlined in the 2015 Town PPI Action Plan, documentation of town-wide efforts, mapping open space, flood zones, and natural functions. The PPI Action Plan provides a review of activities that occurred throughout 2015, as well as, updated tables to reflect individuals/agencies responsible for each of the Elements of Public Information, the target audience, desired outcome, and schedule. This table also lists the projects relating to each element.

Priority: High

Pre or Post Disaster: Pre-disaster

Type of Activity: Education and Awareness

Responsible Departments: CRS Coordinator, Coastal Resources, Building, Planning Department, Public Works, Engineering, Conservation Department, Emergency Management

Funding Resources: Town Operating Budget

Cost: Staff time. 2015 NFIP premium savings estimated at \$242,937

Timeframe: Near-term

Completed Yes or No: No

Month/Year:

Responsible Party:

Funding mechanism/Grant amount:

The Town is in good shape to receive the appropriate amount of points to receive the maximum flood rate premium that CRS allows in Massachusetts. With that being said, the PPI was never approved by CRS and as a result the committee disbanded back in 2015.

Action 6: Complete Coastal Assessment

Scituate received \$180,000 Coastal Resiliency Competitive Grant to complete a Coastal Assessment. This action is the preparation of a comprehensive assessment of coastal erosion and engineering for flood protection measures along the entire coast with recommendations and plan to implement best methods for protection.

Priority: High

Pre or Post-Disaster: Pre-Disaster

Type of Activity: Local Plans and Regulations, Natural Systems Protection

Responsible Departments: Coastal Resources, Public Works, Conservation Department, Planning Department, Engineering

Funding Resources: CZM Coastal Resiliency Grant

Cost: \$180,000
Timeframe: Near-term

Completed Yes or No: Yes
Month/Year: August 2016
Responsible Party: Town of Scituate
Funding mechanism/Grant amount: Executive Office of Energy and Environmental Affairs, \$270,000

Action 7: Implement Recommendations of Coastal Assessment

The comprehensive assessment of coastal erosion and engineering for flood protection measures along the entire coast will be completed in June, 2016. At that point the town will begin to identify funding sources for each of the actions outlined. Implement actions created from Assessing Coastal Erosion report.

Priority: High
Pre or Post-Disaster: Pre-disaster
Type of Activity: Local Plans and Regulations, Natural Systems Protection
Responsible Departments: Coastal Resources, Town Administrator, Board of Selectmen, Town Meeting, Public Works, Planning, Conservation, Building, Emergency Management
Funding Resources: FEMA Grants, MAPC, Chapter 90, MassDOT, EOEEA, CZM, Seawall and Dam Safety
Cost: To be determined
Timeframe: Medium-term

Completed Yes or No: No, carry forward into plan update.
Month/Year:
Responsible Party:
Funding mechanism/Grant amount:

Elevation of/Berm along Humarock Road was pursued but did not have public support so it was abandoned.

Action 8: Beach & Berm Nourishment & Replenishment

Design, develop and replenish beach and cobble berm protection measures. The goal of the nourishment project is to place a natural material on the coastline to prevent erosion and undermining of the existing seawalls and reduce flooding in the adjacent residential neighborhoods. In addition, the stone berm located on Shingle Beach is critical to protecting Musquashicut Pond and adjacent roadways and homes. The town has recently replaced the Musquashicut Pond Berm and is in the process of acquiring the necessary permits for beach nourishment on North Scituate Beach

Priority: High
Pre or Post-Disaster: Pre-disaster
Type of Activity: Natural Systems Protection
Responsible Departments: Public Works, Conservation, Coastal Resources
Funding Resources: FEMA, CZM, CPC
Cost: \$300,000
Timeframe: Near-term

Completed Yes or No: Partial...remains ongoing (implementation)

Month/Year:

Responsible Party: Coastal Management Department

Funding mechanism/Grant amount:

Description of what has been partially completed:

Action 9: Install strategic power grid shutoffs

Install power grid shutoffs to isolate flood-prone and storm damage sensitive coastal areas. Focusing the shut off zones reduces the recovery and restoration time.

National Grid: The town has asked National Grid to break the coastal streets into zones. From Lighthouse point to the north end of Oceanside will be broken down into 6 zones. Most of the power shut offs are right on the coastal roads. National Grid engineers are going to move these shut offs to the side streets that the town believes will be in a safe area far away enough from flooding but close enough to minimize the homes impacted.

Eversource: Chief Murphy met with Eversource engineers last summer to see how the town could make the northern end of Central Ave safer during the storms Scituate endures. The final agreement includes putting in a remote shut off at the location of 200 Central Ave that could power down the area north of this in case of hazardous conditions during a coastal storm. Eversource agreed to put this project on their capital plan.

Columbia Gas: Chief Murphy contacted Columbia gas to inquire about natural gas flow limiters. These are installed between the main in the street and the service meter, if the meter were damaged & leaking this would limit the flow with an inline check valve.

Priority: Medium

Pre or Post-Disaster: Both

Type of Activity: Structure and Infrastructure Projects, Local Plans and Regulations

Responsible Departments: Fire Department, Emergency Management

Funding Resources: National Grid, Eversource, and Columbia Gas

Cost: Private

Timeframe: Near-term

Completed Yes or No: Yes

Month/Year: 2016 - 2018

Responsible Party: Emergency Management Agency

Funding mechanism/Grant amount: All projects funded by the utility companies in cooperation with the Town.

Action 10: Installation of generators

Installation of generators for critical municipal communication facilities to support continuity of operations and community emergency supportive measures.

Priority: High

Pre or Post-Disaster: Pre-disaster

Type of Activity: Structure and Infrastructure Projects

Responsible Departments: Public Works, Facilities

Funding Resources: FEMA/Town Operating Budget
Cost: \$7,000 - \$10,000
Timeframe: Medium-term

Completed Yes or No: Yes

Month/Year:

Responsible Party:

Funding mechanism/Grant amount:

Purchased generators:

All Six Schools - (Some partial, some Full)

Public Safety - Full

Town Hall – Full

Board of Health - Full (Same generator as Town hall)

Communications Shed- Full

Old Gates and Recreation – Partial

New Senior Center - Full

Library - In Design Phase

Highway - Partial

Station One – SFD - Full

Station Four – SFD – under construction and assumed there will be one.

Water Treatment – Full

Sewer Department - Full

3.3.1.7 Critical Facilities

Each jurisdiction classifies “critical facilities” based on the relative importance of that facility’s assets for the delivery of vital services, the protection of special populations, and other important functions. If damaged, the loss of that critical facility would present an immediate threat to life, public health, and safety. Protection of critical facilities is also important for rapid response and recovery of a community, its neighborhoods, and its businesses. In Scituate, the following critical facilities have been identified (Table 19):

Table 19. Critical Facilities

Name	Address	Type
Central Park Housing	Central Park Dr.	Elderly Housing
Lincoln Park Elderly Housing	791 Country Way	Elderly Housing
Wheeler Park I	9 Common St.	Elderly Housing
Wheeler Park II	9 Common St.	Elderly Housing
Meeting House Estates	12 Meeting House Lane	Independent Living (Elderly)
Community Residence	412 First Parish Rd.	Assisted Living – persons with disabilities
Community Residence	664 Country Way	Assisted living – persons with disabilities
Community Residence	129 Vernon Rd.	Assisted living – persons with disabilities
DDS Group Home	31 Lawson Rd.	Assisted living – persons with disabilities
Scituate High School	606 Chief Justice Cushing Hwy.	School/Emergency Shelter
Gates Jr. High School	327 First Parish Rd.	School
Wampanoag Elementary School	266 Tilden Rd.	School
Cushing Elementary School	1 Aberdeen Dr.	School
Jenkins Elementary School	61 First Parish Rd.	School
Hatherly School	72 Ann Vinal Rd.	School
INLY School	46 Watch Hill Drive	School
Police Dept.	604 Chief Justice Cushing Hgwy.	Police Station
Fire Dept.	596 Chief Justice Cushing Hgwy.	Fire Station
Fire Dept.	143 First Parish Rd.	Fire Station
Fire Dept.	4 River St. Humarock	Fire Station
Scituate Reservoir	Chief Justice Cushing Highway	Surface Drinking Water Supply
Scituate Water Treatment Plant	Chief Justice Cushing Hwy.	Water Treatment Plant
Walnut Hill Booster Pump Station	27 Woodworth Lane	Water Booster Pump Station
Mann Lot Booster Station	Mann Lot Rd. & Creelman Dr.	Water Booster Pump Station

Name	Address	Type
Well #10	87A Corner Stetson Rd.	Public Drinking Water Well
Well #11	87 Corner Stetson Rd.	Public Drinking Water Well
Well #18B	Widow's Walk Golf Course	Public Drinking Water Well
Well #19	381 Chief Justice Cushing Highway	Public Drinking Water Well
Well #17A	98 Tack Factory Pond Rd.	Public Drinking Water Well
Well #22	66 Old Forge Rd.	Public Drinking Water Well
Water Division Standpipe	164 Maple St.	Drinking Water Storage
Water Division Standpipe	Mann Lot Rd. & Creelman Dr.	Drinking Water Storage
North River Waste Water Pollution Control Plant	161 Driftway	Sewer Treatment Facility
Chain Pond Pump Station	42°13'13.42"N, 70°44'52.76"W	Sewer Pump Station
Musquashicut Ave Pump Station	42°13'47.08"N, 70°45'46.71"W	Sewer Pump Station
Otis Road Pump Station	42°12'29.07"N, 70°43'33.07"W	Sewer Pump Station
First Parish Pump Station	42°11'48.51"N, 70°46'6.11"W	Sewer Pump Station
Country Way Pump Station	42°11'29.11"N, 70°45'5.43"W	Sewer Pump Station
Herring Brook Pump Station	42°10'35.99"N, 70°44'54.16"W	Sewer Pump Station
Collier Road Pump Station	42°10'28.42"N, 70°42'53.17"W	Sewer Pump Station
Peggotty Beach Pump Station	42°11'23.82"N, 70°43'9.13"W	Sewer Pump Station
Edward Foster Pump Station	42°11'47.90"N, 70°42'58.94"W	Sewer Pump Station
Transfer Station	280 Driftway	Solid Waste Transfer Station
Old Oaken Bucket Pond Dam	Country Way	Holds back Old Oaken Bucket Pond
Herring Brook Reservoir Dam	Chief Justice Cushing Highway	Protects state highway
Hunters Pond Dam	Mordecai Lincoln Rd.	Holds back waters of Hunters Pond, also is part of Mordecai Lincoln Rd.
State Launch Ramp	Between 44 & 66 Jericho Road	Emergency Boat Access
Cole Parkway Launching Ramp	Cole Parkway	Emergency Boat Access
MBTA Greenbush Station	Off Driftway	Transportation Facility; Layover for Greenbush line
Sea St. & Francis R. Powers Bridges	Marshfield Ave. & Julian St., Humarock	Access to Humarock
Edward Foster Bridge	Edward Foster Road	Access to First and Second Cliffs
Cell Towers	600 & 1010 Chief Justice Cushing Highway 1010, 143 First Parish Rd., off Thomas Clapp Rd.	Citizen & Emergency Communication
CVS Pharmacy	92 Front Street	Pharmacy
Scituate Pharmacy	372 Gannet Street	Pharmacy
Scituate Marketplace	71 Front Street	Food Market
St Mary's Hall	2 Edward Foster Road	Church/ Possible Shelter (to be explored)

Name	Address	Type
St Mary's Church	1 Kent St.	Church/ Possible Shelter (to be explored)
Christ Lutheran Church	460 Chief Justice Cushing Highway	Church/ Possible Shelter (to be explored)
St. Luke's Church	465 First Parish Rd.	Church/ Possible Shelter (to be explored)
First Parish Unitarian Universalist Church	330 First Parish Rd.	Church/ Possible Shelter (to be explored)

3.4 Risk Analysis and Assessment

The Scituate Hazard Mitigation Committee assessed the town's risks to natural disasters in terms of population, property, economic resources, and probability of occurrence. The committee considered public health/safety, structural damage, area or town-wide evacuation, and structures that house people with special needs. The committee began by identifying specific areas and structures that are vulnerable to natural hazards.

Vulnerable areas were determined by considering past and potential natural hazards that pose a threat to the population, property, and economic resources of the town. For example, the town's population, residential/commercial properties, schools, bridges and historical buildings were identified as vulnerable areas to natural hazardous events.

The rankings were determined by considering the historical or potential occurrence of natural disasters, the primary threat to the town, and the mitigation benefit that would be received if an appropriate mitigation action was implemented.

3.4.1 Methodology

Evaluating the number of times that the natural hazard has impacted Scituate in the past provides a measure of the likelihood of the event occurring again in the future. This rating is derived from an investigation of trends in the long-term (30 years at least) data (Table 20). Examination of past events helps to determine the probability of similar events occurring in the future. This evaluation also considered the effects of changes in the regional climate.

<i>Natural Hazard</i>	<i>Frequency (i.e. Very Low, Low, Medium, High)</i>	<i>Location (i.e. small/local, medium/regional, large/multiple communities)</i>	<i>Severity (i.e. minor, serious, extensive, catastrophic)</i>	<i>Hazrd Index (i.e. ranked by combining frequency and severity; 10 - high, 1 - low)</i>
Flood-Related Hazards				
- Riverine/Flash Flooding	High	Medium/Regional	Serious	6
- Inland/Urban Flooding/Heavy Rain	High	Medium/Regional	Extensive	7
- Climate Change	Medium	Large/Multiple	Serious	5
- Dam Failure	Low	Medium/Regional	Serious	4
- Coastal Flooding	High	Medium/Regional	Extensive	7
- Sea Level Rise	High	Large/Multiple	Serious	6
- Storm Surge	High	Small/Local	Minor	5
- Coastal Erosion/Shoreline Change	High	Medium/Regional	Extensive	7
Winter-Related Hazards				
- Blizzards/Snow/Nor' easter	High	Large/Multiple	Extensive	8
- Ice	Very Low	Medium/Regional	Minor	2
- Extreme Cold	High	Small/Local	Minor	5
Wind-Related Hazards				
- Hurricanes	High	Large/Multiple	Extensive	7
- Tornadoes	High	Medium/Regional	Serious	6
- High Winds	High	Medium/Regional	Extensive	7
- Lightning/Thunderstorms	High	Medium/Regional	Serious	6
- Hail	High	Small/Local	Minor	5
- Tropical Storm	High	Large/Multiple	Serious	6
- Waterspout	Very Low	Small/Local	Minor	2
Geologic-Related Hazards				
- Earthquakes	Very Low	Medium/Regional	Serious	3
- Landslides	Very Low	Small/Local	Minor	2
Drought				
- Drought	High	Medium/Regional	Minor	5
- Extreme Heat	High	Small/Local	Minor	5
Urban Fire/Wildfire				
- Urban Fire/Wildfire	2016 Plan (Low)		(Minor)	
Invasive Species				
- Multiple	Medium	Small/Local	Minor	4

Town of Scituate, MA

HMPT Meeting #2



Virtual Zoom Call

<https://us02web.zoom.us/j/84248604279?pwd=RzJwNUpaV2RObFYwSUZ2enExV114Zz0>

9

Meeting ID: 842 4860 4279

Passcode: 614232

By Phone:

Dial: 1-301-715-8592

Enter Meeting ID: 842 4860 4279

When prompted for Participant ID number PRESS #

Enter Passcode: 614232

April 29, 2021 10:00 PM - 11:30 AM

<u>Name</u>	<u>Email Address</u>
Chief John Murphy	
Karen Joseph	
Sean McCarthy	
Ben Haskell	
Kyle Boyd	
Lynda Ferguson	
Abdrew Scheele	
William Branton	
Craig Pereira	

Public Workshop #1: July 27, 2021

Town of Scituate, MA

Hazard Mitigation Plan Update



SCITUATE MASSACHUSETTS

Virtual Public Workshop

Tuesday, July 27, 2021
6:00 PM—8:00 PM

Join Zoom Meeting

<https://us02web.zoom.us/j/82373793401?pwd=V0krdlkySHJjUUwrUWhUOVNxR2U0Zz09>

Meeting ID: 823 7379 3401
Passcode: 314992

Dial by phone (voice only)

Dial: 1-929-205-6099

Enter Meeting ID: 823 7379 3401

When prompted for Participant ID number PRESS #

Enter Passcode: 314992

**Come learn what the Town has accomplished
and hear about planning for the future.**

About the Hazard Mitigation Plan Update

The Town of Scituate is currently updating the 2016 Hazard Mitigation Plan. This plan is important because it helps the Town plan and receive funding for projects that reduce the risk of injury or damage to property from future natural hazard events such as flooding and hurricanes. The Disaster Mitigation Act of 2000 (DMA) places high priority on the continuation of the planning process after the initial submittal, requiring communities to seek and receive re-approval from FEMA in order to remain eligible for assistance.

For more information, please visit:

<https://www.scituatema.gov/coastal-management-and-flood-hazard-mitigation/pages/hazard-mitigation-plan-update-2021>

Contact

Kyle Boyd
Director of Planning and Development
kboyd@scituatema.gov
(781) 545-8808

Craig Pereira
Project Manager, Horsley Witten Group, Inc.
cpereira@horsleywitten.com
(401) 272-1717



SCITUATE MASSACHUSETTS

**Town of Scituate, MA
Hazard Mitigation Plan Update
Public Workshop**

Craig Pereira, CFM
Project Manager – Horsley Witten Group

Date: July 27, 2021 6:00 PM – 8:00 PM
Virtual



1

Virtual Platform




2

A Request of Participants

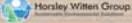
- **In the Chat area to Kyle Boyd:**
 - Your Full Name
 - Are you a resident, business owner, municipal employee?
 - Expectations you have for the workshop



3

Welcome...

WELCOME!



4

**Town of Scituate
Local Hazard Mitigation Committee**

- Kyle Boyd, Director of Planning and Development
- John Murphy, Fire Chief/Emergency Management Director
- Karen Joseph, Town Planner
- Sean McCarthy, Supervisor of Engineering/Public Works
- Amy Walkey, Conservation Agent/Natural Resources Officer
- Mark Thompson, Police Chief
- Dan Smith, Engineering
- Margaret Loughlin, Resident
- Ben Haskell, Environmental/NOAA
- James Canavan, Academia
- Sara Grady, North and South River Watershed
- Lynn Ferguson, Business Owner

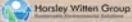


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Why Hazard Mitigation Planning?

Disaster Mitigation Act of 2000, Interim Final Rule, 44 CFR Parts 201 and 206 states, “All communities must have an approved Multiple Hazards Mitigation Plan in order to qualify for future federal disaster mitigation grants”.

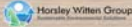
Reduction or elimination of long-term risk to life, property, and the environment.



6

Mitigation Process

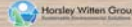
- **Assess Risks**
- Establish Goals
- Identify Projects/Actions
- Update/Maintain Plan



7

Assess Risks... Risk and Vulnerability Assessment

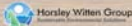
Natural Hazard:
“Any event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, and agricultural loss, damage to the environment, interruption of business, or other types of harm and/or loss”.



