2016 PLAN

Town of Scituate, RI

Local Hazard Mitigation Plan

DRAFT

CDR MAGUIRE

Scituate, Rhode Island:

Local Hazard Mitigation Plan

Acknowledgements

Gina Raimondo
Governor

Rhode Island Emergency Management Agency

Peter Gaynor
Director

Authors

Town of Scituate Hazard Mitigation Committee
CDR Maguire, Inc.

Adopted by Scituate Town Council [insert date]
Pending FEMA Approval

STATE OF RHODE ISLAND
TOWN OF SCITUATE
Resolution No. XX-XX-XX

RESOLUTION TO ADOPT THE SCITUATE, RHODE ISLAND HAZARD MITIGATION PLAN

WHEREAS, the Town of Scituate is vulnerable to natural hazards including hurricanes, flooding, severe winter storms, thunder storms, high wind events, tornadoes, lightning, hail storms and wildfire, and

WHEREAS, the Scituate Hazard Mitigation Committee has created the Town's 2016 Hazard Mitigation Plan in accordance with the Federal Disaster Mitigation Act of 2000 that documents specific courses of action that can be taken in advance of natural hazard events to reduce the City's vulnerabilities,

WHEREAS, adoption of a local Hazard Mitigation Plan will qualify the Town to compete for implementation funds from the Federal Emergency Management Agency's Pre-disaster Mitigation Grant PROGRAM,

NOW, THEREFORE, IT IS ORDAINED by the Town Council of the Town of Scituate that the 2016 Hazard Mitigation Plan created by the Hazard Mitigation Committee is adopted as the Town's policy document which assesses the community's risk to natural hazards and which identifies appropriate mitigation actions for potential implementation.

ADOPTED THIS X DAY OF XX, 2016, at the meeting of the Town Council.

Passed: _____

Charles Collins, Jr., Council President

Approved: _____

Contents

Section 1: Background

1.1 Introduction

The Town of Scituate understands that investments made today in preventative measures can significantly reduce the cost of tomorrow's post-disaster recovery. It is intended that this plan will serve as the foundation for policies and actions to be undertaken by the Town of Scituate in order to reduce the physical, social, and economic hardships that can result from a natural disaster. These hardships include loss of life, destruction of property, damage to critical infrastructure and facilities, loss or interruption of jobs, loss or damage to businesses, and loss or damage to significant historical resources.

The Town of Scituate, Rhode Island Hazard Mitigation Plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000. As defined in 44 CFR 201.2, hazard mitigation means any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards.[1] The 2016 Plan is a new hazard mitigation plan. Additionally, the approved plan will increase the town's competitiveness when applying for FEMA's hazard mitigation assistance (HMA) grant programs. The HMA grant programs provide funding opportunities for pre- and post-disaster mitigation with the common goal of reducing the risk of loss of life and property due to natural hazards. Brief descriptions of FEMA's HMA grant programs can be found at http://www.fema.gov/hazard-mitigation-assistance. An approved mitigation plan expedites the application process for pre- and post- federal mitigation funding, as well as, assists in ensuring a funded project is eligible and technically feasible. Adoption and implementation of this plan will also enable Scituate to access credits under the Federal Emergency Management Agency's (FEMA) Community Rating System (CRS), which offers discounts on National Flood Insurance Program (NFIP) premiums for property owners.

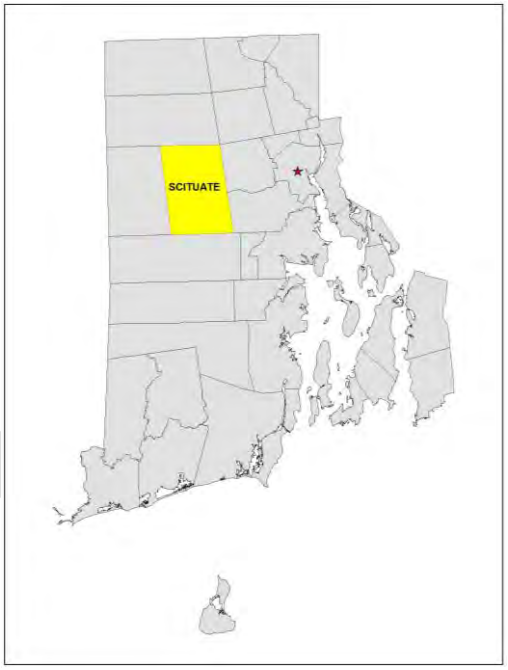
Hazardous events profiled in this plan include flooding (riverine and dam breach), hurricanes and tropical storms, snow and ice, severe storms, extreme heat, tornadoes, earthquakes, wildfire, and drought. To minimize hardships resulting from these hazardous events, the Town of Scituate has identified the following general actions and policies:

- Improve street drainage to reduce flooding during heavy rain events
- Inspect and monitor structural integrity of the dams
- Organize and implement hazard outreach education to vulnerable populations
- Require that critical facilities be protected from hazards such as flooding, high wind, and lightning
- Ensure that shelters can adequately and safely perform during a disaster
- Improve security of records at Town Hall to protect from storm damage
- Coordinate with Providence Water Supply Board to improve responder knowledge of fire lane access points.

[1] 44 CFR 201. Accessed via: http://www.gpo.gov/fdsys/pkg/CFR-2011-title44-vol1/pdf/CFR-2011-title44-vol1-sec201-2.pdf 17 September 2012

1.2 Community Planning Area

The Town of Scituate, Rhode Island was established in 1636 and incorporated in 1730. It was an agriculturally based rural community through the 18th century which transformed into a diversified community of industrial settlements encouraged by textile mills. By the early 20th century, the decline in agriculture, and construction of the Scituate Reservoir, changed the landscape one again to a rural, forested town.[2]



Map 1: Scituate, Rhode Island

Scituate's 54.8 square mile area is located in Providence County in north central Rhode Island, about eight miles west of Providence, Rhode Island. The original spelling of the Town's name "Satuit" is a Native American word meaning "cold brook". In 1915 the State of Rhode Island decided to flood 38% of the Town to create a freshwater reservoir to supply greater Providence. This was a precursor to a larger reservoir completed ten years later. The modern day Scituate Reservoir remains one of the most prominent features in Scituate.

The Scituate Reservoir is the largest body of freshwater in Rhode Island with a capacity of 39 billion gallons. The reservoir and surrounding tributary reservoirs serve 60% of the Rhode Island population, not including back up water reserves for Central Falls and Pawtucket.

The Scituate Reservoir and Gainer Memorial (Kent) Dam are the most significant manmade structures in Scituate. In 1925, increased demands on the Pawtucket River by a growing Providence area prompted a newer water supply system which included a large reservoir and treatment plant. The earth-filled dam spans the North Branch of the Pawtuxet River for about 3,200 feet. Aqueducts transport water from the dam to the water treatment plant. The Providence Water Supply Board owns the treatment plant and most of the land surrounding the reservoir. As per the state enabling legislation, the land can only be used for water supply purposes only.

During the early 1900s, The Town of Scituate was a growing mill town (textiles and iron). The steady flow of the Pawtuxet River provided water to the growing industries. These days, more of a residential community, the commerce in Scituate is comprised of small local businesses.

Scituate currently has a population of 10,329 people, according to the 2010 US Census, which is a 0% change in population from the 2000 US Census. 98% of the population is white, 0.9% are Hispanic or Latino, 0.3% are black, 0.5% are Asian, and 0.8% are more than one race.

Scituate is a municipality that utilizes the Town Council form of government. The Town Council consists of 7 elected members (each elected for a two year term) headed by a Town Council President.

[2] Town of Scituate, Comprehensive Plan, 2004

Table 1: Scituate Land Use Type, 2011

Land Use Type	Acres	Percent Total
Agriculture	1,146	3.27%
Commercial	79	0.23%
Forest	25,628	73.06%
Industrial	17	0.05%
Institutional	124	0.35%
Open	227	0.65%
Other	41	0.12%
Recreation	103	0.29%
Residential	3,358	9.57%
Transportation	1	0.00%
Utilities	119	0.34%
Water	4,235	12.07%
TOTAL	**35,078**	

Scituate is a rural community by design. Businesses in the town are mostly service based, with the exception of 9 industrial/ manufacturing properties. Forested areas account for 73% of the total land use, of 25,628 acres. See Table 1. After water (12%), the next most abundant land use is residential, making up nearly 10% of Scituate.