8

Assess Risks... Natural Hazards Affecting Scituate, MA

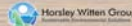
<p>Flood-related hazards</p> <ul style="list-style-type: none"> ▪ Riverine/Flash Flooding ▪ Inland/Urban Flooding ▪ Heavy Rain ▪ Climate Change ▪ Dam Failure ▪ Coastal Flooding ▪ Sea Level Rise ▪ Storm Surge ▪ Coastal Erosion/Shoreline Change 	<p>Winter-related hazards</p> <ul style="list-style-type: none"> ▪ Blizzards/Heavy Snow ▪ Nor’ easters ▪ Ice ▪ Extreme Cold <p>Geologic-related hazards</p> <ul style="list-style-type: none"> ▪ Earthquakes ▪ Landslides
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9

Assess Risks... Natural Hazards Affecting Scituate, MA

<p>Wind-related hazards</p> <ul style="list-style-type: none"> ▪ Hurricanes ▪ Tornadoes ▪ High Winds ▪ Lightning/Thunderstorms ▪ Hail ▪ Tropical Storms ▪ Waterspouts 	<p>Drought-related hazards</p> <ul style="list-style-type: none"> ▪ Drought ▪ Extreme Heat <p>Invasive Species-related hazards</p> <ul style="list-style-type: none"> ▪ Invasive Species <p>Urban/Wildfire-related hazards</p> <ul style="list-style-type: none"> ▪ Urban Fire/Wildfire
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10

Assess Risks... Natural Hazard Profiles

<p>Flood-related hazards</p> <ul style="list-style-type: none"> ▪ Riverine/Flash Flooding: Moderate ▪ Inland/Urban Flooding: High ▪ Heavy Rain: High ▪ Climate Change: Moderate ▪ Dam Failure: Moderate ▪ Coastal Flooding: High ▪ Sea Level Rise: Moderate ▪ Storm Surge: Moderate ▪ Coastal Erosion/Shoreline Change: High 	<p>Winter-related hazards</p> <ul style="list-style-type: none"> ▪ Blizzards/Heavy Snow: High ▪ Nor’ easters: High ▪ Ice: Low ▪ Extreme Cold: Moderate <p>Geologic-related hazards</p> <ul style="list-style-type: none"> ▪ Earthquakes: Low ▪ Landslides: Low
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11

Assess Risks... Natural Hazard Profiles

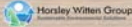
<p>Wind-related hazards</p> <ul style="list-style-type: none"> ▪ Hurricanes: High ▪ Tornadoes: Moderate ▪ High Winds: High ▪ Lightning/Thunderstorms: Moderate ▪ Hail: Moderate ▪ Tropical Storms: Moderate ▪ Waterspouts: Low 	<p>Drought-related hazards</p> <ul style="list-style-type: none"> ▪ Drought: Moderate ▪ Extreme Heat: Moderate <p>Invasive Species-related hazards</p> <ul style="list-style-type: none"> ▪ Invasive Species: Moderate <p>Urban/Wildfire-related hazards</p> <ul style="list-style-type: none"> ▪ Urban Fire/Wildfire: _____
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12

Assess Risks...
Risk and Vulnerability Assessment - Assets

- **Economic Assets**
 - Businesses/employers
 - Tourist destinations
- **Social Assets**
 - Vulnerable populations
 - Cultural locations

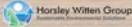


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Assess Risks...
Risk and Vulnerability Assessment - Assets

- **Natural Resources**
 - Lifeline and utility systems
 - Wetlands
 - Conservation and recreation lands
- **Essential Buildings and Critical Facilities**
 - Government buildings
 - Hazardous facilities
 - Roadways
 - GIS Mapping

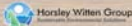


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14

Mitigation Process

- Assess Risks
- **Establish Goals**
- Identify Projects/Actions
- Update/Maintain Plan



15

15

Establish Goals...Mitigation Goals

Strategy:
The Scituate Hazard Mitigation Strategy advocates the concepts of disaster resilient and sustainable communities. Scituate is building a disaster resistant community and achieving sustainable development through the commitment of state and local government and its policymakers to mitigate hazard impacts before disaster strikes.

Goals in support of the strategy:

- Ensure that critical infrastructure sites are protected from natural hazards.
- Protect existing residential and business areas from flooding.
- Maintain existing mitigation infrastructure in good condition.
- Continue to enforce existing zoning and building regulations.



16

16

Establish Goals...Mitigation Goals

Goals in support of the strategy:

- Educate the public about zoning and building regulations, particularly with regard to changes in regulations that may affect tear-downs and new construction.
- Work with surrounding communities to ensure regional cooperation and solutions for hazards affecting multiple communities.
- Encourage future development in areas that are not prone to natural hazards.
- Educate the public about natural hazards and mitigation measures.
- Make efficient use of public funds for hazard mitigation.

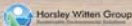


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17

Mitigation Process

- Assess Risks
- Establish Goals
- **Identify Projects/Actions**
- Update/Maintain Plan



18

18

Mitigation Measures...Categories

- Planning and Prevention
- Property Protection
- Natural Resource Protection
- Structural Projects
- Emergency Services, and
- Public Education and Awareness

19

Identify Projects/Actions... Identification of Mitigation Actions

Mitigation actions to be developed based on review of the Town's identified risks and vulnerabilities to natural hazards.

Each action incorporates a brief description of the intended action, who the responsible parties are, a proposed time frame for completion and potential funding sources.

20

Identify Projects/Actions... Prioritization of Actions...STAPLEE Method

- **Social**...is the action socially acceptable?
- **Technical**...is the action technically feasible and provide appropriate level of protection?
- **Administrative**...does the Town have the capability to complete the action?
- **Political**...will the Town support or oppose the project?
- **Legal**...does the Town have the legal authority to complete the action?
- **Economic**...is the action cost-effective?
- **Environmental**...will the action affect the natural environment?

21

Identify Projects/Actions... Implementation

- Town's Capability
- Plan Adoption/Incorporation into Existing Plans

22

Mitigation Process

- Assess Risks
- Establish Goals
- Identify Projects/Actions
- Update/Maintain Plan

23

Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan (March 2018)

Top Priority Actions

- 1. Address the vulnerability of coastal business districts.** Lead a climate vulnerability and resilience workshop with stakeholders, property owners, residents, businesses, and municipal staff and officials for participatory visioning the future with sea level rise and coastal flooding. Front Street is a priority for this action.
- 2. Address the vulnerability of Scituate's municipal infrastructure.** A priority could be the Wastewater Treatment Plant, currently in a 1% Annual Chance Flood.
- 3. Initiate a public outreach and marketing campaign with a sense of urgency on climate change and resilience in Scituate.** The Town has demonstrated results in such an effort, when, during the 2016 drought where resident's behavior shifted sufficiently to mitigate drinking water scarcity during that time.

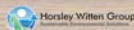
24

Open Space and Recreation Plan (2018)

Goal 2: Protect Scituate's natural shoreline and coastal features and waters, which are a prime recreational and economic resource, and which give the Town its identity as a very appealing seaside community.

Actions include:

- o Continue to develop bylaws and best practices that relate to preserving/enhancing the natural shoreline/coastal resources in the current status and with expected impacts of sea level rise.
- o Continue to strongly enforce Town bylaws discouraging new construction in the floodplain.
- o Implement recommendations from the Coastal Assessment Study and other recent and ongoing studies, as applicable to shoreline protection.



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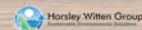
Open Space and Recreation Plan (2018)

- o Implement recommendations from the Coastal Assessment Study and other recent and ongoing studies, as applicable to shoreline protection.
- o Initiate public education on shoreline and coastal resources protection, as well as issues affecting public use of the beach.
- o Work with surrounding communities on long-term planning to ensure regional cooperation on solutions to coastal hazards.

Goal 5: Enhance the natural beauty of the Town's landscape by protecting existing open space, while promoting appropriate use.

Actions include:

- o Prepare management plans for Scituate's public beaches.



26

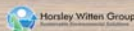
26

Comprehensive Wastewater Resilience Feasibility Study (June 2019)

Assessed the Town's wastewater facilities vulnerabilities to flooding/coastal flooding.

Recommendations include:

- o Political Implementation
 - o Communicate existing/future physical and financial risks/Build consensus/Establish a Planning Group/Integrate results into the day-to-day administration.
- o Cost Recovery/Revenue Opportunities Implementation
 - o Apply for state/federal grants/Establish a Wastewater Resilience Fund/Incrementally increase Sewer Connection Fee/Include near-term measures in the General Budget/Utilize system expansion bond funding to include mitigation improvements.
- o Regulatory Implementation
 - o Integrate recommendations into Master Plan Update/Prepare final engineering/design for near- and long-term measures.



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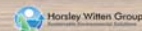
27

Elevating Roadway Improvements and Dune/Beach Nourishment Along North Humarock for Improved Coastal Resiliency (March 2017)

Developed a conceptual plan for elevating a portion of Central Avenue along northern Humarock Beach and optimizing a dune/beach nourishment design for storm damage protection.

Recommendations include:

- o Elevate Central Avenue
- o Construct dunes along the Humarock North
- o Nourish the beach along the entire Humarock North and South



28

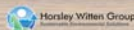
28

Scituate Harbor Sustainability and Resilience Master Plan (August 2020)

Developed to guide future growth, conservation and infrastructure enhancements over the next 25 years, with a focus on reducing the pathways of ocean water into the Scituate Harbor business district.

Resilience recommendations include:

- o An incremental elevation and adaptation of the coastal perimeter of the district that integrates with an elevated Harborwalk, new coastal amenities and open space features.
- o This approach is combined with the protection and improvement of the natural systems that provide protection to the district and adjacent shoreline at the Kent Street marshes and the banks of the Satuit Brook.
- o The addition of green infrastructure in the district to protect and improve water quality of the harbor.



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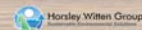
29

Town of Scituate Coastal Community Assessment (September 2018)

To learn more about what residents, businesses and civic organizations, as well as town staff/leadership think about the risks/opportunities associated with being a coastal community.

Recommendations include:

- o Through a robust community engagement process, develop and adopt a long-term coastal resilience vision and strategy.
- o Review, summarize, and present in a simple format, the key actions that have been taken in recent years to improve coastal resilience in Scituate, and the relevant recommendations that have been made in previous studies and plans.
- o Convene community conversations about managed retreat.
- o Review, update, and document the emergency management protocols for coastal storms.



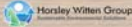
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30

Town of Scituate, MA Annual Flood Mitigation Progress Report (2019)

Efforts to anticipate and mitigate activities along high hazard coastal areas and inland floodways over the years include:

- o Foreshore protection
- o Sea level rise and climate change
- o FEMA Elevation Program
- o Emergency Management
- o Outreach and Education

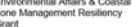


31

Town of Scituate, MA Annual Flood Mitigation Progress Report (2019)

Coastal Grants 2015 – 2019:

Coastal Grant	Project	Funding	Status
Executive Office of Energy and Environmental Affairs & Coastal Zone Management Resiliency Grant	Engineer and study for beach nourishment on N. Scituate Beach	\$118,000	Completed
FEMA FMA 13-01 Elevation Grant	Elevation of 14 properties in the floodplain	\$2,100,000	Completed
Executive Office of Energy and Environmental Affairs & Coastal Zone Management Resiliency Grant	Engineer, design and permit for beach nourishment on N. Scituate Beach	\$241,163	Completed
Executive Office of Energy and Environmental Affairs Dam, Levee and Seawall Grant	Repairs to 760' of seawall along Oceanside Drive	\$4,000,000	Completed
Environmental Protection Agency Resiliency Grant	Technical Assistance for flood resiliency in a coastal community	\$50,000	Completed
Executive Office of Energy and Environmental Affairs & Coastal Zone Management Resiliency Grant	Assessing Coastal Erosion, Sediment Transport & Prioritization Management Strategy for Shoreline Protection	\$270,000	Completed

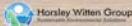


32

Town of Scituate, MA Annual Flood Mitigation Progress Report (2019)

Coastal Grants 2015 – 2019:

Environmental Protection Agency Resiliency Grant	Repair and replacement to 525' of seawall along Oceanside Drive on Town-owned property	\$3,000,000	Completed
MAPC Planning Assistance Grant	Scituate Municipal Vulnerability Plan	\$60,000	Completed
Executive Office of Energy and Environmental Affairs & Coastal Zone Management Resiliency Grant	Humarock Roadway elevation, beach and dune nourishment conceptual designs	\$140,000	Completed
Executive Office of Energy and Environmental Affairs Dam, Levee and Seawall Grant	Repairs to 640' of seawall along Oceanside Drive near 7th Avenue	\$2,500,000	Completed




33

Town of Scituate, MA Annual Flood Mitigation Progress Report (2019)

Coastal Grants 2015 – 2019:

MEMA HMGP Grant	Elevation of 5 properties in the floodplain	\$616,252	In-progress
FEMA FMA 15-01 Elevation Grant	Elevation of 2 properties in the floodplain	\$303,386	In-progress
FEMA Storm Reimbursement	Foreshore damages 3rd Cliff	\$1,680,000	Awarded
FEMA Storm Reimbursement	Foreshore damages	\$5,900,000	Obligated
Executive Office of Energy and Environmental Affairs & Coastal Zone Management Resiliency Grant	Humarock Roadway elevation, beach and dune nourishment conceptual designs	\$240,000	Completed
Executive Office of Energy and Environmental Affairs & MAPC	Downtown Harbor Resiliency Plan	\$62,500	In-progress
MAPC	Reggotty Beach Managed Retreat Feasibility Study	\$35,000	In-progress
FEMA FMA 19-01	Elevation of 1 property in the floodplain	\$170,380	In-progress
Coastal Zone Management	50 Year Coastal Vision	\$261,472	In-progress

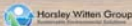


34

Mapping Storm Tide Pathways in Scituate and Cohasset: Assessing Coastal Vulnerability to Storms and Sea Level Rise (2019)

Supplements LIDAR base maps with more accurate GPS survey data to map the routes through which 'storm tides' will pass, threatening vulnerable areas with inundation of varying depths.

299 pathways were identified for Scituate and provide critical information on the precise location of potential flooding to address each pathway and prevent future inundation.



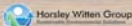
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Scituate 2040 Master Plan Update (June 2021)

Serves as a guide to the Town for future decision-making on actions that will have long-term impacts on the Town's economic, social, and physical resiliency.

Actions include:

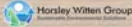
- o Climate Change and Sea Level Rise
 - Elevate structures within flood risk zones.
 - Enhance and raise seawalls and revetments.
 - Enhance and reinforce "hard-engineered" infrastructure such as breakwaters, jetties, and groins.
 - Provide beach nourishment to maintain ecological function.
 - Invest in "soft-engineered" infrastructure such as artificial dunes and berms.
 - Implement boulder dykes.
 - In low-lying areas susceptible to flooding, convert roads to bridges.
- o Climate Change and Ecology
 - Expand wetland protections to include projected wetland migration areas.
 - Reduce clear-cutting.



36

Scituate 2040 Master Plan Update (June 2021)

- o Land Use
 - Establish programs and policies for buy-outs, land swaps, relocations, and transfers of development rights to allow for relocation.
- o Zoning
 - Consider reducing development on flood hazard areas.
- o Community Services and Facilities
 - Evaluate existing community facilities for problems and as assets for impacts related to climate change.
- o Transportation Infrastructure
 - Flood-proof key transportation routes.
 - Anticipate heat damage to roads.
- o Water Infrastructure
 - Prepare for droughts and the effects of sea level rise on groundwater and saltwater intrusion.



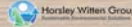
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37

2016 Plan Report Card

Action #1
Elevate Repetitive Loss Structures
Completed...remains ongoing. 22 new elevations completed since 2016.

Action #2
Protect Key Roads, Bridges and Intersections
Partially Completed, remains ongoing.
- DPW constructed approx. 200 ft. of new seawall along Edward Foster Road across from the new Marine Park.
- Lighthouse Road: concrete seawall is currently in preliminary study, design and permitting stage by the USACOE as part of a Sands Hill seawall replacement project.

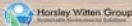


38

38

2016 Plan Report Card

Action #3
Foreshore Protection
Partially Completed...remains ongoing.
- DPW constructed approx. 200 ft. of new seawall along Edward Foster Road across from the new Marine Park.
- Completed seawall projects:
1. Reconstruction of the Mann Hill/Egypt Beach Cobble Berm (DPW).
2. Reconstruction of the section of Cedar Point Revetment that protects the historic lighthouse and park (DPW).
3. North Jetty recently repaired (USACOE).
- Future seawall projects (FEMA funded):
1. Minot Beach/North Scituate Beach/Shore Acres (Seaside Road)/First Cliff/Second Cliff/Third Cliff.



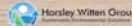
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39

2016 Plan Report Card

Action #3
Foreshore Protection
Partially Completed...remains ongoing.
- Future seawall projects (Town funded):
1. Closing sections along Oceanside Drive in final design and scheduled for construction 2021.
- Future seawall projects (USACOE funded):
1. Closing sections along Oceanside Drive/Turner Road between Turner Road and #3 Rebecca Road in design phase.

Action #4
Drainage and Culvert Repairs, Improvements and Upgrades
Partially Completed...remains ongoing.
- Culvert upgrades at Bailey's Causeway and Gilson Road (DPW)
- Ocean outfall refurbished on Oceanside Drive (DPW)



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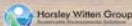
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2016 Plan Report Card

Action #5
CRS Participation/Implementation of Public Information Program
Not Completed...carry forward

Action #6
Complete Coastal Assessment
Completed...August 2016/Executive Office of Energy and Environmental Affairs/\$270,000 grant

Action #7
Implement Recommendations of Coastal Assessment
Not Completed...carry forward
- Elevation of/berm along Humarock Road was pursued and abandoned due to limited public support.



41

41

2016 Plan Report Card

Action #8
Beach and Berm Nourishment & Replenishment
Partially Completed...implementation remains ongoing

Action #9
Install Strategic Power Grid Shutoffs
Completed...2016 – 2018/funded by utility companies

Action #10
Installation of Generators
Completed.
- All schools/Public Safety/Town Hall/Board of Health/Communications Shed/Old Gates and Recreation/New Senior Center/Station 1/Water Treatment/Sewer Dept.

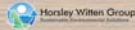


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42

Online Public Survey

<https://www.surveymonkey.com/r/ScituateMAHazardMitigationPlanUpdate>



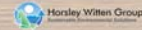
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43

Project Schedule

Draft Update available for comment: **Fall/Winter 2021**

Draft Update to MEMA: **Winter 2022**



44

44

Contact Us...

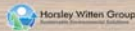
Questions/Comments:

Kyle Boyd
Director of Planning and Development
Town of Scituate

kboyd@scituatema.gov
Phone: (781) 545-8808

Craig Pereira—Project Manager
Senior Planner
Horsley Witten Group, Inc.

55 Dorrance Street, Suite 200
Providence, RI 02903
cpereira@horsleywitten.com
Phone: (401) 272-1717



45

45

Town of Scituate, MA

Virtual Public Workshop #1

Join Zoom Meeting

<https://us02web.zoom.us/j/82373793401?pwd=V0krdlkvSHJjUUwrUWhUOVNzR2U0Zz09>

Meeting ID: 823 7379 3401

Passcode: 314992

Dial by phone (voice only)

Dial: 1-929-205-6099

Enter Meeting ID: 823 7379 3401

Enter Passcode: 314992

July 27, 2021 6:00 PM - 8:00 PM

<u>Name</u>	<u>Email Address</u>
Seth Pfeiffer	
Briana Trifaro	
A. Scheele	
Kyle Boyd	
Jim Canavan	
Karen Canfield	
Stafania Garo	
Chief Murphy	
William Branton	
Bonnie Brown	
Pam Hable	
Neil Duggan	

Local Hazard Mitigation Committee Meeting #3: October 5, 2021



Scituate Hazard Mitigation Plan Update

Hazard Mitigation Planning Team Meeting #3

Join Zoom Meeting

<https://us02web.zoom.us/j/89147203813>

Meeting ID: 891 4720 3813

One tap mobile

+1-929-205-6099 US (New York)

Meeting ID: 891 4720 3813

Find your local number: <https://us02web.zoom.us/u/kdWJmrPZCD>

October 5, 2021 10:30 – 12:00 PM

Agenda

1. Outstanding Data Needs
 - a. Municipal Interviews
 - b. Online Community Survey
 - c. Dams
 - d. Storm Tides Pathway Study Data
 - e. FEMA Flood Hazard/NFIP Data/Economic Vulnerability
 - i. Joy Duperrault/Garrett Fish coordination
 - f. Wildfire Property at Risk
 - g. Development Trends
 - i. Residential and Commercial
 - h. ECEMP
2. Actions for Continued Compliance with NFIP
3. Vulnerability Assessment (Tables/Mapping)
4. Next Steps



Memorandum of Meeting

To: Kyle Boyd

From: Craig Pereira

Date: October 5, 2021

Re: Scituate Hazard Mitigation Plan Update: Hazard Mitigation Planning Team Meeting #3

In attendance:

John Murphy – Fire Chief/Emergency Management Director
Amy Walkey – Conservation Agent/Natural Resources Officer
James Canavan - Academia
Ben Haskell – Environmental/NOAA
Kyle Boyd – Director of Planning and Development
Andrew Scheele – Director, Board of Health

Consultant Team

Craig Pereira, Project Manager - Horsley Witten Group, Inc. (HW)

The third Hazard Mitigation Planning Team (HMPT) meeting was held October 5, 2021. The following items were discussed and include follow up items highlighted in yellow:

1. Outstanding Data Needs

- Municipal Interviews.
Craig Pereira commented that only two have been returned (William Branton and Karen Joseph).
 - Remaining HMPT members to complete and return Interview Template (attached).
- Online Community Survey.
Craig stated that only 15 responses have been received to date.
 - HMPT members to push the survey link out over the next month or so via email and Facebook.
- Dams.
Craig still needs the most recent Phase 1 Inspection Report for Old Oaken Bucket Pond Dam to identify short- and long-term recommendations for inclusion in the HMP update.
 - Sean McCarthy to provide.
- Storm Tides Pathway Study Data.
Craig requested the Storm Tides Pathway data from the study. Information needed includes any GIS shapefiles and a breakdown of the specific pathways (prioritized).
 - Kyle to reach out to Mark Borrelli.
- FEMA Flood Hazard/NFIP Data.
Craig still needs data related to the NFIP Program (Joy Duperault):
 - Kyle to reach out to Joy Duperault.

Joy Duperault, CFM

State NFIP Coordinator & Deputy Hazard Mitigation Officer

joy.duperault@mass.gov (no desk phone available during COVID 19)

Information requested includes:

- Total number of active flood insurance policies
- Total coverage value
- Number of policies in VE, A zone
- Number and value of claims since 1978
- Coordination with FEMA on Repetitive Flood Loss Properties (ISAA Agreement)

Craig still needs repetitive flood loss data from Garrett Fish, FEMA Region 1. Craig will coordinate with Garrett on this and previous requests.

Garrett Fish

Emergency Management Specialist

FEMA Region I

99 High St

Boston, MA 02110

202-957-4109

garrett.fish@fema.dhs.gov

Information requested includes:

- Physical Address
- Building Type/Use...commercial, residential, etc.
- Wildfire Property at Risk.
Craig requested specific areas of town that are more susceptible to wildfires, although the risk is low.
 - Chief Murphy to respond here.
- Development Trends.
Craig requested a list of major residential and commercial developments since 2016, including the following:
 - Residential:
 - Only major residential (subdivisions)
 - Subdivision Name
 - Number of Units
 - Physical Address...Map/Lot
 - Status: Completed/Under Construction/Pending
 - Commercial:
 - Only major commercial
 - Project Name
 - Total Square Footage
 - Physical Address...Map/Lot
 - Status: Completed/Under Construction/Pending
 - Robert Vogel to provide to Craig.
- Comprehensive Emergency Management Plan
Craig requested a copy of the Town's ECEMP to review and for inclusion in Section 3 Capability Assessment. If not a full copy, then the following information is needed:
 - Purpose Statement

- Goals
 - Emergency Operations Center (Primary, Alternate)
 - Shelters/Mass Care Facilities (capacity, services, physical locations)
 - Mutual Aid Systems in place
 - Emergency Alerts and Warnings
 - Chief Murphy to provide ECEMP data to Craig.
2. Mission Statement.
Craig presented the mission statement from the 2016 plan and proposed a revised version (attached).
- All HMPT members to weigh in.
3. Goals.
Craig presented the goals from the 2016 plan and proposed a set of revised goals. The goals should be over-arching, while the mitigation strategy is where details come in.
- All HMPT members to weigh in.
4. Actions for Continued Compliance with NFIP.
Craig presented the table of actions to the HMPT who responded ‘completed’ or ‘to be completed’.
- Robert Vogel to review and confirm (attached).
5. Vulnerability Assessment.
In advance of this meeting and as part of the Economic Vulnerability Assessment, Craig provided the tables and mapping that resulted from a series of overlays with the Town’s parcel data (including critical facilities and vulnerable populations), including:
- FEMA Flood Zones
 - Sea Level Rise (1-foot and 3-foot projected scenarios)
 - SLOSH (Hurricane Surge Inundation Zones)
- Craig merged GIS parcel data with a new CAMA export from the Assessor’s Office, then overlaid with the three GIS shapefiles above. Based on where parcels intersected, the parcels impacted (number and type by land use code, critical facilities/infrastructure, and vulnerable populations) for each hazard scenario and the economic impacts (total value) were identified.
- Craig commented that there are a number of sea level rise scenario projections being used across the state. Given the planning horizon of this plan update (5 years), the expected rise in sea level over time, and for consistency with other Town documents, Craig utilized the 2013 Kleinfelder Study projections for 1-foot (projected 1.08’ by 2038) and 3-foot (projected 2.80’ by 2063) rise. These projections are reinforced in the following:
- Scituate 2040 Master Plan Update (2021)
 - Municipal Vulnerability Preparedness: Building a Resilient Scituate (2018)
 - Scituate CRS Flood Mitigation Progress Report (2019)
 - Commonwealth of Massachusetts HIRA (2019)
- For readable of all mapping, Critical Facilities and Vulnerable Populations were separated into two map series, then each further broken down into quadrants.
- All HMPT members to review and provide feedback.
6. Next Steps.
Craig commented that the next step is to develop the list of mitigation actions for consideration. Craig will begin to populate this list from carry over actions of the 2016 plan

and review of the Capability Assessment (existing plans, studies and reports) and carry over identified objectives and actions. Review of the Risk/Vulnerability Assessment should also inform development of this list. This will be the focus of HMPT meeting #4 and will also include an abbreviated Cost-Benefit Review/Prioritization.

- All HMPT members should begin to develop their own list of mitigation actions for consideration.

The Town's contract with HW ends October 31, 2021 and will need an extension. Kyle stated that the Town has requested an extension with the state.

- Kyle to provide a contract extension to Craig.

7. General Comments.

Craig stated that the Town is interested in completing the draft plan by January 2022 (if possible) in order to be eligible to apply for state/federal funding, yet not wanting to rush the final plan. Craig commented this timeline is tight given everything that still needs to happen, however, will work towards it as a target.

Ben Haskell commented that the NOAA Facility has two components, the boat house on pilings and the Administration building atop First Cliff. Should these be separated out when identified as vulnerable to climate projections?

Craig commented that they do not need to be separated out in the plan. Should the Town seek funding to mitigate vulnerability of the boathouse, that is where the two would be separated.

James Canavan asked about data regarding the marshes.

Kyle will reach out to Amanda Davis to see if there is any data relevant to the HMP update.

Existing Mission Statement:

Preserve and enhance the quality of life, property, and resources by identifying areas at risk from natural hazards and implementing hazard mitigation actions to protect Scituate's population, infrastructure, and historical, cultural, and natural resources.

Proposed Mission Statement:

The purpose of the Scituate Hazard Mitigation Plan is to preserve and enhance the quality of life, property, and resources by identifying all potential natural hazards impacting the community today and into the future, and the implementation of mitigation actions to protect Scituate's population, infrastructure, and historical, cultural, and natural resources towards a resilient community.

Existing Goals:

- Ensure that critical infrastructure sites are protected from natural hazards.
- Protect existing residential and business areas from flooding.
- Maintain existing mitigation infrastructure in good condition.
- Continue to enforce existing zoning and building regulations.
- Educate the public about zoning and building regulations, particularly with regard to changes in regulations that may affect tear-downs and new construction.
- Work with surrounding communities to ensure regional cooperation and solutions for hazards affecting multiple communities.
- Encourage future development in areas that are not prone to natural hazards.
- Educate the public about natural hazards and mitigation measures.
- Make efficient use of public funds for hazard mitigation.

Proposed Goals:

- Prevent and reduce the loss of life, injury, and property damages resulting from all natural hazards.
- Prevent and reduce damage to public infrastructure resulting from all hazards.
- Educate the public regarding vulnerabilities to natural hazards and steps to take towards increased resiliency.
- Facilitate regional coordination/collaboration for hazards affecting multiple communities.
- Identify and seek funding for measures to mitigate or eliminate significant hazards.
- Integrate hazard mitigation planning as an integral element in all relevant municipal departments, committees, boards and projects.

Actions for continued compliance with NFIP:

Actions (Listed in order of priority)	Done/Ongoing	To be Done
Join the NFIP.	X	
Participate in NFIP training by State and/or FEMA.	X	
Establish mutual aid agreements with neighboring communities to address administering the NFIP following a major storm event.		X
Address NFIP monitoring and compliance	X	
Revise/adopt subdivision regulations and erosion control regulations to improve floodplain management in the community.	X	
Participate in the CRS.	X	
Prepare, distribute, or make available NFIP, insurance and building code explanatory pamphlets or booklets.	X	
Identify and become knowledgeable on non-compliant structures in the community.	X	
Identify and become knowledgeable of submit to rate structures.		X
Identify cause of submit to rate structure and analyze how to prevent non-compliant structures in the future.		X
Inspect foundations at time of completion before framing to determine if lowest floor is at or above BFE.	X	
Require use of elevation certificates.	X	
Report any changes in the Special Flood hazard Area to FEMA within 180 days of change.	X	
Identify and keep track of LOMA/LOMR in the community.	X	
Gain familiarity with community's Flood Insurance Rate Maps.	X	
Address repetitive loss structures.	X	

Town of Scituate, MA

HMPT Meeting #3



Join Zoom Meeting

<https://us02web.zoom.us/j/89147203813>

Meeting ID: 891 4720 3813

One tap mobile

+1-929-205-6099 US (New York)

Meeting ID: 891 4720 3813

Find your local number: <https://us02web.zoom.us/u/kdWJmrPZCD>

October 5, 2021 10:30 AM - 12:00 PM

Name

Email Address

John Murphy

Amy Walkey

James Canavan

Ben Haskell

Kyle Boyd

Andrew Scheele

Craig Pereira



Local Hazard Mitigation Committee Meeting #4: February 1, 2022



Scituate Hazard Mitigation Plan Update
Hazard Mitigation Planning Team Meeting #4

Join Zoom Meeting
<https://us02web.zoom.us/j/89132093723>
Meeting ID: 891 3209 3723
One tap mobile
+13126266799,89132093723# US (Chicago)
+19292056099,89132093723# US (New York)
Meeting ID: 891 3209 3723

February 1, 2022 9:30 – 11:30 PM

Agenda

1. STAPLEE Prioritization
2. Next Steps



Memorandum of Meeting

To: Kyle Boyd

From: Craig Pereira

Date: February 2, 2022

Re: Scituate Hazard Mitigation Plan Update: Hazard Mitigation Planning Team Meeting #4

In attendance:

Corey Miles – Coastal Management Officer
John Murphy – Fire Chief/Emergency Management Director
Karen Joseph – Town Planner
William Branton – Chief Operator WWTF
Amy Walkey – Conservation Agent/Natural Resources Officer
James Canavan - Academia
Ben Haskell – Environmental/NOAA
Kyle Boyd – Director of Planning and Development
Robert Vogel – Building Commissioner
Andrew Scheele – Director, Board of Health

Consultant Team

Craig Pereira, Project Manager - Horsley Witten Group, Inc. (HW)

The fourth Hazard Mitigation Planning Team (HMPT) meeting was held February 1, 2022. The following items were discussed and include follow up items highlighted in yellow:

1. STAPLEE Prioritization. The HMPT reviewed the STAPLEE Prioritization score sheet, then ranked each mitigation action for consideration.
 - All HMPT members to review the STAPLEE rankings and provide feedback within two weeks.
2. Next Steps.
 - Finalize Mitigation actions for consideration
 - Identify date for Public Workshop #2
 - Identify time frame for Public Comment Period (1 month)

**Part 2: Prioritize Actions – Quantitative Method
Method C – Simple Score**

Criterion:	Cost	Benefit
<p>Social: Is the action compatible with present and future local community needs and values?</p> <ul style="list-style-type: none"> - Is the proposed action socially acceptable to the community? - Are there equity issues involved that would mean that one segment of a community is treated unfairly? - Will the action cause social disruption? 		
<p>Technical: Is the action feasible with available local resources (or as supplement by outside resources as necessary)?</p> <ul style="list-style-type: none"> - Will the proposed action work? - Will it create more problems than it solves? - Does it solve a problem or a symptom? - Is it the most useful action in light of other community goals? 		
<p>Administrative: Does the community have the administrative capacity to implement the action?</p> <ul style="list-style-type: none"> - Can the community implement the action? - Is there someone to coordinate and lead the effort? - Is there sufficient funding, staff, and technical support available? - Are there ongoing administrative requirements that need to be met? 		
<p>Political: Is there strong public support to implement and maintain the action?</p> <ul style="list-style-type: none"> - Is the action politically acceptable? - Is there public support both to implement and to maintain the project? 		
<p>Legal: Does the community have the legal authority to implement the action?</p> <ul style="list-style-type: none"> - Are there legal side effects (taking)? - Is the action allowed via Comprehensive Plan, or does it need to be amended? - Will the community be liable for the action? - Will the activity be challenged? 		
<p>Economic: Is the action cost-effective?</p> <ul style="list-style-type: none"> - What are the costs and benefit of the action? - Do the benefits exceed the costs? - Are initial, maintenance, and administrative costs taken into account? - Has funding been secured for the proposed action? - What burden will this action place on the tax base of local economy? - Does the action contribute to other community goals? 		
<p>Environmental: Does the action impact environmental resources, and is the impact positive, negative, or neutral?</p> <ul style="list-style-type: none"> - Will the action need environmental regulatory approvals? - Will it meet local and state regulatory requirements? 		
Sub-total		
Priority/Total Score		
Ranking Descriptions:		
Very Beneficial: 2		
Favorable: 1		
Not Applicable: 0		
Not Favorable: -1		

PUBLIC EDUCATION AND AWARENESS

Action #1

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Address the vulnerability of coastal business districts.

Lead a climate vulnerability and resilience workshop with stakeholders, property owners, residents, businesses, and municipal staff and officials for participatory visioning the future with sea level rise and coastal flooding. The goal of the workshop is to educate stakeholders to the current and future risks and ensure stakeholders are active participants in the waterfront's current and future resilience. Front Street is a priority for this action.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Planning and Development
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Increased understanding of vulnerabilities, Improved resilience
- Vulnerable Area: Public Awareness/Education, Coastal Areas, Public/Private Property

Action #2

...2016 Plan

CRS participation/implementation of public information program.

Implement actions related to flood awareness and prevention to improve the current CRS rate.

- Action Type: Planning, Pre-Disaster
- Priority Score: 24
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Planning and Development
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Increased understanding of vulnerabilities, Improved resilience
- Vulnerable Area: Public Awareness/Education, Coastal Areas, Public/Private Property

Action #3

...Report of the Massachusetts Coastal Erosion Commission, Volume 1, Findings and Recommendations December 2015/Scituate 2040 Master Plan Update 2021

Maintain and expand technical and financial assistance and communication and outreach to communities to support local efforts to address the challenges of erosion, flooding, storms, sea level rise, and other climate change impacts.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Planning and Development/DPW/Master Plan Implementation Committee
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Increased understanding of vulnerabilities, Improved resilience
- Vulnerable Area: Public Awareness/Education, Coastal Areas, Public/Private Property

Action #4

...Town of Scituate Coastal Community Assessment, September 2018/Scituate 2040 Master Plan Update 2021

Implement recommendations from the Coastal Community

(1) Assessment, including:

- I. **Through a robust community engagement process, develop and adopt a long-term coastal resilience vision and strategy.** The questions facing Scituate are not about whether to take action on the coast, but how, when, and where to act. The community is eager to see these questions answered strategically and to be meaningfully involved in the process, so the long-term plan is community-developed and community-supported.
- II. **Review, summarize, and present in a simple format, the key actions that have been taken in recent years to improve coastal resilience in Scituate, and the relevant recommendations that have been made in previous studies and plans.** Currently, there is no easy way to find out what Scituate already knows about its own coastal vulnerabilities and strengths, what solutions have already been implemented or considered, and what remains unknown.
- III. **Convene community conversations about managed retreat.** Many in the community want to talk about managed retreat, but it's a topic that can only be approached sensitivity and skillfully, and without any expectation of a given outcome. We propose a possible path for supporting conversations on this challenging issue.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Planning and Development, DPW, Master Plan Implementation Committee
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget

- Cost Estimate: Municipal Personnel Time
- Benefit: Increased understanding of vulnerabilities, Improved resilience
- Vulnerable Area: Public Awareness/Education, Coastal Areas, Public/Private Property

Action #5

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Initiate a public outreach and marketing campaign with a sense of urgency on climate change and resilience in Scituate.

The Town has demonstrated results in such an effort, when, during the 2016 drought where resident's behavior shifted sufficiently to mitigate drinking water scarcity during that time.

- Action Type: Planning, Pre-Disaster
- Priority Score: 25
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Planning and Development
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Increased understanding of vulnerabilities, Improved resilience
- Vulnerable Area: Public Awareness/Education, Coastal Areas, Public/Private Property

Action #6

...HW

Develop and implement an annual Disaster Mitigation Workshop for businesses, industry, and shoreline users.

Prior to the start of hurricane season (June 1st), the Harbormaster (s) will:

- Develop and implement an education/training program for harbor and waterfront users that includes the distribution of storm readiness checklist for boaters.
- Update accurate lists of principal marine interests and pumpout facilities including marinas, waterfront businesses, neighboring Harbormasters, Coast Guard, Towing and Salvage Companies, environmental teams, key vessel operators, and fishing cooperatives.

- Action Type: Planning, Pre-Disaster
- Priority Score: 25
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Harbormaster, Planning and Development
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Increased understanding of vulnerabilities, Improved resilience

- Vulnerable Area: Public Awareness/Education, Coastal Areas, Public/Private Property

PROPERTY PROTECTION

Action #7

...2016 Plan/Coastal Erosion, Sediment Transport and Prioritization Management Strategy Assessment for Shoreline Protection, August 2016/Elevating Roadway Improvements and Dune/Scituate 2040 Master Plan Update 2021

Elevate Vulnerable Structures

The Town has completed a number of homes and utility elevations to date. This program has proven generally popular and the Town plans to continue to offer funding obtained through federal, state and regional grants. The program criteria will be modified as needed throughout the life of this plan.

- Action Type: Planning, Pre-Disaster
- Priority Score: 17
- Lead: Coastal Management and Flood Hazard Mitigation Dept./Building Official
- Supporting: Coastal Advisory Commission/ DPW/Planning and Development/Master Plan Implementation Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP/EOEEA Grants
- Cost Estimate: Significant
- Benefit: Improved public safety, Minimized impacts from flooding, Improved resilience
- Vulnerable Area: Repetitive Loss properties, Coastal Areas, Public/Private Property

NATURAL RESOURCE PROTECTION

Action #8

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018/Scituate 2040 Master Plan Update 2021

Evaluate vulnerability to salt water intrusion for wells and aquifers near the coastline, and vulnerability of water pump stations to a 1% and a 0.2% Annual Chance Flood and prioritize infrastructure improvements that enhance resilience.

- Action Type: Planning, Pre-Disaster
- Priority Score: 28
- Lead: DPW Water Division
- Supporting: Water Resources Committee, Master Plan Implementation Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants

- Cost Estimate: Significant
- Benefit: Protection of natural resources
- Vulnerable Area: Municipally-owned Infrastructure, Coastal Areas

Action #9

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018/Scituate 2040 Master Plan Update 2021

Relocate or elevate well field pump houses that are in the flood zone in the future.

- Action Type: Planning, Pre-Disaster
- Priority Score: 28
- Lead: DPW Water Division
- Supporting: Water Resources Committee/Master Plan Implementation Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Protection of natural resources
- Vulnerable Area: Municipally-owned Infrastructure, Coastal Areas

Action #10

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Revise Stormwater bylaw so all new and redevelopment captures at least first 1” of rain onsite, using Low Impact Development and other strategies, or evaluate the design standards that consider sea level rise and/or the 1% Annual Chance Flood.

- Action Type: Planning, Pre-Disaster
- Priority Score: 9
- Lead: Planning and Development
- Supporting: Conservation Commission, Building Official, Planning Board
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Protection of natural resources, Minimized impacts from flooding
- Vulnerable Area: Natural Resources

Action #11

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018/Scituate 2040 Master Plan Update

Salt Marsh Restoration:

- I. Contract a formal evaluation on salt marsh health and long-term monitoring and maintenance such as citizen science groups.
- II. Initiate short-term marsh restoration techniques such as invasive removals.

- III. Evaluate Wetlands Protection Act and land acquisition opportunities to plan for, protect, and/or acquire land for horizontal marsh migration.
- IV. Perform recommendations for salt marsh restoration based upon formal evaluation.
- V. Collaborate with the Town of Marshfield on salt marsh evaluation and restoration.