The Town of Scituate has been a compliant member of the National Flood Insurance Program (NFIP) since January 2, 1981. The NFIP is a Federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. Participation in the NFIP is based on an agreement between communities and the Federal Government. This insurance is designed to provide an insurance alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and replacing their contents.

There are 30 NFIP insurance policies in Scituate, 27 of which are in a Special Flood Hazard Area (SFHA) A Zone. The combined coverage on those policies is $6,964,500. Since 1978, there have been 30 flood claims resulting in a total payment of $555,951. There are a total of 5 repetitive loss residential properties in Scituate, 2 of which have been mitigated.[3]

1.3 Recent Significant Events

Nor'easters are a common winter storm event in Scituate but much of the town's population has been fortunate to have never experienced a major storm event, dam failure, or severe wildfire. The following are a few notable storm events in Scituate's history:

- The Hurricane of 1938 was the last Category 3 hurricane to hit Rhode Island.
- Hurricane Carol in 1954 caused $90 Million in damages and was responsible for 19 deaths in the region.
- The Blizzard of 1978 dropped over two feet of snow on the region.
- Hurricane Gloria in 1985
- Hurricane Bob in 1991
- The declared flood of March 2010 delivered the first 100 year storm in several years caused significant property damage
- Tropical Storm Irene caused several days of power outages 2011.
- Hurricane Sandy caused significant downed trees and power outages in 2012.
- Winter Storm Nemo in 2013
- Winter Storm Juno in 2015

[3] Conversation with State Hazard Mitigation Officer at RI Emergency Management Agency, April 2014

Section 2: Planning Process

The Disaster Mitigation Act of 2000 stresses that each local government seeking FEMA mitigation funding must first have a FEMA approved multi-hazard mitigation plan. Federal planning regulations require the following planning tasks be completed and documented:

- Determine the planning area and resources
- Create a planning team- the Scituate Hazard Mitigation Committee (SHMC) to carry out the next 6 tasks
- Create an outreach strategy
- Review community capabilities
- Conduct or review existing risk assessment
- Develop or review the local mitigation activities
- Update the hazard mitigation plan
- Review and adoption of the plan by the governing body.

2.1 Overview

The Town of Scituate initiated hazard mitigation planning in October 2003 at the recommendation of the Rhode Island Emergency Management Agency (RIEMA). A draft plan was developed but it was not approved or adopted and sat dormant until 2014 when the Town decided to hire a consultant to resume planning efforts.

2.2 Building the Team

The SHMC was organized under the authorization of the Town Council to create Scituate's Hazard Mitigation Plan. After discussions with the Town's EMA Director and Town Solicitor, a committee was solicited via phone and approved by the Town Council. The resulting SHMC is comprised of the Scituate Emergency Management Director, the Town Building Official/Engineer, Public Works Director, the Town Clerk, the Town Solicitor, Police Chief, North Scituate Fire Chief, a Town Council member, two members of the Providence Water Board, and a local resident (See Appendix A). The Town also hired a consultant to aid in the hazard mitigation planning process. The first meeting of the SHMC was May 15, 2014. Meeting agendas were posted according to the Open Meetings Act (OMA) by the Scituate Town Clerk's office. This includes posting the notice at Town Hall as well as on the Town's website.

2.3 Understanding Scituate's Risks

At the first meeting, the team discussed the goals of the planning process and which hazards affect Scituate. The Hazards of most concern to the SHMC were flooding (riverine and dam breach), hurricanes and tropical systems, snow and ice, and other severe storms that bring hail, lightning, and wind. A discussion of past storms revealed that the Town Highway Department can keep the roads clear of snow up to about 18 inches deep. After that, it becomes difficult to keep up with the demand. Although failure of the Gainer (Kent) Dam would cause catastrophic damage throughout the region, it is well maintained and doesn't present a structural hazard, at this time. The heavy rains and spring snowmelt flooding the tributaries are of more immediate concern to the SHMC. These more frequent events cut off road access and compromise infrastructure and Town services. Due to the rural Scituate landscape, the committee was also concerned about downed trees cutting off road access, pulling down utility wires and possibly stranding residents. The consultant facilitated the discussion and documented the Town's concerns, strengths, and vulnerabilities.