- Action Type: Planning, Pre-Disaster
- Priority Score: 28
- Lead: Coastal Resource Commission
- Supporting: Coastal Advisory Committee/Master Plan Implementation Committee
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget, FEMA/EOEEA grants
- Cost Estimate: Municipal Personnel Time
- Benefit: Protection of natural resources, Minimized impacts from flooding
- Vulnerable Area: Coastal Areas, Natural Resources

Action #12

...Open Space and Recreation Plan 2018/Scituate 2040 Master Plan Update 2021

Protect Scituate's natural shoreline and coastal features and waters, which are a prime recreational and economic resource, and which give the Town its identity as a very appealing seaside community.

- I. Continue to coordinate various town departments and local task forces to develop bylaws and best practices that relate to preserving and enhancing the natural shoreline and coastal resources in the current status and with expected impacts of sea level rise. Explore the use of beach nourishment to maintain attractive beaches well suited to local recreation.
- II. Continue to strongly enforce Town bylaws discouraging new construction in the floodplain.
- III. Implement recommendations from the Coastal Assessment Study and other recent and ongoing studies, as applicable to shoreline protection.
- IV. Initiate public education on shoreline and coastal resources protection, as well as issues affecting public use of the beach. Include lawn service contractors, landscapers, and other businesses whose actions impact the coastline.
- V. Work with surrounding communities on long-term planning to ensure regional cooperation on solutions to coastal hazards.

- Action Type: Planning, Pre-Disaster
- Priority Score: 28
- Lead: Conservation Commission
- Supporting: Coastal Advisory Commission, DPW, Master Plan Implementation Committee
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget, FEMA/MEMA grants
- Cost Estimate: Municipal Personnel Time

- Benefit: Protection of natural resources, Minimized impacts from flooding
- Vulnerable Area: Coastal Areas, Natural Resources

Action #13

...Open Space and Recreation Plan 2018/Report of the Massachusetts Coastal Erosion Commission, Volume 1, Findings and Recommendations December 2015

Enhance the natural beauty of the Town's landscape by protecting existing open space, while promoting appropriate use.

Prepare management plans for Scituate's public beaches.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Coastal Management and Flood Hazard Mitigation
- Supporting: Scituate Beach Commission
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Moderate
- Benefit: Protection of natural resources
- Vulnerable Area: Coastal Areas, Natural Resources

STRUCTURAL PROJECTS

Action #14

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018/Scituate 2040 Master Plan Update 2021

For additional interim protection prior to raising critical infrastructure and residences, consider building soft shoreline protection features such as earthen berms with living shorelines to protect buildings located in low energy flood zones.

- Action Type: Planning, Pre-Disaster
- Priority Score: 21
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Coastal Advisory Commission/Master Plan
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Improved public safety, Minimized impacts from flooding, Improved resilience
- Vulnerable Area: Repetitive Loss properties, Municipally-owned Infrastructure/Buildings, Coastal Areas, Public/Private Property

Action #15

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018/Scituate 2040 Master Plan Update 2021

Continue beach and dune nourishment.

- Action Type: Planning, Pre-Disaster
- Priority Score:
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Scituate Beach Commission/Coastal Advisory Commission, DPW, Master Plan Implementation Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Improved public safety, Minimized impacts from flooding, Improved resilience
- Vulnerable Area: Repetitive Loss properties, Municipally-owned Infrastructure/Buildings, Coastal Areas, Public/Private Property

Action #16

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018/Scituate 2040 Master Plan Update 2021

Install sacrificial dunes, sand fences, seawalls and other coastal infrastructure investments.

- Action Type: Planning, Pre-Disaster
- Priority Score: 24
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Scituate Beach Commission/Coastal Advisory Commission, DPW, Master Plan Implementation Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Improved public safety, Minimized impacts from flooding, Improved resilience
- Vulnerable Area: Repetitive Loss properties, Municipally-owned Infrastructure/Buildings, Coastal Areas, Public/Private Property

Action #17

...Coastal Erosion, Sediment Transport and Prioritization Management Strategy Assessment for Shoreline Protection, August 2016/Elevating Roadway Improvements and Dune/Beach Nourishment Along North Humarock for Improved Coastal Resiliency, March 28, 2017/Scituate 2040 Master Plan Update 2021

Implement Recommended Shore Protection Measures by Study Area¹

Ongoing threats to public and private infrastructure continue to be a major concern for the Town, as both long-term coastal erosion and relative sea level rise in the coming

¹ Coastal Erosion, Sediment Transport, and Prioritization Management Strategy Assessment for Shoreline Protection August 2016.

decades will continue to exacerbate regional storm damage. With this understanding, the Town pursued a long-term planning effort to identify ongoing coastal erosion and the sediment transport pathways that govern this process, screen potential shore protection strategies to determine their applicability, assess both historical storm damage and needed shore improvement costs by shoreline reach, and prioritize shore protection and/or other management strategies based on costs and storm protection benefits.

For all study areas, elevating homes and buildings in high hazard flood areas above base flood elevations is recommended. Also, in all the shore protection approaches, appropriate public access easements will need to be acquired from the involved property owners if the project is publicly funded.

Minot Beach

- Beach nourishment/Perched cobble beach 1,200 feet:
 - \$600,000 construction costs
 - \$2.2 million over a 50-year life cycle
- Seawall improvements:
 - \$6.7 million over a 50-year life cycle

Increasing the height of the seawall by 2 feet can reduce overtopping rates to levels that will not damage pavement under existing climate conditions and does prevent damage under hypothetical SLR scenarios.

North Scituate Beach/Seaside Road

- North Scituate Beach - beach nourishment (Phase 1 2,900 feet):
 - \$8.2 million construction costs
 - \$58.9 million over a 50-year life cycle
- Surfside Road – beach nourishment (2,700 feet):
 - \$4.9 million
 - \$35.2 million over a 50-year life cycle

Nourishment has the benefit of providing improved storm protection, providing a sediment source for adjacent shorelines (Mann Hill, Egypt Beaches), and creating a recreational resource.

Mann Hill Beach

- Managed retreat (move homes landward):
 - > \$1.5 million
- Managed retreat (buyout all homes):
 - > 2.3 million

Beach nourishment would improve the longevity of development along Mann Hill Beach would be improved, although continued erosion of the cobble dune land form will be difficult and/or cost-prohibitive to maintain in the long-term.

Egypt Beach

- Construction of a boulder dike (2,300 feet):
 - \$1.42 million construction costs

The boulder dike alone does not provide protection from severe storm events, however, it is determined that a rejuvenated sediment supply via nourishment provided further to the north will allow long-term accretion along the landward side of the dike.

Oceanside Drive...consider first the incremental improvements/repairs completed through several EOEEA coastal grants (1st grant to repair 760 feet of seawall/\$4.0 million...2nd grant to repair/replace 525' of seawall/\$3.0 million...3rd grant to repair 640 feet of seawall/\$2.5 million)

- Rehabilitation of seawall and revetment (10,000 feet):
 - \$80.2 million
 - \$199.6 million over a 50-year life cycle
- Drainage improvements for the basins:
 - \$4.0 million

Beach nourishment could be implemented along Oceanside Drive at a lower cost, there are obstacles in providing lasting protection for the northern portions of the study area and the possibility on inhibiting and/or blocking navigational pathways into Scituate Harbor and outfalls from the basins.

Cedar Point

- Rehabilitation of seawall and revetments (1,300 feet):
 - \$10.4 million
 - \$25.9 million over a 50-year life cycle
- Beach nourishment/Cobble berm (1,200 feet)
 - \$4.6 million
 - \$17.1 million over a 50-year life cycle
- Boulder dike (1,200 feet):
 - \$720,000

Benefits include increased storm protection, upgraded condition of the existing coastal engineering structures, and improved emergency egress.

First Cliff

- Maintain the status quo:
 - \$10.3 million over a 50-year life cycle

Edward Foster Road

- Rehabilitation of seawall and revetment (1,300 feet):
 - \$10.4 million
 - \$25.9 million over a 50-year life cycle

The rehabilitated structure can protect against increased wave overtopping due to potential sea level rise and maintain the emergency egress between First and Second Cliff.

Second Cliff

- Maintain the status quo:
 - \$13.3 million over a 50-year life cycle

Peggotty Beach

- Managed retreat (move homes landward):
 - > \$4.8 million
- Managed retreat (buyout all homes):
 - > 8.7 million

Peggotty Beach represents one of the most highly erosional areas along the Scituate coast, where overwash of the low-lying barrier beach has caused readily observable landward migration of the barrier beach into the salt marsh system along its landward limit.

Third Cliff

- Maintain the status quo:
 - \$26.8 million over a 50-year life cycle

Fourth Cliff

- Maintain the status quo:
 - \$4.3 million over a 50-year life cycle

Humarock North/South

- Elevate Central Avenue (4,800 feet):
 - \$3.6 million
- Humarock North only beach nourishment (50-foot berm/3,500 feet):
 - \$4.1 million
 - \$160.7 million over a 50-year life cycle
- Humarock North only beach nourishment (100-foot berm/3,500 feet):
 - \$6.3 million
 - \$130.2 million over a 50-year life cycle
- Humarock North/South beach nourishment (50-foot berm/10,500 feet):
 - \$12.3 million
 - \$70.8 million over a 50-year life cycle
- Humarock North/South beach nourishment (100-foot berm/10,500 feet):
 - \$26.4 million
 - \$120.0 million over a 50-year life cycle
- Construction of dunes stand-alone (4,800 feet):
 - \$9.6 million
 - \$78.2 million over a 50-year life cycle

Benefits include increased storm protection, eliminating the need for post-storm roadway clearing along Central Avenue, providing an increased littoral sediment supply

to protect down-drift beaches, providing a greater recreational resource, and preventing a breach between Humarock and Fourth Cliff.

- Action Type: Planning, Pre-Disaster
- Priority Score: 17
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Scituate Beach Commission/Coastal Advisory Commission/DPW/ Master Plan Implementation Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP/EOEEA Grants
- Cost Estimate: Significant
- Benefit: Improved public safety, Minimized impacts from flooding, Improved resilience
- Vulnerable Area: Repetitive Loss properties, Municipally-owned Infrastructure/Buildings, Coastal Areas, Public/Private Property

Action #18

Scituate Harbor Sustainability and Resilience Master Plan, August 2020/Scituate 2040 Master Plan Update 2021

Implement Resilience Recommendations for Scituate Harbor

The resilience recommendations for Scituate Harbor focus on an incremental elevation and adaptation of the coastal perimeter of the district that integrates with an elevated Harborwalk, new coastal amenities and open space features. This approach is combined with the protection and improvement of the natural systems that provide protection to the district and adjacent shoreline at the Kent Street marshes and the banks of the Satuit Brook. The addition of green infrastructure in the district to protect and improve water quality of the harbor. All of these investments are focused on reducing the pathways of ocean water into the business district.

- I. A new elevated waterfront park amenity at Cole Parkway that provides flood protection.
- II. New seating and coastal amenities along an elevated Scituate Harborwalk from Cole Parkway to the Town Pier, evaluating the feasibility of potential for extension to the Scituate Marine Park.
- III. Elevation of sea walls and bulkhead edges that already exist in the district
- IV. Floodproofing the waterside of buildings along Front Street and adding infrastructure for deployable floodgates between gaps in buildings.
- V. Exploration of roadway infrastructure resilience improvements at the Satuit Brook bridge and Edward Foster Road and bridge.

- Action Type: Planning, Pre-Disaster
- Priority Score: 17
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: DPW Highway Division
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Significant

- Benefit: Improved public safety, Minimized impacts from flooding, Improved resilience
- Vulnerable Area: Repetitive Loss properties, Municipally-owned Infrastructure/Buildings, Coastal Areas, Public/Private Property

Action #19

...Scituate Comprehensive Wastewater Treatment Resilience Feasibility Study/ Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018/Scituate 2040 Master Plan Update 2021

Implement Flood Mitigation Measures for the Identified Pump Stations and the Wastewater Treatment Plant

The sewer collection and treatment system are a critical Scituate lifeline system and failure, or disruption of system operations will result in significant impacts to the Town and its residents.

- Seven of the nine pump stations and the wastewater treatment plant are vulnerable to coastal flooding.
- System flood vulnerabilities include:
 - Direct damages due to flood inundation, corrosion, mold and structure damage.
 - Disruption or loss of service due to temporary or long-term repair.
 - Unanticipated environmental releases.

Based on the results of the coastal flood vulnerability assessment the following objectives (in order of priority) have been identified:

- I. Form a water/wastewater planning committee to develop a long-range management plan for the resilience of water/wastewater within the Town.**
- II. Reduction to Elimination of Infiltration/Inflow**
 - Addressed in a separate mitigation action.
- III. Flood Protection of Pump Stations (in order of priority)**
 - a. Sand Hills**

Near-term measures: (\$25,000)

 - i. Personnel entryway: install full flood door (\$9,600)
 - ii. Wall penetrations: flood proof any structural/wall penetrations (\$1,200)
 - iii. Air and exhaust vents: raising and/or extension of ventilation ducts that are below or at the maximum flood elevation (\$5,000)
 - iv. Air and exhaust vents: raising and/or extension of ventilation ducts that are below or at the maximum flood elevation (\$5,000)
 - v. Gas meter: provide shielding to protect the gas meter components from debris collision in the event of projected maximum flooding (\$3,000)

- vi. Gas Meter: relocate the gas meter assembly above the anticipated flood elevation (\$5,000)

Long-term measures: (\$225,000 without flood wall protection options included)

- vii. Pump motors: Elevate pump motors (\$20,000)
- viii. Electric Meter: relocate the electric meter assembly above the anticipated flood elevation (\$5,000)
- ix. Gas generator: raise generator above maximum flood elevation (\$150,000)
- x. Control Panels: relocate or elevate electrical components (\$50,000)
- xi. Flood Wall Protection Options:
 - 1. Option 1: 8' high aqua-fence with concrete pad/stop log gate (\$225,000)
 - 2. Option 2: 8' high stop logs with concrete pad (\$235,000)
 - 3. Option 3: 8' high sheet piling flood wall with concrete pad/stop log gate (\$382,000)

*Sand Hills Pump Station was prioritized separately from the other pump stations, as well as the Treatment Plant due to their significance in maintaining a functional system.

b. Musquashicut

Near-term measures: (\$35,000)

- i. Wet/Dry well hatches: replace hatches with watertight hatches (\$20,000)
- ii. Personnel entry: install full flood door (\$4,800)
- iii. Wet well vent: raise wet well vent pipe above flood elevation (\$1,000)
- iv. Air and exhaust vents: raising and/or extension of ventilation ducts that are below or at the maximum flood elevation (\$1,200)
- v. Gas meter: provide shielding to protect the gas meter components from debris collision in the event of projected maximum flooding (\$3,000)
- vi. Gas Meter: relocate the gas meter assembly above the anticipated flood elevation (\$5,000)

Long-term measures: (\$387,000)

- vii. Electric Meter: relocate the electric meter assembly above the anticipated flood elevation (\$5,000)
- viii. Gas generator: raise generator above maximum flood elevation (\$150,000)
- ix. Control Panels: relocate or elevate electrical components (\$50,000)
- x. Flood Wall Protection Options:
 - 1. Option 1: 8' high aqua-fence with concrete pad/stop log gate (\$225,000)

2. Option 2: 8' high stop logs with concrete pad (\$235,000)
3. Option 3: 8' high sheet piling flood wall with concrete pad/stop log gate (\$382,000)

c. *Herring Brook*

Near-term measures: (\$104,000)

- i. Wet/Dry well hatch covers: replace hatches with watertight hatches (\$20,000)
- ii. Gas generator: raise generator above maximum o elevation (\$75,000)
- iii. Wet well vent: raise wet well vent pipe above flood elevation (\$1,000)
- iv. Gas meter: provide shielding to protect the gas meter components from debris collision in the event of projected maximum flooding (\$3,000)
- v. Gas Meter: relocate the gas meter assembly above the anticipated flood elevation (\$5,000)

Long-term measures: (\$387,000 without flood wall protection options included)

- vi. Electric Meter: relocate the electric meter assembly above the anticipated flood elevation (\$5,000)
- vii. Control Panels: relocate or elevate electrical components (\$50,000)
- viii. Flood Wall Protection Options:
 1. Option 1: 7' high sheet piling flood wall with concrete pad/stop log gate (\$156,250)
 2. Option 2: 7' high stop logs with concrete pad/stop log gate (\$162,500)
 3. Option 3: 8' high sheet piling flood wall with concrete pad/stop log gate (\$232,000)

d. *Chain Pond*

Near-term measures: (\$33,200)

- i. Wet/Dry well hatches: replace hatches with watertight hatches (\$25,000)
- ii. Personnel entry: install full flood door (\$4,000)
- iii. Wall penetrations: flood proof any structural/wall penetrations (\$1,200)
- iv. Gas Meter: provide shielding to protect the gas meter components from debris collision in the event of projected maximum flooding (\$3,000)

Long-term measures: (\$160,000)

- v. Electric Meter: relocate the electric meter assembly above the anticipated flood elevation (\$5,000)

- vi. Gas generator: raise generator above maximum flood elevation (\$150,000)
- vii. Gas Meter: relocate gas meter assembly above the anticipated flood elevation (\$5,000)

e. *Pegotty Beach*

Near-term measures: (\$36,200)

- i. Wet/Dry well hatches: replace hatches with watertight hatches (\$20,000)
- ii. Personnel entry: install full flood door (\$4,800)
- iii. Wet well vent: raise wet well vent pipe above flood elevation (\$1,000)
- iv. Wall penetrations: flood proof any structural/wall penetrations (\$1,200)
- v. Air and exhaust vents: raising and/or extension of ventilation ducts that are below or at the maximum flood elevation (\$1,200)
- vi. Gas meter: provide shielding to protect the gas meter components from debris collision in the event of projected maximum flooding (\$3,000)
- vii. Gas Meter: relocate the gas meter assembly above the anticipated flood elevation (\$5,000)

Long-term measures: (\$205,000 without flood wall protection options included)

- viii. Electric Meter: relocate the electric meter assembly above the anticipated flood elevation (\$5,000)
- ix. Gas generator: raise generator above maximum flood elevation (\$150,000)
- x. Control Panels: relocate or elevate electrical components (\$50,000)
- xi. Flood Wall Protection Options:
 - 1. Option 1: 7' high aqua-fence with concrete pad (\$156,250)
 - 2. Option 2: 7' high stop-logs with concrete pad (\$162,500)
 - 3. Option 3: 8' high sheet piling flood wall with concrete pad/stop log gate (\$232,000)

f. *Edward Foster*

Near-term measures: (\$36,200)

- i. Wet/Dry well hatches: replace hatches with watertight hatches (\$20,000)
- ii. Personnel entry: install full flood door (\$4,800)
- iii. Wall penetrations: flood proof any structural/wall penetrations (\$1,200)
- iv. Wet well vent: raise wet well vent pipe above flood elevation (\$1,000)
- v. Air and exhaust vents: raising and/or extension of ventilation ducts that are below or at the maximum flood elevation (\$1,200)

- vi. Gas meter: provide shielding to protect the gas meter components from debris collision in the event of projected maximum flooding (\$3,000)
- vii. Gas Meter: relocate the gas meter assembly above the anticipated flood elevation (\$5,000)

Long-term measures: (\$205,000 without flood wall protection options included)

- viii. Electric Meter: relocate the electric meter assembly above the anticipated flood elevation (\$5,000)
- ix. Gas generator: raise generator above maximum flood elevation (\$150,000)
- x. Control Panels: relocate or elevate electrical components (\$50,000)
- xi. Flood Wall Protection Options:
 1. Option 1: 8' high aqua-fence with concrete pad/stop log gate (\$225,000)
 2. Option 2: 8' high stop logs with concrete pad (\$235,000)
 3. Option 3: 8' high sheet piling flood wall with concrete pad/stop log gate (\$382,000)

g. Collier Road

Near-term measures: (\$29,000)

- i. Wet/Dry well hatches: replace hatches with watertight hatches (\$20,000)
- ii. Personnel entry: install full flood door (\$4,800)
- iii. Wall penetrations: flood proof any structural/wall penetrations (\$1,200)
- iv. Gas Meter: provide shielding to protect the gas meter components from debris collision in the event of projected maximum flooding (\$3,000)

Long-term measures: (\$205,000)

- v. Control panels: relocate or elevate electrical components (\$50,000)
- vi. Gas generator: raise generator above maximum flood elevation (\$150,000)
- vii. Gas Meter: relocate gas meter assembly above the anticipated flood elevation (\$5,000)

All identified pump stations recommended for future pump station replacement Benefit-Cost Analysis and Feasibility Study.

*Musquashicut, Herring Brook, Chain Pond, Peggotty Brook, Edward Foster and Collier Road pump stations were prioritized together.

IV. Flood Protection of Treatment Plant/Enhance Treatment Plant Overflow Capacity

- a. Plant SSCs
- b. Plant outfalls
- c. Stormwater outfalls
- d. Hydraulic gradient
- e. Liner restoration
- f. Conversion to constructed wetlands/treatment

Short-term measures: (\$947,000 without deployable flood protection options included)

- i. Electric/Instrumentation Manholes: 10 @ \$10,000 each (\$100,000)
- ii. Effluent Outfall 20" Pipe: Install backflow prevention/20" duckbill valve (\$17,000)
- iii. Stormwater Outfall 15" Pipe: Install backfill prevention/15" duckbill valve (\$25,000)
- iv. Stormwater Outfall 6" Pipe: Install backflow prevention/6" duckbill valve (\$5,000)
- v. Lined Emergency Storage Lagoon: Liner lagoon restoration (\$800,000)
- vi. Deployable Perimeter Flood Protection:
 1. Option 1: Aqua-Fence System (\$950,000)
 2. Option 2: Stop Logs System (\$775,000)

Long-term measures: (\$400,000 without permanent flood wall protection options included)

- vii. Pump station: new pump station with generator upgrade to manage hydraulic head (\$400,000)
- viii. Permanent Flood Wall Protection:
 1. Option 1: 8' high sheet piling flood wall (1,000 LF) with concrete pad (\$2,000,000)
 2. Option 2: 8' high sheet piling wall (1,370 LF) with concrete pad (\$27,400,000)

*Treatment Plant was prioritized separately from other system components due to its significance in maintaining a functional system.

- Action Type: Planning, Pre-Disaster
- Priority Score: 28
- Lead: DPW Sewer Division
- Supporting: Master Plan Implementation Committee, Water/Wastewater Planning Committee (once established)
- Time Frame: Near/Short-term recommendations: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Improved resilience, Minimized impacts/damages/costs, Protection of natural resources

- Vulnerable Area: Municipally-owned Infrastructure/Buildings, Coastal Areas, Natural Resources

EMERGENCY SERVICES

Action #20

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Prepare a list of key utility facilities that require critical power restoration and inform the power company of locations of the facilities to expedite electricity restoration during an outage.

- Action Type: Planning, Pre-Disaster
- Priority Score: 27
- Lead: DPW
- Supporting: Eversource
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Improved Public Safety/Health/Welfare, Continuation of critical services
- Vulnerable Area: Public Utilities, Municipally-owned Infrastructure

Action #21

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018/Scituate 2040 Master Plan update 2021

Create a Heat Emergency Action Plan.

Prioritize creating cooling centers for those most vulnerable to heat, systematic communications strategies, and back-up energy plans. Stress the importance of tree canopy for cooling buildings (reduce clear-cutting) and anticipate heat damage to roads.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Health Dept.
- Supporting: Planning and Development, Conservation Commission, Master Plan Implementation Committee
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Improved Public Health/Safety/Welfare
- Vulnerable Area: Public Awareness/Education

Action #22

...Waterways Management Plan 2011

Set aside five moorings for emergency and storm usage.

- Action Type: Planning, Pre-Disaster
- Priority Score: 24
- Lead: Harbormaster
- Supporting: Fire Dept.
- Time Frame: Short Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Improved emergency services
- Vulnerable Area: Coastal Areas

PLANNING AND PREVENTION

Action #23

...HW

Address the needs of the Old Oaken Bucket Pond Dam:

A. Complete a Phase 1 Inspection/Report of the dam.

The last Phase 1 Inspection on file was completed August 16, 2012. This dam is classified as a significant hazard structure. According to ODS regulations, a Phase 1 Inspection should be conducted every five years, which is now past due for this structure.

B. Complete recommended improvements based on most recent Phase 1 Inspection Report

- Repair leak in fish ladder wall at end near stone training wall.
- Repair loose stones in upstream spillway embankment and stones that have fallen out of training walls.
- Remove all trees and brush including roots from spillway and upstream embankment.
- Install weed control fabric and rip-rap on spillway between primary and auxiliary weirs.
- Remove large boulders from streambed inside the culvert.

C. Develop an Emergency Action Plan (EAP) for Old Oaken Bucket Pond Dam.

Old Oaken Bucket Pond Dam is a Significant hazard dam owned by the Town of Scituate. An EAP is a plan of action to reduce potential property damage and loss of life in an area affected by a dam failure. An EAP identifies the areas, structures, facilities and roads that could be affected by dam failure. It also establishes a monitoring system which can activate the plan. Lastly, it identifies the corresponding official(s), organizations, and agencies along with their responsibilities regarding implementation of the plan. The most recent available Phase 1 Inspection Report (August 16, 2012) notes an EAP date February 1994 which should be updated.

- Action Type: Mitigation, Pre-Disaster
- Priority Score: 28
- Lead: DPW Engineering Division
- Supporting: Planning and Development/Conservation
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget/FEMA and MEMA Grants
- Cost Estimate: Significant
- Benefit: Protection of property, protection of life/infrastructure (water supply)
- Vulnerable Area: Municipally-owned Infrastructure

Action #24

...Mapping Storm Tide Pathways in Scituate and Cohasset: Assessing Coastal Vulnerability to Storms and Sea Level Rise

Obtain Storm Tide Pathways Study Data, then Implement Recommendations:

A. Increase public awareness of the importance of healthy coastal wetlands and natural coastal processes, and the need to protect these resources.

Education materials should be aimed at shoreline property owners, among others, to discuss the importance of natural sediment transport processes, and best practices for vegetation management, erosion management, and buffer protection, etc. This effort should be coordinated with the development of permitting guidance.

B. Use best available tools to understand the potential impact of storm surge on public and private property, sensitive infrastructure and natural resources, and to develop strategies and plans to avoid, minimize or mitigate adverse impacts.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Coastal Management and Flood Hazard Mitigation Dept.
- Supporting: Coastal Advisory Commission, DPW
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget/General Fund
- Cost Estimate: Municipal Personnel Time
- Benefit: Protection of property, Protection of life/infrastructure, Increased awareness of vulnerabilities, Accelerated evacuation
- Vulnerable Area: Coastal Areas

Action #25

...HW

Identify municipal personnel to become a Certified Floodplain Manager

Personnel from the Building/Community Development/Marine and Environmental Affairs department should become a Certified Floodplain Manager (CFM) through the Association of State Floodplain Managers. In addition to providing floodplain

coordination information to the public, a CFM can assist with floodplain mapping, elevation certificates and floodplain mitigation alternatives.

- Action Type: Planning and Pre-Disaster
- Priority Score: 26
- Lead: Building Official
- Supporting: Planning and Development
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Institutional awareness of hazards for contractors/homeowners, Increased property protection, Improved resilience
- Vulnerable Area: Municipally-owned Infrastructure, Repetitive Loss Properties

Action #26

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Establish and Maintain a Climate Resilience Task Force that works across departments and commissions for a comprehensive approach across sectors.

Task force to assess all plan recommendations for coastal and climate resilience, prioritize mitigation actions, and identify and pursue funding for project implementation.

- Action Type: Planning, Pre-Disaster
- Priority Score: 28
- Lead: Planning and Development
- Supporting: Coastal Management and Flood Hazard Mitigation Dept.
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Improved resilience/communication
- Vulnerable Area: Climate Resilience

Action #27

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Establish neighborhood Resilience Zones for specialized community-based participatory planning where residents, businesses, and neighborhood stakeholders create a shared vision of positive change/adaptation to current and future risks.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Planning and Development
- Supporting: Coastal Management and Flood Hazard Mitigation Dept.
- Time Frame: Medium Term

- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Improved resiliency/communication
- Vulnerable Area: Climate Resilience

Action #28

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Perform a community-based participatory visioning process for Scituate's Waterfront around Front Street.

Include business owners, residents, fishermen, and other stakeholders to collectively create solutions for the future of Front Street that address current and future coastal flooding in addition to public benefits and economic growth.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Coastal Management and Flood Hazard Mitigation Dept
- Supporting: Planning and Development
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Institutional awareness of hazards for contractors/homeowners, Increased property protection, Improved resilience
- Vulnerable Area: Coastal Areas

Action #29

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Seek out new funding opportunities to implement climate resilience investments.

These may include local surcharges similar in concept to the Community Preservation Act that can provide a dedicated source of funding for climate improvement projects.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Planning and Development
- Supporting: Coastal Management and Flood Hazard Mitigation Dept.
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Improved resiliency/communication
- Vulnerable Area: Climate Resilience

Action #30

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Evaluate all zoning, bylaws, and codes for barriers to improvements for climate resilience measures in the built, natural, and landscaped environment (i.e., minimize impervious surfaces using pervious pavers, minimize parking requirements, and shared driveways, use low Impact Development and Green Infrastructure, etc.). Ensure consistency with MA 2020 Model Floodplain Bylaw by creating a Coastal Flood Plain District Bylaw.

- Action Type: Planning, Pre-Disaster
- Priority Score: 22
- Lead: Planning and Development
- Supporting: Coastal Management and Flood Hazard Mitigation Dept., Planning Board
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Improved resilience
- Vulnerable Area: Climate Resilience

Action #31

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Consider establishing a Coastal Business Improvement District.

This could be a consistent source of revenue that could fund climate resilience improvements projects in addition to creating public programming and encouraging business patronage along the waterfront.

- Action Type: Planning, Pre-Disaster
- Priority Score: 22
- Lead: Planning and Development
- Supporting: Economic Development Commission
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget
- Cost Estimate: Municipal Personnel Time
- Benefit: Improved resilience, Economic development
- Vulnerable Area: Climate Resilience

Action #32

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Evaluate culverts, bridges, river and stream crossings for effectiveness in water flow during floods. Use MA Stream Crossing Standards.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: DPW Engineering Division

- Supporting: Coastal Management and Flood Hazard Mitigation Dept.
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Institutional awareness of hazards for contractors/homeowners, Increased property protection, Improved resilience
- Vulnerable Area: Municipally-owned Infrastructure, Repetitive Loss Properties

Action #33

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018/Scituate 204 Master Plan Update 2021

Create a municipal working group to inform design standards on raising roads in response to current and future coastal flooding. Also consider the implications for commercial, industrial, and residential egress.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: DPW Engineering Division
- Supporting: Building Official/Master Plan Implementation Committee
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Municipal Personnel Time
- Benefit: Protection of property. Protection of life/infrastructure, Increased awareness of vulnerabilities, Accelerated evacuation
- Vulnerable Area: Municipally-owned infrastructure

Action #34

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Support green building standards and energy use reduction for retrofits and new development. Incentivize when possible.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Building Official/Planning and Development
- Supporting: Renewable Energy Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants
- Cost Estimate: Moderate
- Benefit: Energy use reductions
- Vulnerable Area: Public/Private Property, Public Utilities

Action #35

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Explore feasibility of implementing Community Shared Solar (CSS) to institute Town-wide renewable energy efforts.

CSS can provide solar energy benefits to residents, non-profits, and businesses that are unable to install solar on their own properties while reducing Town-wide carbon emissions.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Building Official, Planning and Development
- Supporting: Renewable Energy Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants/US DOE
- Cost Estimate: Moderate
- Benefit: Energy use reductions, Improved resilience
- Vulnerable Area: Public/Private Property, Public Utilities, Climate Resilience

Action #36

...Building a Resilient Scituate – Climate Vulnerability Assessment and Action Plan, March 2018

Implement renewable back-up energy strategies for municipal buildings and critical infrastructure such as wells and waste water pump stations.

- Action Type: Planning, Pre-Disaster
- Priority Score: 20
- Lead: Building Official, Planning and Development
- Supporting: Renewable Energy Committee
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget, FEMA/MVP Grants/US DOE
- Cost Estimate: Significant
- Benefit: Energy use reductions, Improved resiliency, Continuation of critical services
- Vulnerable Area: Municipally-owned Buildings/Infrastructure

Action #37

...Report of the Massachusetts Coastal Erosion Commission, Volume 1, Findings and Recommendations December 2015

Support the implementation and study of pilot projects for innovative solutions and the encouragement of learning by doing and experimentation in shoreline management approaches.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: Coastal Management and Flood Hazard Mitigation
- Supporting: Coastal Advisory Commission, DPW
- Time Frame: Long Term

- Financing Options: FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Improved public safety, Property protection, Protection of natural resources
- Vulnerable Area: Coastal Areas

Action #38

Scituate 2040 Master Plan Update (June 2021)

Establish programs and policies for buy-outs, land swaps, relocations, and transfers of development rights to allow for relocation.

- Action Type: Planning, Pre-Disaster
- Priority Score: 20
- Lead: Coastal Management and Flood Hazard Mitigation
- Supporting: Planning and Development/Master Plan Implementation Committee
- Time Frame: Long Term
- Financing Options: FEMA/MVP Grants
- Cost Estimate: Significant
- Benefit: Improved public safety, Property protection, Protection of natural resources
- Vulnerable Area: Coastal Areas

Action #39

...Scituate Flow Monitoring Program and Infiltration/Inflow Analysis, CDM Smith, 2016.

Implement Recommendations for Future Phase II Sewer System Evaluation Survey (SSES)

The next step in the Town's I/I program is to begin to investigate and locate the sources of infiltration and inflow in the areas identified as contributing excessive flow (SSES). The results of the SSES program will provide the Town with a roadmap for implementation of I/I removal and capital improvements program. Area 4-2 completed...sewer service in this area has been entirely replaced with the Cedar Point Sewer Replacement Project.

Task 1: Flow Isolation and CCTV Inspection of Sewers for high-priority sub-areas (4-1, 5-1, and 6-1) and low-priority sub-areas exceeding the infiltration threshold (2-1), divided into two parts:

- Flow Isolation – Flow isolation is used to document the extent of infiltration entering the sewer system on a reach-to-reach basis. This work is performed during the night-time hours (11:00 PM – 6:00 AM) when sanitary flows are typically at their lowest and during dry weather to gain an understanding as to the extent of infiltration entering a sewer pipe. The results of the program will help determine those sewer reaches that should be further evaluated under a CCTV inspection program.
- CCTV Inspection – CCTV inspection includes cleaning and follow-up televising to gain visual documentation of sewer pipe defects that might

contribute excessive flows. Given the potential for rainfall derived inflow and infiltration (RDII) influenced flows in certain areas, it is recommended that, in addition to a traditional program, that certain areas be CCTV inspected during rainfall events and/or during periods of high tide to document the presence of RDII and I/I from private sources. If available, the Town can utilize their equipment to minimize follow-up investigations costs. Area 6-1CCTV and SSES report completed.

Task 2: Manhole Inspection Program for high priority sub-areas (4-1, 5-1, and 6-1) and low priority sub-areas (1-1, 2-1, 5-2, and 7-2). The inspections shall include visually identifying and quantifying sources of extraneous flow entering through defects such as pipe connections, defective shelves, or leaking walls.

Task 3: Smoke Testing Program for the remaining low priority sub areas exceeding the inflow threshold (1-1 and 7-2) shall occur during the summer/fall to help locate potential inflow sources and to aid in the further stages of inflow removal. This smoke testing will help to target where to implement inflow remediation programs such as dye testing, CCTV inspection of sewer service connections, and house-to-house programs...Areas 2-1, 3-1, 4-1, 5-1, 5-2, and 6-1 preliminary study and smoke testing completed. Further CCTV inspections, design, and engineering needs to occur.

Task 4: Multi-Sensor Inspection (MSI) for approximately 13,400 linear feet of the 18-inch to 36-inch diameter reinforced concrete main interceptor. This will also determine the structural condition of the interceptor (sub-areas 1-1 and 3-1) and help measure the potential pipe deterioration from hydrogen sulfide.

Task 5: Community Relations Program for high priority sub-areas (4-1, 5-1, and 6-1) and low priority sub-areas (1-1, 2-1, 5-2, and 7-2). Program includes public outreach by providing notifications for affected homeowners prior to commencement of the field work.

Task 6: SSES Report. Using the data from these investigations, the final SSES report with rehabilitation recommendations will be generated.

See table below for a summary of estimated costs for an SSES program and follow-up rehabilitation for each basin (sub-area). The extent of the required rehabilitation will not be known until the SSES program is completed, therefore a range of costs for rehabilitation construction have been provided.

Meter	Priority	Priority Ranking ¹	Length (ft)	I/I	Construction Range ^{3,4,5,6}	
				Investigations ²	Total Low Cost	Total High Cost
4-2	High	1	4,724	\$ 20,000	\$ 700,000	\$ 1,700,000 ⁷
5-1	High	2	9,223	\$ 25,000	\$ 1,400,000	\$ 1,900,000
6-1	High	3	21,068	\$ 55,000	\$ 3,000,000	\$ 4,200,000
4-1	High	4	14,735	\$ 40,000	\$ 2,100,000	\$ 3,000,000
Subtotal			49,750	\$ 140,000	\$ 7,200,000	\$ 9,100,000
5-2	Low	5	15,999	\$ 40,000	\$ 1,900,000	\$ 2,800,000
2-1	Low	6	19,424	\$ 45,000	\$ 2,300,000	\$ 3,500,000
1-1	Low	7	29,971	\$ 115,000	\$ 3,000,000	\$ 4,600,000
7-2	Low	8	20,190	\$ 55,000	\$ 2,300,000	\$ 3,500,000
Subtotal			85,584	\$ 255,000	\$ 9,500,000	\$ 14,400,000

Notes

1. Priority ranking based on the subarea's total I/I divided by the inch-miles. Based on MassDEP guidelines, subareas 2, 2 3-1, 7-1 and 8-1 were not recommended for further inspection.
2. I/I Investigations cost includes flow isolation, cleaning and CCTV inspection, smoke testing, manhole inspections, and multi-sensor inspection of the main interceptor (where applicable). Cost does not include follow-up investigations such as house-to-house inspections and dye testing.
3. High priority subareas assumes 10%-15% of mainline sewer will need to be open cut replaced and 50%-70% will need to be cured-in-place pipe (CIPP) lined. Also assumes that 50%-70% of the manholes will need to be rehabilitated and 50%-70% of sewer services will need to be open cut replaced.
4. Low priority subareas assumes 7.5%-12.5% of mainline sewer will need to be open cut replaced and 40%-60% will need to be cured-in-place pipe (CIPP) lined. Also assumes that 40%-60% of the manholes will need to be rehabilitated and 40%-60% of sewer services will need to be open cut replaced.
5. Cost does not include main interceptor rehabilitation. This cost should not be estimated until a multi-sensor inspection is completed.
6. Construction cost includes construction contingency, engineering and permitting, bidding, construction services and police. Costs are in August 2016 dollars.
7. High cost for subarea 4-2 includes replacement of existing gravity system with new low pressure sewers and grinder pumps.

- Action Type: Planning, Pre-Disaster
- Priority Score: 26
- Lead: DPW Sewer Division
- Supporting: DPW Engineering Division
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget/FEMA, MVP Grants
- Cost Estimate: Significant
- Benefit: Improved capacity of sewer system, Minimized potential for environmental impacts
- Vulnerable Area: Municipally-owned Infrastructure

Action #40

...HW

Prepare an 'After the Storm Recovery Plan' for the Community.

The Town should utilize the opportunity of a disaster to improve its disaster resilience.

Once critical life and safety issues and vital public services have been addressed and re-established, emphasis should be placed on the long-term recovery of the community, balancing the need to rebuild rapidly and return to normal against the objective of building back better and stronger.