The SHMC met regularly (May 15, June 19, and July 17, 2014) to discuss the plan and identify hazards, vulnerabilities, and mitigation projects specific to Scituate. Each committee member was encouraged to identify and develop relevant actions based on town hazard history and current town needs as they relate to their functional responsibilities. After each meeting, committee members were given work to complete before the next meeting that allowed them to reflect upon what was covered in that meeting and what would be covered at the next meeting. The Town's consultant met with committee members and stakeholders on an as-needed basis to review specific sections of the plan relating to their expertise.

2.4 Developing the Mitigation Strategy

At the July 17, 2014 meeting, the SHMC was presented with a list of potential mitigation actions that would address the identified Town vulnerabilities. The committee discussed the merits of each action and came up with a list of ones they would like to include pursue. Details (i.e. timeframe, cost, responsible parties) were worked out at a later date via email.

Throughout the planning process the SHMC encouraged the public to participate by advertising the public hearings and soliciting input during the sessions. Based on information from previous SHMC meetings, the consultant drew up a draft plan for the SHMC to review and comment on. After a thorough review, the final draft of the plan was presented to the public for comment. The draft plan was posted to the Town's website on 11/4/2014 for public review as well as sent to the following individuals in neighboring communities for their input.

- Foster: Randy Parrot, EMA Director
- Glocester: Jason Rhodes, EMA Director
- Smithfield: Todd Manni, EMA Director
- Johnston: Daniel Parrillo, EMA Director
- Cranston, Peter Lapolla, Town Planner/LHMC Chair
- Coventry: Bryan Volpe, Police Chief/EMA Director

No comments, questions, or concerns were received from neighboring communities or the public at large..

The plan was presented to the Council for review on 11/13/2014 prior to the official public meeting. A brief summary presentation was presented by CDR Maguire staff to introduce the plan's concepts. After that meeting, hard copies of the draft plan were placed in both local libraries and Town Hall. The draft plan was presented for comment during a public Town Council meeting on 12/11/2014. (Note: Prior to the meeting there was a disparate planning effort, RhodeMapRI[4] which the Town opposed. Many mistakenly associated the two planning efforts. Both prior to and during the Town Council meeting, the Town Solicitor and CDR Maguire staff clarified the role of hazard mitigation planning and addressed citizen concerns.) At the meeting, there were no further edits or suggestions for the draft hazard mitigation plan.

The draft plan was approved by the Town Council on 12/11/2014 to be submitted to RIEMA for review. The plan was forwarded to RIEMA for review on 12/17/2014. Due to other pressing State concerns and staff turnover, comments were not received back from RIEMA until 10/14/15, nearly a year later. In the meantime, most of the SHMC members met in August 2015 to review current hazard mitigation actions that would qualify for upcoming Hazard Mitigation Assistance funding. On April 14, 2016 the Town Council re-instated the Local

[4] http://rhodemapri.org/

Hazard Mitigation Committee for a one-year term. On April 27, 2016, the committee met again after a long absence to review the current actions and capabilities since the last official meeting in 2014. After discussions and edits as recommended by RIEMA, the plan was submitted to FEMA for approval. Following FEMA conditional approval, the plan was adopted by the Town Council on XXX. After adoption, the final plan was delivered to RIEMA and FEMA Region I.

2.5 Implementing the Plan

The Town of Scituate and the SHMC realize that successful hazard mitigation is an ongoing process that requires implementation, evaluation, and updates to this plan. The town also understands the importance of integrating appropriate sections of the plan into the town's Comprehensive Plan, Emergency Operations Plan, and site plan review process. It is intended that this plan and the ongoing efforts of the SHMC will preserve and enhance the quality of life, property, and resources for the Town of Scituate.

Adoption of this mitigation strategy increases Scituate's eligibility for federal hazard mitigation grants. These grants originate from FEMA's Pre-Disaster Flood Mitigation Assistance (FMA), Pre-Disaster Mitigation (PDM) and post-disaster Hazard Mitigation Grant (HMGP) Programs. (Refer to Appendix B for further information.)

2.5.1 Monitoring

The SHMC, under the leadership of the Town's Emergency Management Director, will meet annually in September (once the plan is adopted), to monitor and evaluate the actions contained in the plan. At each meeting, the committee members will discuss the actions assigned to them to ensure continual progress with mitigation efforts. The status of each mitigation action will be documented. The SHMC will also continue to reevaluate membership on the committee to ensure effective engagement of the appropriate parties.

2.5.2 Evaluation

At the annual meetings, the SHMC will evaluate both the actions and the planning process. The SHMC will base its evaluation on whether or not the actions have met the following criteria: increased public awareness/education, reduction in hazard damage, actions being implemented in the designated time frames, and actions staying within the cost estimate. The committee will document and report its findings to the Town Council.

2.5.3 Revisions

Recognizing that this is a living document, the SHMC will make changes to it after each annual revision or a disaster, as conditions warrant. These revisions will also reflect changes to priorities and funding strategies that may have been implemented.

A full revision of the plan will commence a year in advance of the current plan expiration date in order to ensure the Town always has an approved plan. The update will be completed every five years and will incorporate a formalized process for prioritizing actions and weighing the cost/benefit of such actions. All updates or revisions to the plan will be submitted to RIEMA. The Town Council will involve the public in the plan revision process by holding an annual advertised public meeting to present recommended revisions and solicit input. Revised plans will also be sent to the neighboring communities for comment.

All future meetings will again be open to the public and it is the hope of the SHMC Committee that once the public education and outreach actions begin, public involvement in the Plan will increase and will be reflected

in future revisions. The SHMC will involve the public and neighboring communities in the annual meeting by posting it on the website and in the local newspaper to encourage involvement.

Section 3: Risk Assessment

3.1 Defining Risks and Methodology

Risk includes the characteristics of the hazard and takes into account the magnitude, duration, distribution, area affected, frequency and probability of an event. This section focuses on assessing the community's risk to natural hazards by identifying which natural hazards affect Scituate. The section also assesses the vulnerability of people, structures, and critical facilities to these hazards and examines the capabilities in place to mitigate them.

3.2 Hazards

3.2.1 Hazard Identification

The Scituate Hazard Mitigation Committee (SHMC) reviewed the hazards listed in the State's Hazard Mitigation Plan[5] and recent Town experiences to begin a discussion about hazards in Scituate. The discussion put the likelihood of these events into historical perspective and recognized that although the probability of hurricanes and riverine flooding events may be higher; the intensity and potential impacts from less likely events such as dam breaks and tornadoes can be far greater. The SHMC ranked the following hazards in order of risk (probability + impacts) from high to low.

- Flooding (Riverine)
- Flooding (Dam breach)
- Hurricanes & Tropical Storms
- Snow & Ice
- Severe Storms (hail, lightning, wind)
- Extreme Heat
- Tornadoes
- Earthquakes
- Wildfire
- Drought

It must be noted that the identified natural hazards listed in the list above is not complete. There are numerous natural hazards that exist but are not presented, such as volcanoes, tsunamis, landslides, land subsidence, avalanche, tornadoes, storm surge, and coastal erosion that may occur and affect other parts of the state. However, after the SHMC analyzed the historical data, the committee decided not to consider these hazards at this time due to a low probability and frequency of occurrence for the hazards listed above in this part of the United States. Scituate does not have volcanoes or the right terrain to support landslides, avalanches, or land subsidence. Given the low probability of tornado activity the committee decided not to include them in this plan. Being an inland town, Scituate does not experience the effects of tsunamis, coastal

[5] Rhode Island Hazard Mitigation Plan, 2013 http://www.riema.ri.gov/prevention/mitigation/RI%20SHMP%2011-26-2013.pdf

erosion, or storm surge. Cold temperatures are usually short in duration and historically haven't compromised Town function.

3.2.2 Hazard Profiles

This subsection will describe each type of natural hazard that Scituate has historically experienced and more likely experience in the future.