Additional items for consideration as part of the Plan's development should include:

- A. Completion of Community Assessments
 - B. Recovery and Reconstruction Bylaw
 - C. Debris Management Plan
- Action Type: Planning, Pre-Disaster/Post-Disaster
 - Priority Score: 28
 - Lead: Planning and Development
 - Supporting: DPW, Planning Board/Building Dept.
 - Time Frame: Medium Term
 - Financing Options: Municipal Operating Budget, FEMA/MVP Grants
 - Cost Estimate: Moderate
 - Benefit: Improved resiliency, accelerated recovery
 - Vulnerable Area: Emergency Response/Recovery

2022 Action Number	Title	Cost/ Benefit	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total	Prioritization
PUBLIC EDUCATION AND AWARENESS											
2022 - 1	Address the vulnerability of coastal business districts.	Cost	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	14	
2022 - 2	CRS participation and implementation of public information program.	Cost	2	2	2	1	2	2	0	11	24
		Benefit	2	2	2	2	2	2	1	13	
2022 - 3	Maintain and expand technical and financial assistance and communication and outreach to communities to support local efforts to address the challenges of erosion, flooding, storms, sea level rise, and other climate change impacts.	Cost	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	14	
2022 - 4	Implement recommendations from the Coastal Community Assessment, including:(1) develop and adopt a long-term coastal resilience vision and strategy (2) review/summarize/present key actions that have been taken in recent years to improve coastal resilience (3) convene community conversations about managed retreat.	Cost	2	2	2	2	2	2	0	12	26
		Benefit	2	2	2	2	2	2	2	14	
2022 - 5	Initiate a public outreach and marketing campaign with sense of urgency on climate change and resilience in Scituate.	Cost	2	2	1	2	2	2	0	11	25
		Benefit	2	2	2	2	2	2	2	14	
2022 - 6	Develop and implement an annual Disaster Mitigation Workshop for businesses, industry, and shoreline users.	Cost	2	2	1	2	2	2	0	11	25
		Benefit	2	2	2	2	2	2	2	14	
PROPERTY PROTECTION											
2022 - 7	Elevate Vulnerable Structures.	Cost	1	2	2	2	-1	-1	2	7	20
		Benefit	2	2	2	2	1	2	2	13	

2022 - 40	Prepare an 'After the Storm Recovery Plan' for the Community.	Cost	2	2	2	2	2	2	2	14	28
		Benefit	2	2	2	2	2	2	2	14	

Town of Scituate, MA

HMPT Meeting #4



Join Zoom Meeting

<https://us02web.zoom.us/j/89132093723>

Meeting ID: 891 3209 3723

One tap mobile

+13126266799,89132093723# US (Chicago)

+19292056099,89132093723# US (New York)

Meeting ID: 891 3209 3723

February 1, 2022 9:30 AM - 11:30 AM

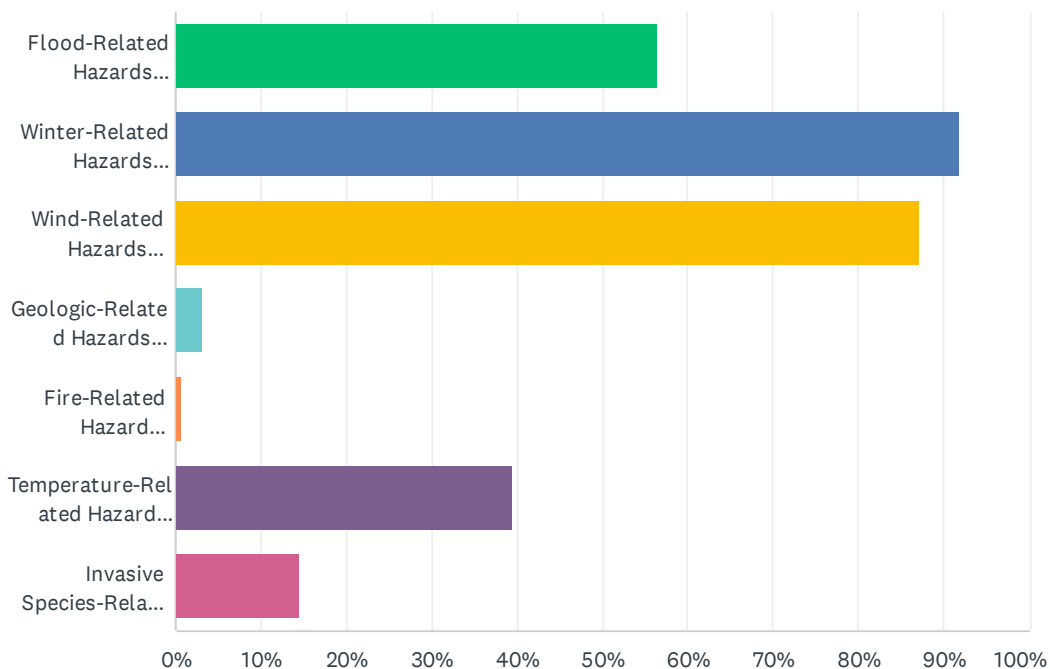
<u>Name</u>	<u>Email Address</u>
Corey Miles	
John Murphy	
Karen Joseph	
Kyle Boyd	
William Branton	
Andrew Scheele	
Amy Walkey	
Ben Haskell	
Robert Vogel	
James Canavan	
Craig Pereira	

Public Workshop #2: _____

On-Line Survey

Q1 Which of the following hazard events have you or has anyone in your household and/or business experienced in the past 20 years within the Town of Scituate? (Check all that apply)

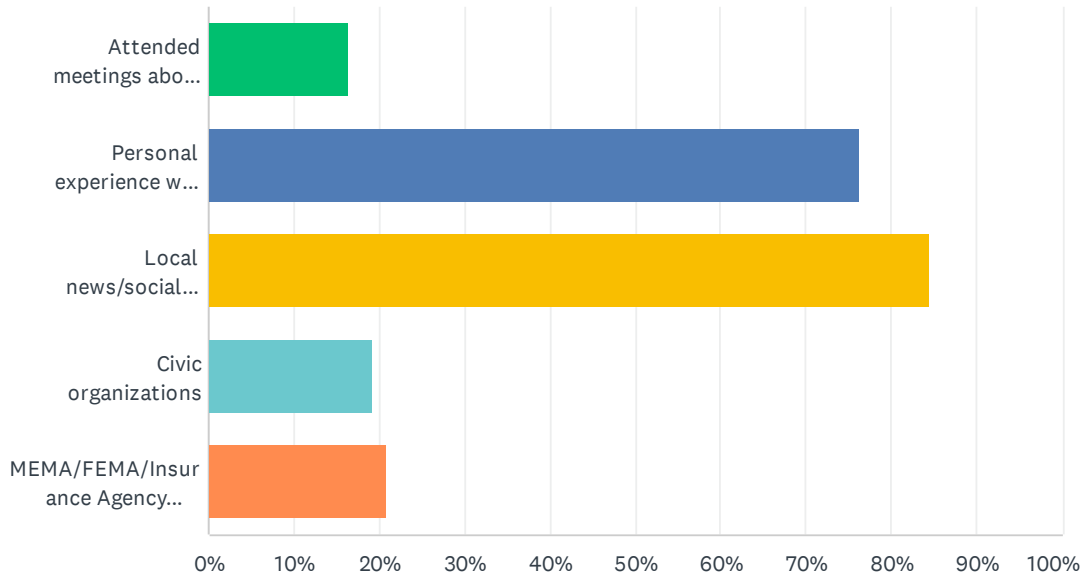
Answered: 281 Skipped: 4



ANSWER CHOICES	RESPONSES
Flood-Related Hazards (Riverine/Flash Flooding, Inland/Urban Flooding/Heavy Rain, Coastal Flooding/Storm Surge, Coastal Erosion/Shoreline Change, Climate Change/Sea Level Rise)	56.58% 159
Winter-Related Hazards (Blizzards, Heavy Snow, Ice, Nor' easters)	91.81% 258
Wind-Related Hazards (Hurricanes, Tornadoes, High Winds, Lightning/Thunderstorms, Hail, Tropical Storms)	87.19% 245
Geologic-Related Hazards (Earthquakes, Landslides)	3.20% 9
Fire-Related Hazard (Wildfire/Urban Fire)	0.71% 2
Temperature-Related Hazard (Extreme Heat/Cold, Drought)	39.50% 111
Invasive Species-Related Hazards	14.59% 41
Total Respondents: 281	

Q2 Which of the following have provided you with useful information to help you prepare for a hazard event? (Check all that apply)

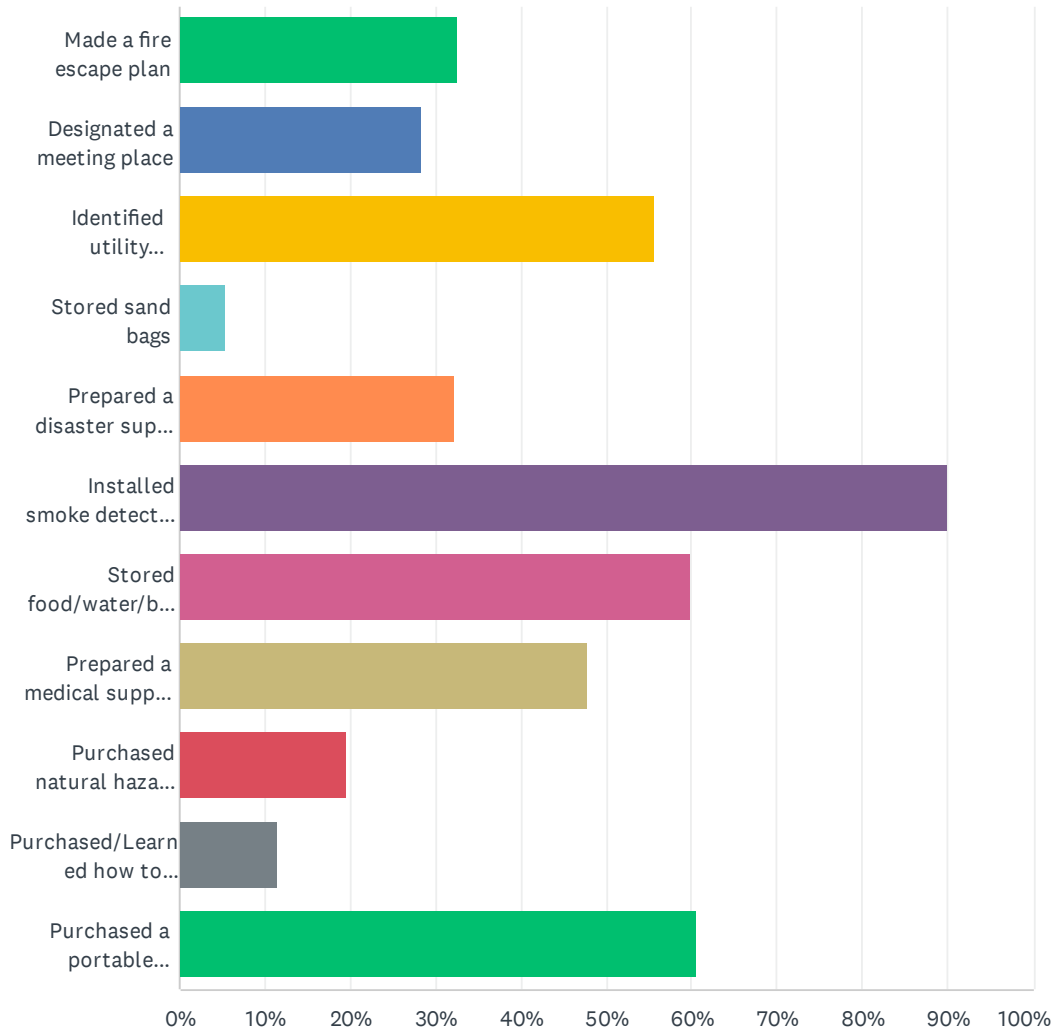
Answered: 282 Skipped: 3



ANSWER CHOICES	RESPONSES	
Attended meetings about disaster preparedness	16.31%	46
Personal experience with one or more natural hazards/disasters	76.24%	215
Local news/social media	84.40%	238
Civic organizations	19.15%	54
MEMA/FEMA/Insurance Agency websites	20.92%	59
Total Respondents: 282		

Q3 Which of the following steps has your household and/or business taken to prepare for a hazard event? (Check all that apply)

Answered: 279 Skipped: 6

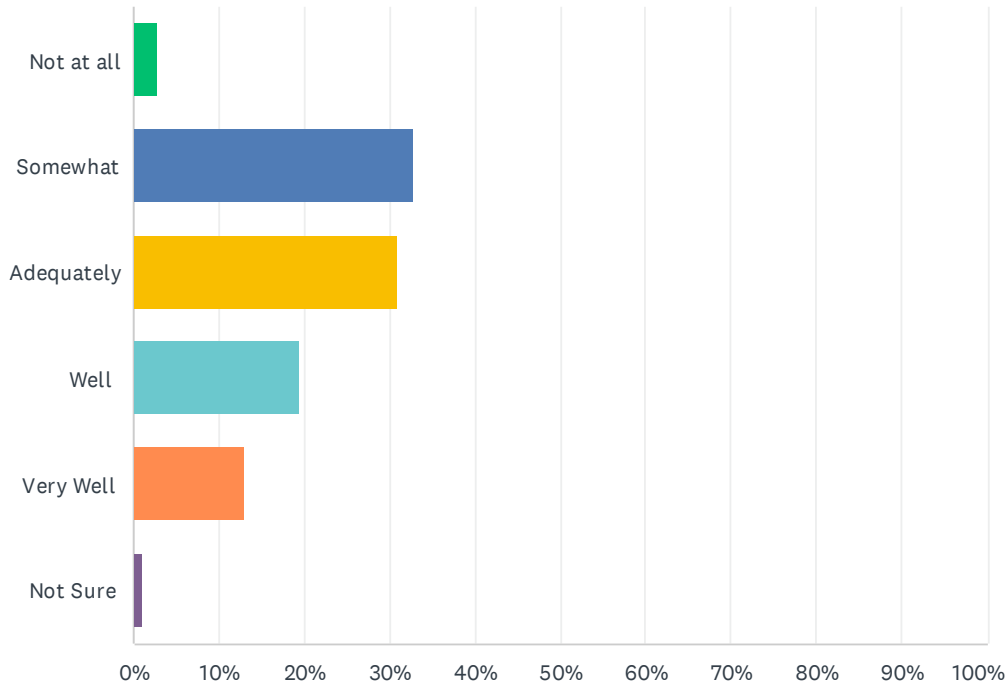


Scituate, MA Hazard Mitigation Plan Update

ANSWER CHOICES	RESPONSES	
Made a fire escape plan	32.62%	91
Designated a meeting place	28.32%	79
Identified utility shut-offs	55.56%	155
Stored sand bags	5.38%	15
Prepared a disaster supply kit	32.26%	90
Installed smoke detectors on each level of the house	89.96%	251
Stored food/water/batteries	59.86%	167
Prepared a medical supply kit	47.67%	133
Purchased natural hazard insurance	19.71%	55
Purchased/Learned how to program a NOAA Weather Radio	11.47%	32
Purchased a portable generator	60.57%	169
Total Respondents: 279		

Q4 In your opinion, how prepared is your household and/or business to deal with a natural hazard event?

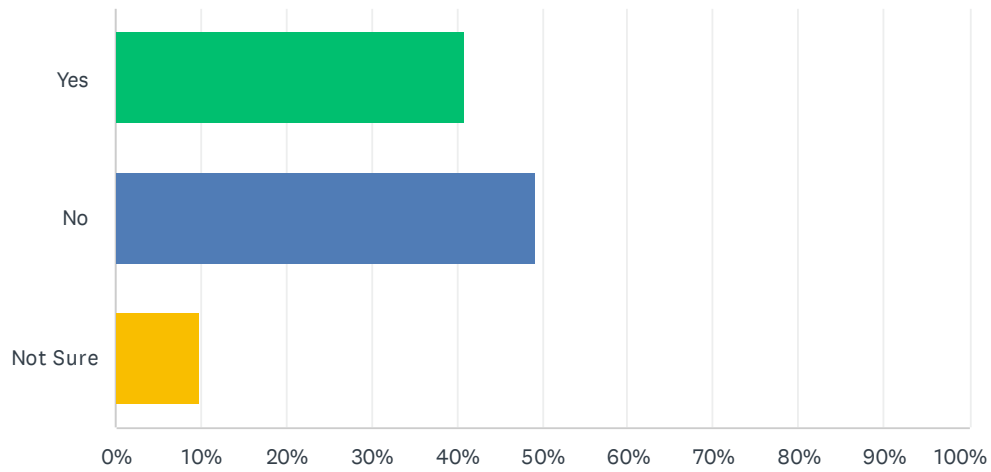
Answered: 284 Skipped: 1



ANSWER CHOICES	RESPONSES	
Not at all	2.82%	8
Somewhat	32.75%	93
Adequately	30.99%	88
Well	19.37%	55
Very Well	13.03%	37
Not Sure	1.06%	3
TOTAL		284

Q5 Is your property located in or near a FEMA designated floodplain?

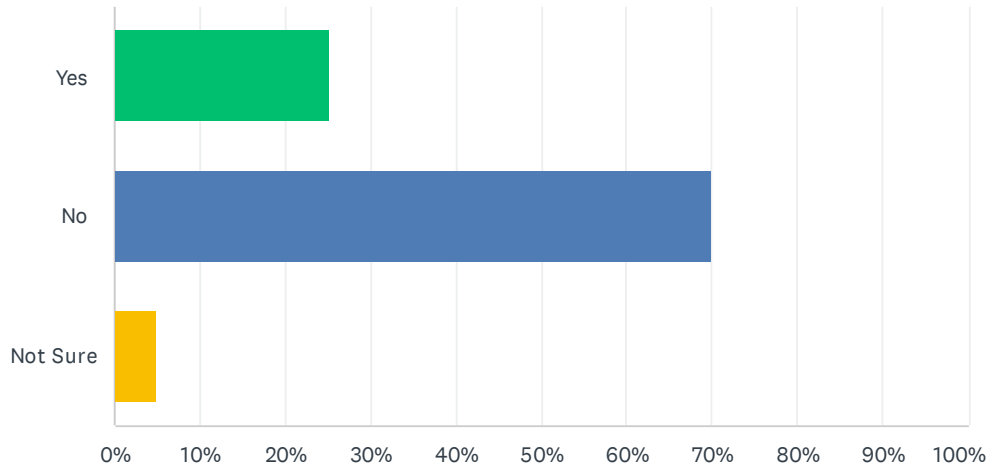
Answered: 284 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	40.85%	116
No	49.30%	140
Not Sure	9.86%	28
TOTAL		284

Q6 Do you have flood insurance?