As part of the hazard profile, the SHMC assigned a value of high, medium, and low for the P*robability of Future Occurrence*. The values were determined based upon historic frequency and current conditions.

Low = <25% chance of occurring in a given year
Medium= 25-75% chance of occurring in a given year
High = 75%-100% chance of occurring in a given year

The table also identifies *Impacts* that each hazard would have on the community. Most of the impacts were destruction of property and loss of services. The committee ranked each hazard's *Risk* on the town based upon probability and impacts.

Low = low probability of occurring and minimal damage to the entire town
Medium= medium probability of occurring and measurable damage to the entire town
High = high probability of occurring and widespread damage town-wide

The table below summarizes the results.

Table 2: Hazard Risks

Type	**Probability (low, medium, high)**	**Impacts** (populations, infrastructure, natural environment, economy)	**Risk Rank**
Flooding (Riverine)	High	Roadways flooded, services lost, infrastructure damaged	High
Flooding (Dam Breach)	Hope Mill Dam-low Gainer Dam- low Ponagansett- low	Minimum damage Catastrophic damage Minimum damage	High
Hurricanes & Tropical Storms	High	Infrastructure, populations, impassable roads, downed trees and wires.	High
Snow & Ice (18+ inches of snow)	High	Vulnerable population shelter in place or evacuating, dangerous roads, wires down, getting responders to the emergency	Medium
Severe Storms (hail, lightning, wind)	High	Lightning strikes on municipal buildings and residences. Hail damage to roofs and cars. Wind damage to trees and houses.	Medium
Extreme Heat	Medium	Public health, high energy costs	Medium
Tornadoes	Low	Devastating but localized. Hard to determine impacts	Medium

Type	Probability (low, medium, high)	Impacts (populations, infrastructure, natural environment, economy)	Risk Rank
Earthquakes	Low	Hard to determine impacts, based upon magnitude and location	Low-high
Wildfire	Low	Trees have moisture, and fires have been low to the ground so wildfire impacts have been few	Low
Drought	Low	Availability of water in wells	Low

Flooding (Riverine)

Description

Flooding is "a general and temporary condition of partial or complete inundation of normally dry land areas from: (1) the overflow of inland or tidal waters; (2) the unusual and rapid accumulation of runoff of surface water from any source."[6] Flooding can be caused by a variety of sources including extreme tides, storm surges, tsunamis, extreme weather, and rapid snow melt.

By their very nature, floodplains are the low, flat, periodically flooded lands adjacent to rivers, lakes and oceans and subject to geomorphic (land-shaping) and hydrologic (water flow) processes.[7] It is only during and after major flood events that the connections between a river and its floodplain become more apparent. These areas form a complex physical and biological system that not only supports a variety of natural resources but also provides natural flood and erosion control. In addition, the floodplain represents a natural filtering system, with water percolating back into the ground and replenishing groundwater. When a river is divorced from its floodplain with levees and other flood control structures, natural benefits are either lost, altered, or significantly reduced."[8]

Location

Floodplains in Scituate include "A", "AE" zones. "A" zones are areas that would be inundated by the 100 year flood. "The A Zone is that portion of the Special Flood Hazard Area that is not subject to high velocity wave action during the base flood and is not designated as Zone V due to primary frontal dune considerations. The source of flooding in an A Zone can be a stream or river that overflows its banks; a lake; or coastal storm surge accompanied by wave heights and wave run-up depths less than 3 feet."[9] "AE" zones area zones depicted using specific elevation data. Map 2 depicts the FEMA flood zones in Scituate.

The areas of Scituate that generally flood during rain events are: Ring Rock Acres, Nipmuc Road, Hope Village south of the Gainer Memorial Dam (Howard Avenue, Frosty Valley), Dexter Lane, and portions of Danielson Pike and Hartford Avenue in North Scituate (northern reaches of the reservoir).

[6] Rhode Island Hazard Mitigation Plan, 2013 http://www.riema.ri.gov/prevention/mitigation/RI%20SHMP%2011-26-2013.pdf
[7] Rhode Island Hazard Mitigation Plan, 2013 http://www.riema.ri.gov/prevention/mitigation/RI%20SHMP%2011-26-2013.pdf
[8] Rhode Island Hazard Mitigation Plan, 2013 http://www.riema.ri.gov/prevention/mitigation/RI%20SHMP%2011-26-2013.pdf
[9] "CRS Credit for Coastal A Zone Regulations." http://training.fema.gov/EMIWeb/CRS/

History

Residential flooding

Historically, in western Providence County torrential rainfall, thunderstorms, and snowmelt are the causal events that result in street, basement, and stream flooding. Torrential rainfall associated with Tropical Storm Allison resulted in flash flooding throughout Providence County, causing two roads in Foster to be closed after being damaged by runoff. Extremely heavy rain caused streams to rise rapidly and flood over banks on September 10, 1999, January 24, 1998, and April 1, 1993. Thunderstorms not only produce large hail and damaging wind, but have also flooded areas such as streams flowing into the Scituate Reservoir on June 13, 1998. On January 12, 1996, snow, changing to heavy rain, resulted in catch basins clogging and officials in Scituate closing Route 116 when 4 feet of standing water made the roadway impassable. Historically, flood damage in Scituate primarily affects low-lying areas, wetlands, and those homes located in the 100-year flood zone. Since 1993, the National Climatic Data Center reported 31 flood events in Providence County. Of these, four reported flooding events occurred in Scituate.

Probability of Future Occurrence

High- The SHMC agreed that there is a 100% likelihood of flooding occurring in Scituate within the next year. As rain storms become more intense due to climate change, increased land development and riverine flooding will continue to be a major concern for the Town.

Extent and Impact

Stream gauges can alert weather forecasters when rivers and streams start to rise. There are numerous stream gauges in Scituate for the Pawtuxet River Basin. High stream levels upstream can give slight advance notice to the more populated areas of Providence, Cranston, and Warwick. It is difficult to accurately determine the extent a rainstorm event would have on the possibility of flooding. A rainstorm that occurs when the ground is still frozen will cause more flooding than if a storm of the same intensity occurred during warmer months. Recent history has shown that it may not be one storm that causes streams to overflow, but rather successive rain events that saturate the watershed. Flooding that peaks within a few hours before retreating will have less of an impact than one that remains high for days. The 100 year flood (1% annual chance of occurring) is the standard to which development in the Scituate floodplain is built.

The likelihood and costs of flooding within the Town of Scituate has increased over the decades due to increases in real estate development and its associated impervious materials, and climate changes. It is important to point out that there are many natural factors and man-made structures such as dams, that when combined, can cause floods. Therefore, it is important that the Town identifies all of the existing man-made structures that may contribute to flooding events. Once identified, these structures can be analyzed for their structural integrity and functionality.

Flooding (Dam Breach)

Description

Failure of the Gainer Memorial Dam would have catastrophic effects on not only Scituate but most of Rhode Island. The resulting flood of that magnitude would certainly wipeout the village of Hope in southeastern Scituate. The flood waters would flow southeast along the Pawtuxet River, overtopping its banks in Coventry, West Warwick, Warwick, Cranston, and Providence. Not only will areas downstream of the reservoir be flooded but the drop in reservoir levels would also affect draw for drinking water and fire hydrants in 60% of the State. This creates a health and safety risk state-wide.

Construction of the Gainer Dam in 1925
Providence Water Supply Board)

One of the other 19 dams may also fail, causing flooding in neighborhoods. There are four dams in Scituate which when compromised could have an impact on people and infrastructure. The Rhode Island Department of Environmental Management has identified the following in their 2013 Dam Safety Report.

Table 3: High and Significant Hazard Dams in Scituate[10]

Name	Hazard Class	Max Discharge (CFS*)
Gainer Memorial	High	53,520
Hope Mill	Significant	10,730
Horseshoe Dam	Significant	6,000
Barden Reservoir/Ponagansett	Significant	4,654
Peeptoad Pond	Low	620
Moswansicut Pond	Significant	310
Westconnaug (Jordon Pond)	Significant	290
Peabody Reservoir (lower)	Low	220
King Pond	Low	98
Keebler Farm	Low	37
Pine Swamp Reservoir #1	Significant	30
Abner's Pond	Low	20
Peck Farm Pond	Low	16
Burton Pond (breached)	Low	0
Potterville Pond	Low	0
Potter Pond	Low	0
Pine Swamp Reservoir #2	Low	0
Duck Pond	Low	0
Mathewson Pond	Low	0

*maximum spillway discharge in cubic feet per second at maximum capacity.