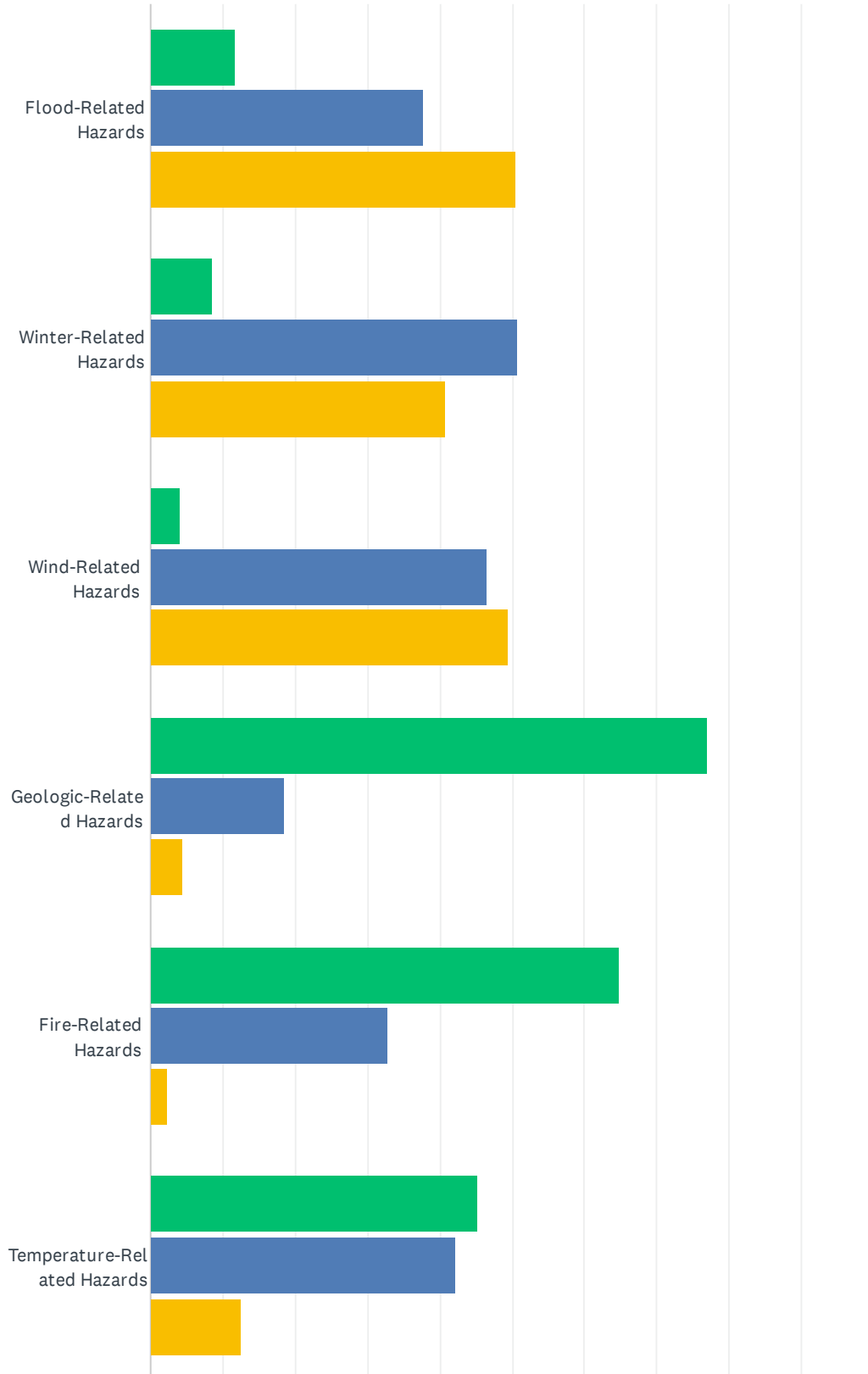
Answered: 282 Skipped: 3



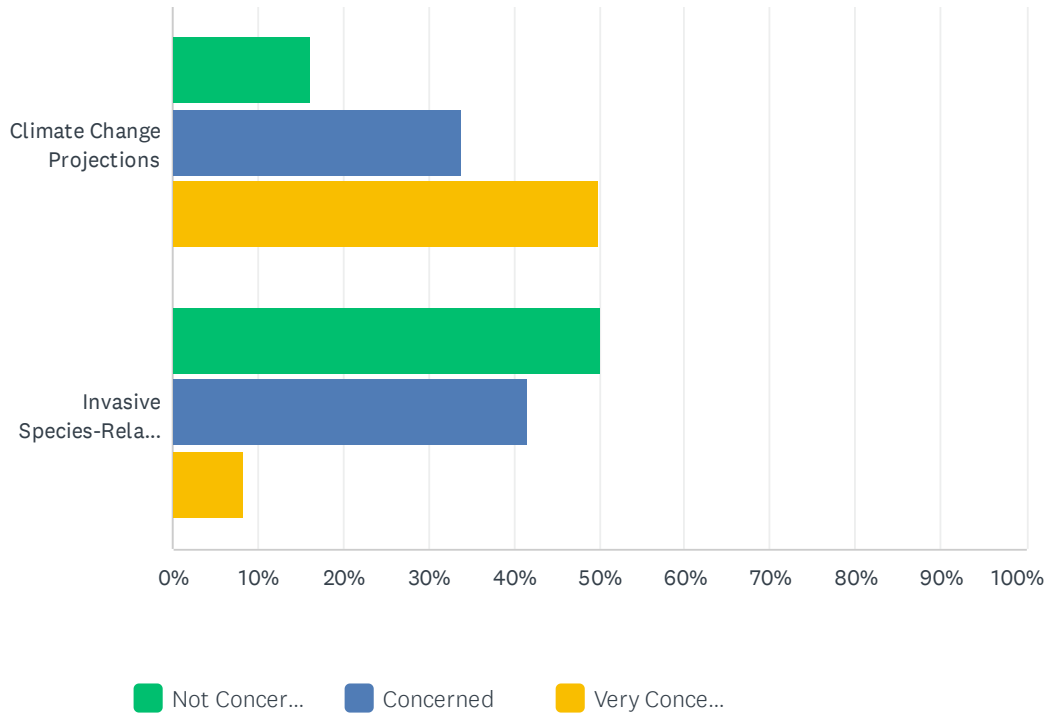
ANSWER CHOICES	RESPONSES	
Yes	25.18%	71
No	69.86%	197
Not Sure	4.96%	14
TOTAL		282

Q7 How concerned are you about the following hazards in the Town of Scituate? (Check one response for each hazard)

Answered: 284 Skipped: 1



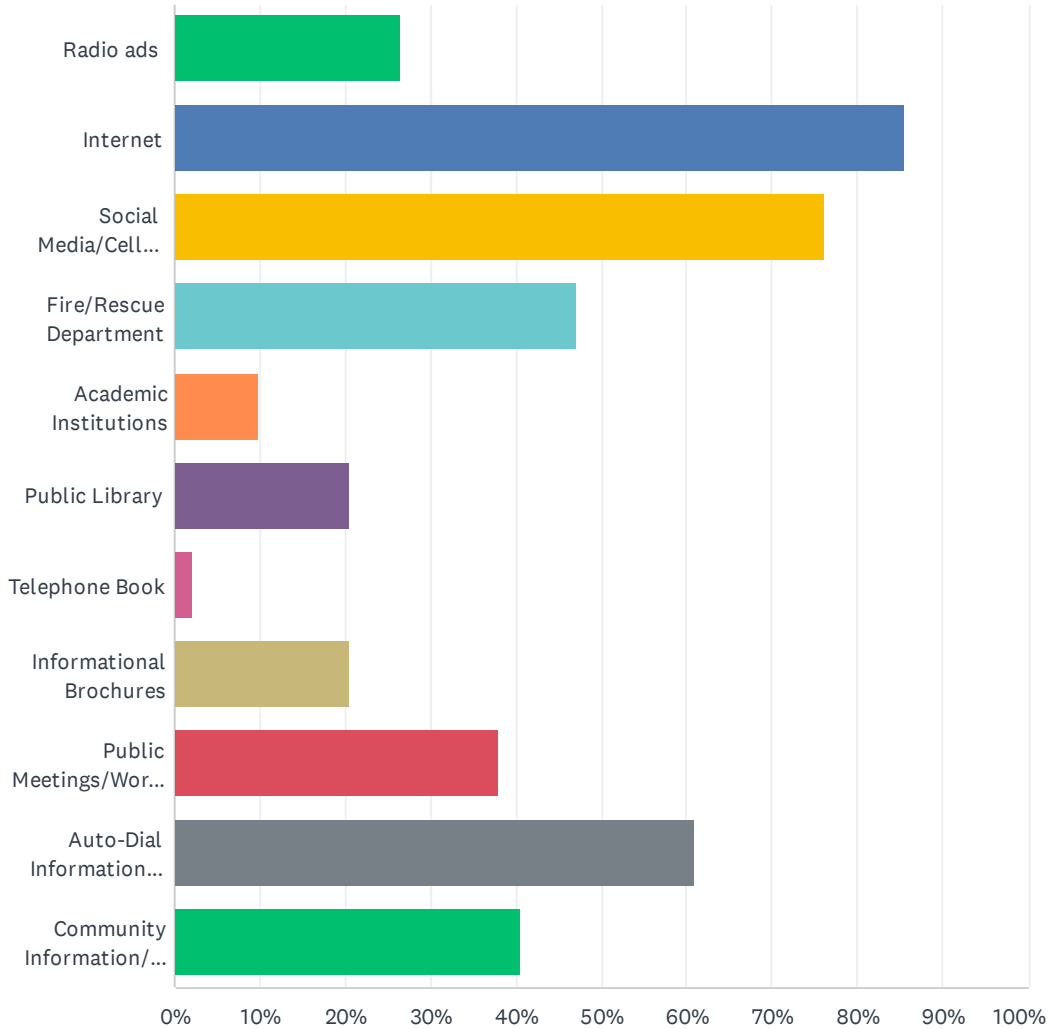
Scituate, MA Hazard Mitigation Plan Update



	NOT CONCERNED	CONCERNED	VERY CONCERNED	TOTAL
Flood-Related Hazards	11.66% 33	37.81% 107	50.53% 143	283
Winter-Related Hazards	8.57% 24	50.71% 142	40.71% 114	280
Wind-Related Hazards	3.97% 11	46.57% 129	49.46% 137	277
Geologic-Related Hazards	76.92% 190	18.62% 46	4.45% 11	247
Fire-Related Hazards	64.78% 160	32.79% 81	2.43% 6	247
Temperature-Related Hazards	45.25% 119	42.21% 111	12.55% 33	263
Climate Change Projections	16.24% 44	33.95% 92	49.82% 135	271
Invasive Species-Related Hazards	50.00% 126	41.67% 105	8.33% 21	252

Q8 In your opinion, which of the following methods do you think are most effective for providing hazard and disaster information? (Check all that apply)

Answered: 284 Skipped: 1

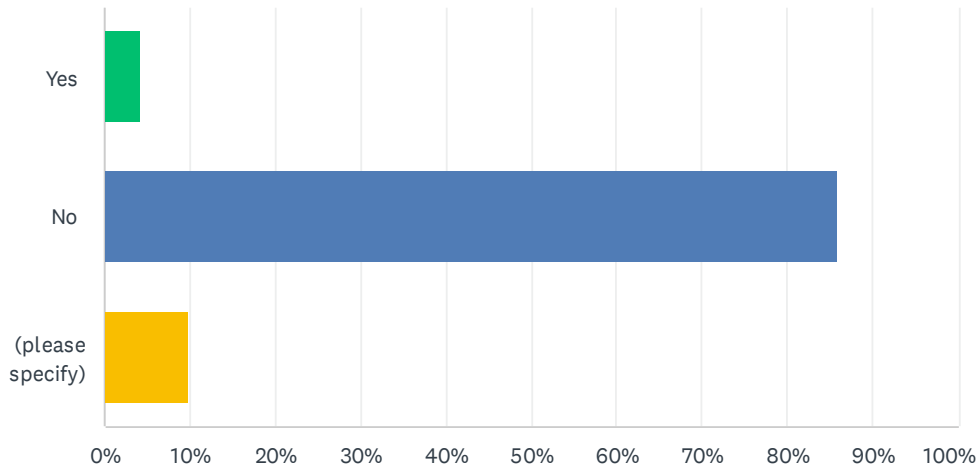


Scituate, MA Hazard Mitigation Plan Update

ANSWER CHOICES	RESPONSES	
Radio ads	26.41%	75
Internet	85.56%	243
Social Media/Cell phone apps.	76.06%	216
Fire/Rescue Department	47.18%	134
Academic Institutions	9.86%	28
Public Library	20.42%	58
Telephone Book	2.11%	6
Informational Brochures	20.42%	58
Public Meetings/Workshops	38.03%	108
Auto-Dial Information (Code Ready/Reverse 911)	60.92%	173
Community Information/Training Sessions	40.49%	115
Total Respondents: 284		

Q9 Do you have any special access or functional needs within your household and/or business that would require early warning or specialized response during disasters?

Answered: 278 Skipped: 7



ANSWER CHOICES	RESPONSES
Yes	4.32% 12
No	85.97% 239
(please specify)	9.71% 27
TOTAL	278

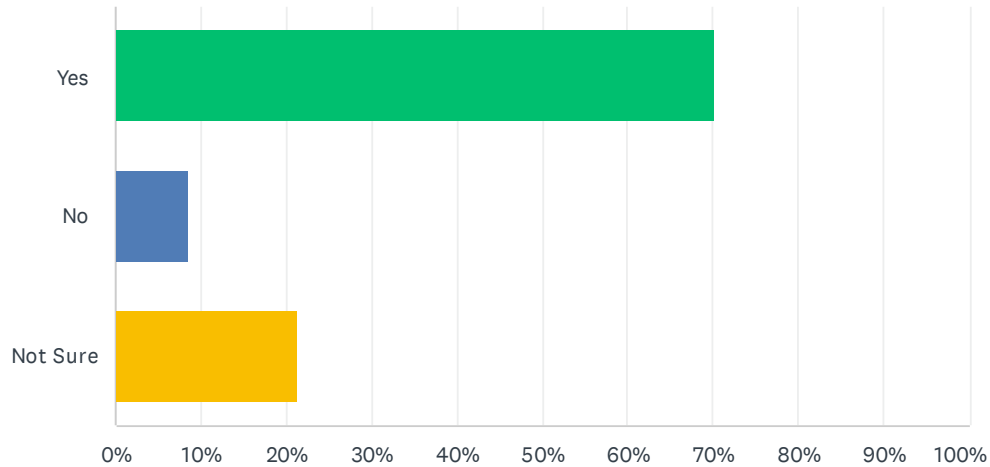
#	(PLEASE SPECIFY)	DATE
1	None	12/16/2021 8:30 AM
2	We live in an Oceanfront home in South Humarock. There may not be an escape route open to us if there was a storm of the highest magnitude and both bridges were impassible.	12/12/2021 6:57 AM
3	Oxygen tank	12/8/2021 1:33 PM
4	Age (elderly)	12/7/2021 2:54 PM
5	The causeway to 1st and 2nd cliff floods and has impacted my ability to get home at times	12/7/2021 2:05 PM
6	My elderly parents reside next door to me. Power outages are of particular concern, especially during colder months. Portable generators can be problematic as I experienced while living in coastal southwestern Connecticut during Superstorm Sandy. "Fixed" generator would be preferable but are expensive.	12/7/2021 1:37 PM
7	Early warning of costal flooding potential would allow positioning of cars to avoid being without transportation	12/7/2021 8:28 AM
8	Elderly Household member	12/7/2021 5:21 AM
9	Elderly parent	12/6/2021 6:48 PM
10	We have someone in a wheelchair. I can't imagine a situation where we had to evacuate (we have a back-up generator and plenty of firewood, and we're not in a flood plain), but if we did to	12/6/2021 6:29 PM

Scituate, MA Hazard Mitigation Plan Update

	evacuate, it would be hard to move her.	
11	X	12/6/2021 3:20 PM
12	Mother is on oxygen, last storm we lost electricity - as did everyone else. We were able to get a generator hooked up from a family member.	12/6/2021 1:54 PM
13	9	12/6/2021 12:34 PM
14	Live alone and need to go to a shelter for heat and safety.	12/6/2021 12:13 PM
15	Two elderly family members	12/6/2021 12:12 PM
16	We have occupations in the medical field and work from home, therefore need access to continue to provide medical services. We have elevated our home and installed hurricane windows.	12/6/2021 11:32 AM
17	Early warning would be best for all. I consider "social media" as following Stephen Maguire and NOT the news team. My husband will also look extensively at the weather, sea, buoy information and not rely on the media for the details. Social media with the town sending information has been good as warnings. Recently your email about the high floods and parking on Cole Parkway was a good reminder that I may not have thought of. Too much info from reliable sources including SPD, SFD is never enough. Keep up the communication.	12/6/2021 11:29 AM
18	Not sure	12/6/2021 11:14 AM
19	Elderly town shut electricity of storm damage water should have been shut off at street level not support immediate preparation	12/6/2021 11:07 AM
20	Handicap family member	12/6/2021 11:00 AM
21	Elderly with medical condition	12/6/2021 10:38 AM
22	Need to be sure street drains are clear before a storm and pump stations are functional. The intense water run off from clear cutting and over-building on "fill" will make coastal front properties vulnerable from the Ocean AND downstream Toll flooding.	7/29/2021 7:34 PM
23	Need electricity for a medical equipment	7/29/2021 8:55 AM
24	Pump stations and waste water treatment plant require as much notice as possible to plan and enact mitigation and safety strategies for flooding events.	7/29/2021 7:54 AM
25	Yes, if the Town Of Scituate proactively TURNS OFF ELECTRICITY for a storm again, better consideration and communication is needed. My street was cut off the grid for 14 days, in the freezing cold winter (early 2000's).The neighbors across the street still had electricity. People started running electrical cords outside across the Street to get power. The electric Co, state reps, senators couldn't do anything without the Town's permission to restore. Meanwhile it was all over the news that electricity was turned off; kinda like come and loot the town. I had a moving van with CT plates parked in my driveway. No landline phone, to electricity no cell phone coverage. The National Guard should have been called in if the local government couldn't fulfill their duties.	7/28/2021 1:01 PM
26	Handicapped residents	7/28/2021 12:31 PM
27	elderly	7/28/2021 10:46 AM

Q10 Are you interested in making your home, business or neighborhood more resistant to hazards?

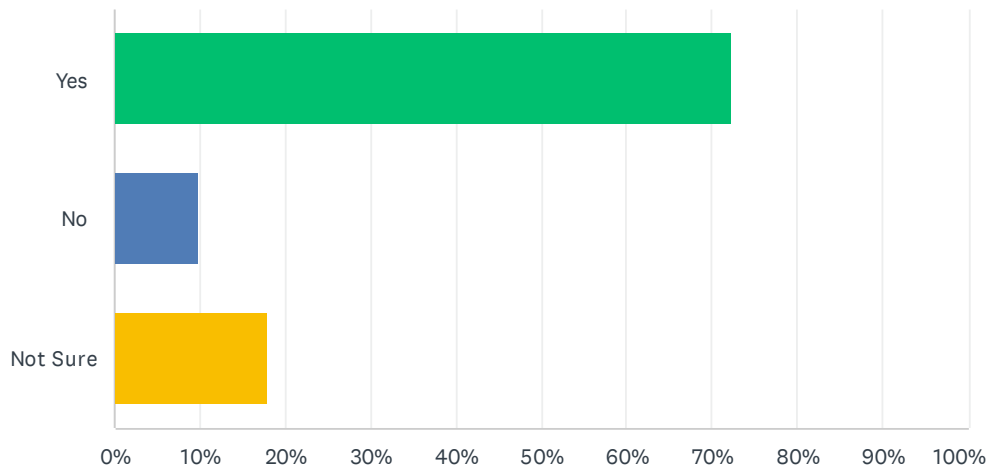
Answered: 281 Skipped: 4



ANSWER CHOICES	RESPONSES	
Yes	70.11%	197
No	8.54%	24
Not Sure	21.35%	60
TOTAL		281

Q11 Would you be willing to spend your own money on your current home and/or business to help protect it from impacts of potential future natural disasters within the community? Examples could include: Elevating a flood-prone home; Elevating utilities in flood-prone basements; Strengthening your roof, siding, doors, or windows to withstand high winds; Removing trees/low branches; Purchasing a portable generator.

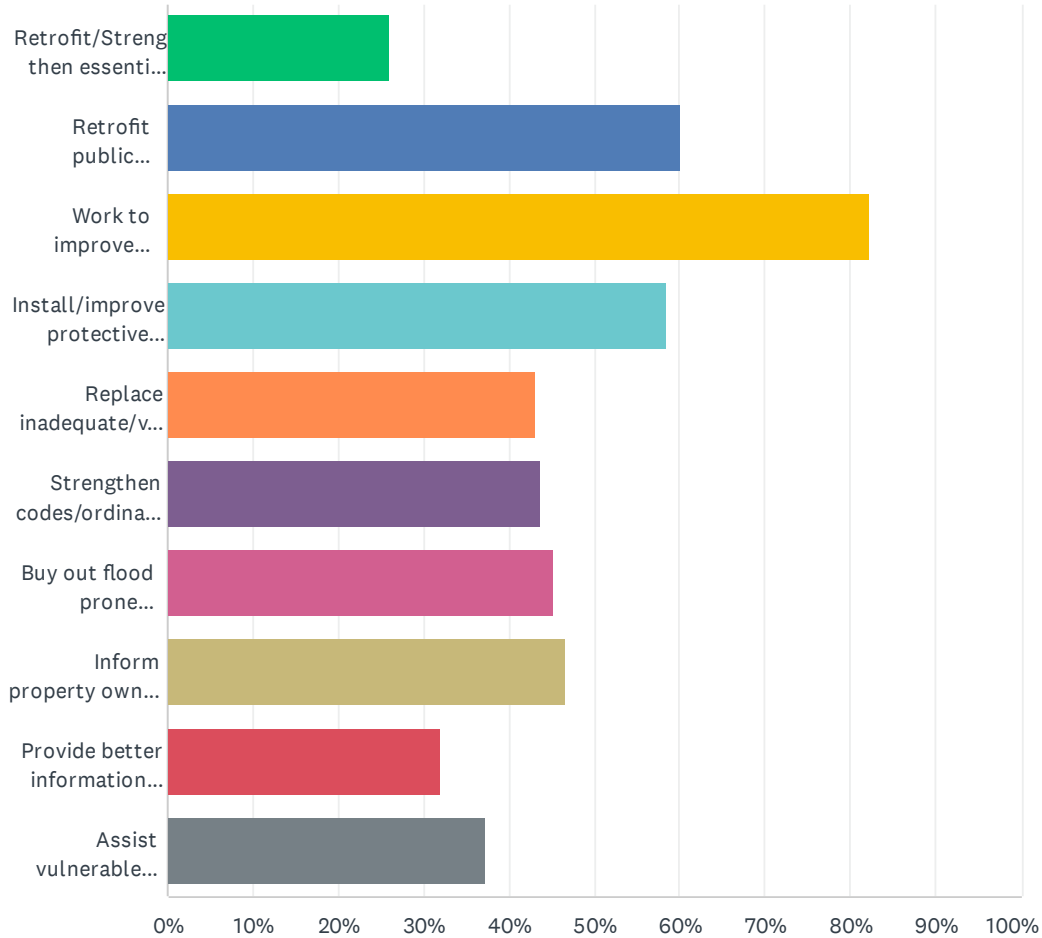
Answered: 284 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	72.18%	205
No	9.86%	28
Not Sure	17.96%	51
TOTAL		284

Q12 What types of projects do you believe local, county, state or federal government agencies could be doing to reduce the damage and disruption of natural disasters in Scituate? (Select your top three choices)

Answered: 281 Skipped: 4

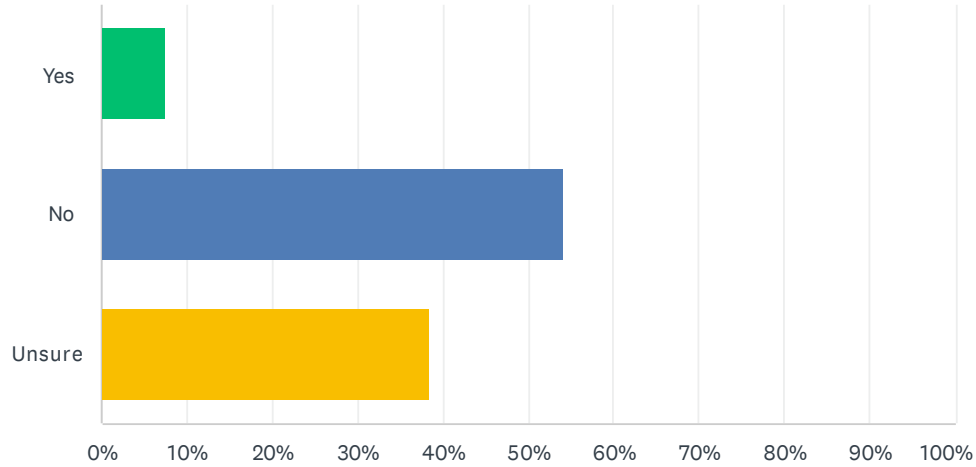


Scituate, MA Hazard Mitigation Plan Update

ANSWER CHOICES	RESPONSES	
Retrofit/Strengthen essential public facilities such as police, fire/emergency, schools,	25.98%	73
Retrofit public infrastructure, such as elevating roadways and improving drainage systems	60.14%	169
Work to improve utilities resiliency (electric, communications, water/wastewater facilities)	82.21%	231
Install/improve protective structures (floodwalls/sea walls)	58.36%	164
Replace inadequate/vulnerable bridges and causeways	43.06%	121
Strengthen codes/ordinances to require higher hazard risk management standards and/or provide greater control over development in high hazard areas	43.77%	123
Buy out flood prone properties and maintain as open space	45.20%	127
Inform property owners of ways they can reduce the damage caused by natural events	46.62%	131
Provide better information about hazard risks and high hazard areas	32.03%	90
Assist vulnerable property owners with securing funding to make their properties more resilient	37.37%	105
Total Respondents: 281		

Q13 In your opinion, has the Town done enough to prepare for the projected impacts of climate change?

Answered: 284 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	7.39%	21
No	54.23%	154
Unsure	38.38%	109
TOTAL		284

Q14 Additional comments?

Answered: 79 Skipped: 206

#	RESPONSES	DATE
1	Waste of time	12/20/2021 2:47 PM
2	Waste of time	12/20/2021 2:46 PM
3	no	12/16/2021 8:28 AM
4	N/A	12/16/2021 8:28 AM
5	n/a	12/16/2021 8:27 AM
6	Please do not base town policy on grossly-overstated predictions of catastrophic impacts from climate change. These hysterical predictions are NOT BASED ON SCIENCE. See for example "Unsettled," by Stephen Koonin, President Obama's lead climate scientist.	12/15/2021 3:05 PM
7	If you rely on Internet or email, you need to be sure each property owner receives the notifications. e.g. I do not get your emails, nor know how to get on your list. This link was forwarded to me.	12/14/2021 8:35 PM
8	When the North and South Rivers are dredged, why is the soil being sold instead of being used for beach nourishment? Maybe we could consider using it to help protect our beaches. Why are some properties protected by seawalls that are paid for by the government and the others are paid for by the homeowners? I live on a private road that runs parallel to the river. It is quickly eroding with the increase in tidal level and the 37 homes that are accessed by this road are looking at the potential that they soon may not be able to reach their properties. What can be done about this? I could go on forever but, not sure any requests wouldn't fall on deaf ears.	12/12/2021 6:57 AM
9	Would like to see Scituate focus on strengthening infrastructure rather than new builds. Bought our 1st home here in 1991 with the understanding the town was 90% built. Then Title 5 passed. Now it's like developers have all the control. maybe we should be concentrating on closing that loophole??	12/9/2021 6:58 PM
10	I am very concerned that the Town has received FEMA funds to repair seawalls and revetments for Second Cliff and the other cliffs and has not taken any actions to protect these properties even though the property owners have offered to assist. The properties on the Cliffs also provide some of the largest tax base for the town and for the town to not use the federal funds already appropriated by the Federal government for the work is incredibly concerning. This has been going on for years and every storm there is more property damage which can be prevented. By the Town waiting to use the federal funds they are only increasing the costs for the repair. I am very concerned that the Town is going to lose the Federal FEMA funds if they don't take action soon.	12/8/2021 1:35 PM
11	More investment should be made to protect, restore wetlands. Better restrictive zoning in flood zones, especially V zones, to prevent future development.	12/8/2021 8:12 AM
12	Need to protect our sewer treatment plant and water treatment plants from flooding	12/7/2021 8:52 PM
13	We have absolutely no choice but begin managed retreat in some of the most vulnerable coastal areas. It is much better to be pro-active, rather than wait until properties are damaged and/or destroyed (and lives put in danger) by coastal flooding and storm events. The town has no choice but to act now.	12/7/2021 5:42 PM
14	I live in a coastal community which is not prepared for the next flood tide.... Let alone a 100 year storm!	12/7/2021 5:39 PM
15	Downtown flooding, very poor water infrastructure that creates muddy water often after storms and old waste water treatment facilities/capacity are my major concerns.	12/7/2021 4:59 PM
16	Very concerned that Edward Foster Rd has no access to and from 2nd Cliff with even a minimal storm/nor'easter.	12/7/2021 2:54 PM

Scituate, MA Hazard Mitigation Plan Update

17	The theme of the next few decades will be infrastructure to adapt to extreme climate and weather patterns. With COVID allowing a shift to remote work that some people find beneficial, it makes it even more important that we have resilience in our power and water utilities, so that we can also keep up things like broadband and telephony to support an increasingly 'connected' citizenry. Having experienced power outages at various times year-round, that's an impactful risk. I'm concerned about the challenges we face in delivering clean, safe drinking water throughout the community and fixing aging infrastructure quickly and effectively. Seeing new construction and the addition of houses is positive in terms of bringing people to our community, but when we are already dealing with droughts and water limits, how can we feel confident in supporting additional residents? Continual annual flooding in the Harbor also makes me worry about the long-term prospects for small businesses surviving in that part of town.	12/7/2021 1:12 PM
18	Power lines are EXTREMELY vulnerable in Scituate! Would love to see more attention/improvement put toward this critical infrastructure.	12/7/2021 12:10 PM
19	need to figure out a way to protect Peggotty beach from future erosion... ? expand from the natural jetty from the north side of the beach/beginning of 2nd cliff to reduce erosion	12/7/2021 9:38 AM
20	The town should ask its' residents for specific ideas on increasing the resilience of areas prone to natural impacts like flooding. I have proposed specifics but got no traction which could of been because of who I talked with or how I made the suggestion. Prepare a survey like this one but with specific suggestions being made.	12/7/2021 8:28 AM
21	The Town of Scituate must begin to take seriously the need to plan for the impact of climate change and put a stop immediuately to reckless irresponsible building in flood plains and low lying areas while perpetuating the fantasy that "dune nourishment" and stronger higher sea walls are the answer.	12/7/2021 8:26 AM
22	Sea wall failure on cedar point risk on harbor	12/7/2021 8:18 AM
23	It is important to consider burying utilities underground especially on the Scituate cliffs. Also, consider flood impact of the Edward Foster Causeway and its impact on residents if prolonged flooding leads to no access to and from the cliffs. Peggotty Beach lookout is also an area of concern.	12/7/2021 7:53 AM
24	We have had a tree at the end if our driveway that is rotted half way up. Tree professionals and town employees alike told us to have the town take care of this because power would be obstructed. They marked the tree , sent us a letter they were coming snd then they never came. Our several requests have been ignored. 107 Satuit Trail	12/7/2021 7:34 AM
25	Thank you for survey. Know there are multiple groups working on issue. Could there be one source of info? Confusing to know all that is going on. Also, don't understand why town allows building/homes along shore prone to flooding/storms.	12/7/2021 7:19 AM
26	Peggotty Beach needs a sea wall ASAP before the ocean breaks through into the Kent St marshes. I cannot comprehend why this hasn't been done yet considering the significant erosion since 1978.	12/7/2021 6:20 AM
27	Very concerned about the frequency of the water rising and making the causeway leading to 1st and 2nd cliff inaccessible to not only residents but for medical/fire/police to access residents or property in an emergency during a higher tide (which is more frequent now than ever before). In addition, the deterioration of the jetty and road under the Peggotty Beach overlook as a result of the water rising and pounding the road during even minor coastal flooding.	12/7/2021 5:21 AM
28	Do not allow any further building on floodplains prepare for coastal retreat.	12/6/2021 10:45 PM
29	The town should investigate Wave Attenuating Devices.	12/6/2021 8:18 PM
30	Need to rebuild, strenthen breakwaters on 3rd and 4th cliffs using federal funds.	12/6/2021 5:40 PM
31	The revetment behind 3rd cliff has been compromised for almost 4 years - needs to be fixed. Also town needs to coordinate with other agencies - example - building code is 40 feet high in Scituate - but north River Commission forces homeowners to lower water front homes to 35 feet "scenic" statute - scenic over safety is not a good formula for disaster preparedness .	12/6/2021 4:40 PM
32	Winter power outages are a CONSTANT worry in winter.	12/6/2021 4:39 PM

Scituate, MA Hazard Mitigation Plan Update

33	For question number 2 you did not have the answer option of town email alerts. I feel these are very helpful during events. I think question 13 should have been a range versus yes/no. For multiple list questions I would add and "Other" option and let people fill it in. It can be informative.	12/6/2021 3:47 PM
34	We are just waking up to the impact of climate change - maybe a little too late.	12/6/2021 3:16 PM
35	The town has worked to strengthen the sea walls. We still have buildings/homes in the flood zone and during very bad snow/rain storms with high tides, the harbor floods every time. Overall, the town does a great job notifying citizens of potential weather issues by email, text, WATD notices and Jim Boudreau keeps residents in the loop on town issues with help from WATD spots. Keep up the good work!	12/6/2021 1:54 PM
36	I really appreciate the emails that warn us about storms and other weather events. Also what you can do to be prepared.	12/6/2021 1:37 PM
37	When are they going to stop building in the most dangerous locations. FEMA flood and velocity zones.	12/6/2021 1:34 PM
38	Knock down the beach houses to create a floodwall.	12/6/2021 1:08 PM
39	-No option to indicate when one has installed a permanent generator tied to the home (not a portable). We installed a whole house generator. -Some answer categories too broad, e.g. upgrade coastal roadways & drainage. I support improving drainage but not roadways because I think floodplain roadways are near impossible to maintain and endlessly expensive. Better to phase out these roadways as part of managed retreat. -Definition of "neighborhood" unclear. I live near but not in the floodplain. I am increasingly unwilling to spend tax dollars to protect homes that are clearly unviable because they are in flood zones that flood regularly in average storms and catastrophically in major storms. The houses keep getting damaged/destroyed and keep getting rebuilt (usually bigger). The fact that the vast majority of these properties are owned by wealthier people makes things even more untenable. Subsidizing the wealthy is not good public or environmental policy. With all we know, managed retreat is the only rational way forward, including the elimination of seawalls, which worsen beach erosion rather than mitigate it. The Town needs to bite the bullet and start now to develop a comprehensive plan for retreat, begin to line up the federal and state funds for it, and stop throwing good money after bad. The sooner we face this reality and start planning, the less expensive it will be and the more lead time property owners will have to prepare.	12/6/2021 1:04 PM
40	Six households on my 12 household street have purchased whole-house generators because of woefully inadequate public works response to clearing at-risk trees along thoroughfares and utility easements.	12/6/2021 12:59 PM
41	Enough with the surveys and meetings...get to work accomplishing the goals. Also, no rock berms on the beaches!! Use sand!!	12/6/2021 12:58 PM
42	We need to move forward on managed retreat. We cannot allow a minority of property owners to require town resources to the exclusion of the rest of the town.	12/6/2021 12:55 PM
43	At the very least, trees, branches etc could be much better cleared from power, cable and telephone lines.	12/6/2021 12:30 PM
44	Stay on top of town drains on streets as the one on First Parish was backed up and we had water in our basement and the town did NOTHING about it.	12/6/2021 12:24 PM
45	The town spent so much money in the harbor, but it did not result in any flood protection and businesses and parking spaces get flooded on a regular basis. I think, the town should make it a number one priority to make the harbor protected against future floods and if this is not feasible, because of rising sea levels, plan for an alternative business area.	12/6/2021 12:20 PM
46	Scituate Conservation Department should follow up on my neighbor who has torn up the wetland area on his property. Conservation been sent letters to them over the years since they bought the property. They are still engaged in this activity since they moved to Scituate a little over a year ago.	12/6/2021 12:13 PM
47	Since I live at 154 Turner Road, I am most concerned about the decaying sea wall. The sea wall from the intersection of Turner Road and Oceanside all the way to Cedar Point needs to be repaired now. I know money is an issue but waiting until the wall gives way during a storm is an even worse disaster. When is the wall going to be properly repaired, replaced, not just patched up? That would be good to know.	12/6/2021 12:08 PM

Scituate, MA Hazard Mitigation Plan Update

48	As a town, we need to assess areas of vulnerability better in order to avoid loss of electricity. We also need to hold National Grid accountable for the lids of power for 5 days last month.	12/6/2021 11:55 AM
49	It appears the town has allowed overbuilding in hazardous prone land. Specifically The BA and Toll brothers complex.	12/6/2021 11:50 AM
50	I believe certain areas in scituate have had flood mitigation improvements and other areas have been severely ignored. I also believe money has been allocated and approved for those ignored areas and used in other areas.	12/6/2021 11:32 AM
51	Please start taking climate change seriously. The over-development needs to STOP.	12/6/2021 11:31 AM
52	I value the town updates before and during storm events through email. I have found these local communications to be more accurate and detailed than most weather news outlets offer. But I voluntarily signed up for the emails. Perhaps the town could email and/or text All residents with this valuable information as essential emergency communications, regardless of whether the resident has signed up for other town communications. The resident could choose preference on how to receive the communicatons - emails/texts or both. Additionally, when the internet is down, we find a hot spot service essential for internet access and communications. Thank you	12/6/2021 11:31 AM
53	I think people should make the effort to think/do things for themselves and not be dependent on Gov't.. ex. I bought my own generator 12 yrs. ago. I paid to have tree branches removed around my property. I could go on.	12/6/2021 11:30 AM
54	I know the town is trying but funding may be an issue like repairing/replacing sea walls that are vulnerable.	12/6/2021 11:29 AM
55	We have public roadways that flood during non-storm related high tides. This is due to rising sea levels and the town needs to make a plan to mitigate this increasing problem	12/6/2021 11:27 AM
56	climate change is HERE - Front Street shops are extremely exposed - consideration of longterm solution seem stalled	12/6/2021 11:26 AM
57	Town is doing a good job working on these issues but there's always more to do	12/6/2021 11:21 AM
58	Additional concern: groundwater level increases in areas not in designated flood zones	12/6/2021 11:19 AM
59	There is more to the town than just the coastline areas.	12/6/2021 11:18 AM
60	The rain drain sewers are always flooded when it rains, especially on my street. They need to be serviced more especially ones that are clogged. I have sent numerous emails for years and the street still floods bc the storm drain is clogged. Heavy rains will create actual waves of water down Egypt beach rd bc storm drains are clogged and not functional.	12/6/2021 11:14 AM
61	Excellent response town wall replacement not shut off electricity provide more direct communication if select certain area shut off vital services	12/6/2021 11:07 AM
62	Sewage pumping stations in low lying areas may need to be elevated.	12/6/2021 10:58 AM
63	there are a great many challenges ahead due to climate change. very happy Scituate is looking to prioritize solutions now	12/6/2021 10:54 AM
64	Catch basin on my road near beach has been compromised for 2yrs & still not repaired	12/6/2021 10:51 AM
65	1. Town should remove more trees along the roadways that constantly damage wires if wires will not be moved underground. 2. Flood prone properties should not be allowed to rebuild year after year. Town should work with state/feds to buy out these properties (our tax money has reconstructed several of these properties time and time again) based on risk assessment.	12/6/2021 10:47 AM
66	You need to provide harbor renters and condo owners alternative parking when a storm arises when they must move this it cars from Cole Parkway. Their are residents who live in the harbor who have no other parking options other than Cole Parkway parking. Provide a location we can park and transportation to get us back to our homes from the alternate parking area.	12/6/2021 10:40 AM
67	Love the town. I live in Cedar Point so glad the sewer and road projects are done, went well. The seawalls are literally falling apart at Lighthouse and Rebecca would be good to fix that.	12/6/2021 10:36 AM
68	The town needs to trim and remove problem trees. This would reduce power outages. The issue of roads now designated private or paper roads contain many damaged and dead trees	12/6/2021 10:35 AM

Scituate, MA Hazard Mitigation Plan Update

that are a hazard . The homeowners cannot remove trees that are not within their deeded property. Town has been ignoring this issue and pushing it back onto abutters.

69	Has the town stopped issuing building permits to homes within FEMA designated flood areas?	12/6/2021 10:34 AM
70	Suggest Federal partnership especially in Humarock due to the military recreational facilities at 4th Cliff	12/6/2021 10:29 AM
71	Scituate needs more government funded money... not tax payers. Taxes have already gone up, drastically. Families and elders need to sell their homes. They no longer can afford to live here and have a safe community. Seawalls, bridges and utilities all needs to be updated and secured!	12/6/2021 10:29 AM
72	Why hasn't the town moved electrical underwound yet? We spend the money to fix downed lines every year a storm comes, why not invest now so we avoid losing electricity every time it is windy. It doesn't make sense. Underground makes more sense. Investing now will pay off later.	12/6/2021 10:24 AM
73	With many working from home, ensuring high speed internet access remains available during and after storms should be a priority for both communications and economic functionality. Electrical, phone and cable wires should be buried to reduce outages.	12/6/2021 10:22 AM
74	I am concerned about an adequate supply of potable especially in the summer considering recent experience with drought and continuing residential development	12/5/2021 3:20 PM
75	CAN'T STOP THE OCEAN, PLAN FOR RETREAT.	10/13/2021 3:04 PM
76	Analysis should be performed to understand if a new 3' higher seawall is to be constructed, will that deflect flooding to other vulnerable adjacent areas (I.e. Oceanside Dr; not everyone got a new seawall nor was asked about easement).	7/29/2021 7:34 PM
77	The town should invest in renewable energy infrastructure (both public and encourage private). And town leaders should encourage state and federal decision makers to do the same, and move more quickly towards a carbon emissions reduced/free future.	7/29/2021 2:24 PM
78	It's time to plan for coastal retreat. Should consider purchase of electric grid. No more building on floodplain	7/29/2021 8:55 AM
79	Stop repetitive building of additions and "accessory dwellings" on non-conforming lots. Stop clear cutting acres leaving drainage issues. Stop building in wetlands and marshes just because trucks of fill are dumped.	7/28/2021 1:01 PM

Appendix C – Correspondences

Availability of Draft Plan – Municipal Posting
Availability of Draft Plan – Adjacent Communities
Availability of Draft Plan – Municipal Departments
Public Comments