[10] RI DEM 2014 Dam Inventory and GIS data layer

Location

All 39 billion gallons of water in the Scituate Reservoir are held back by the earthen filled Gainer Dam located at the south eastern part of the reservoir. Also of note are the Hope Mill Dam located downstream of the Gainer Dam near Route 116 at the Town line, the Horseshoe Dam is near the North Scituate town center off Route 6, the Ponagansett Dam on the western side of town near the northern reaches of the Scituate Reservoir, the Moswanicut Pond dam is on the north side of Route 6 also near North Scituate town center, the Westconnaug/Jordon Pond Dam located west of the Scituate Reservoir, in the Clayville neighborhood, and the Pine Swamp Reservoir is north of Central Ave. and east of East Road near the east side of the town line.
See Map 4 for dam locations.

History

There is no history of dam failure in Scituate.

Probability of Future Occurrence

Low- The dams are maintained and inspected regularly. There is a low threat of them being breached during any given year.

Extent and Impact

A low probability yet high impact flooding event would be a breach of the Gainer Memorial Dam, Jordon Pond Dam, Hope Mill Dam, or Ponagansett Dam. A breach would send water flooding downstream, inundating homes and roads. A wet weather breach of the Gainer Memorial Dam would send floodwaters over a wide area, primarily flowing south to Greenwich Bay and east to the Pawtuxet River and Narragansett Bay. Specifically in Scituate, the following would be affected: Hope Elementary School, Scituate Police Station, and the Hope-Jackson Fire Department.

Providence Water Supply Board, the owners of the Gainer Memorial Dam, have an Emergency Operation Plan should a breach occur. Depending on the magnitude, effects would be felt throughout the state.

Hurricanes and Tropical Storms

Description

"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.

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 extratropical 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. Howling winds associated with Nor'easters also have the potential to produce significant storm surge, similar to that of a Category One hurricane. In addition, these types of storms can also produce wind gusts to near hurricane force as well as flooding rain and crippling snowfall.

Hurricanes are categorized according to the Saffir-Simpson scale with ratings determined by wind speed and central barometric pressure. Hurricane categories range from 1 through 5, with Category 5 being the strongest (winds greater than 155 mph). A hurricane watch is issued when hurricane conditions could occur within the next 36 hours. A hurricane warning indicates that sustained winds of at least 74 mph are expected within 24 hours or less."[11]

Hurricanes are classified by their damage potential according to a scale developed in the 1970s by Robert Simpson and Herbert Saffir, and updated slightly by the National Hurricane Center in 2012. The Saffir-Simpson scale is designed to give public officials and the general public usable information on the magnitude of a storm. It gives an indication of the potential flooding and wind damages associated with each hurricane category. The scale rates the intensity and effects of hurricanes based on wind speed and barometric pressure measurements as shown in Table 4.

Table 4: Saffir-Simpson Hurricane Wind Scale[12]

Category	Central Pressure		Winds		Damage
	Millibars	Inches	(mph)	(kts)	
1	>980	>28.9	74-95	64-83	Minimal
2	965-979	28.5 - 28.9	96-110	84-96	Moderate
3	945-964	27.9 - 28.5	111-129	96-112	Extensive
4	920-944	27.2 - 27.9	130-156	113-136	Extreme
5	<920	<27.2	157+	>137	Catastrophic

While there is a low to medium probability that the Town will be significantly impacted by a hurricane in the next five years, one direct hit on the State of Rhode Island could be catastrophic for all of the cities and towns. The Town has been impacted by hurricanes several times throughout the past century, all of which are

[11] Rhode Island Hazard Mitigation Plan, 2013 http://www.riema.ri.gov/prevention/mitigation/RI%20SHMP%2011-26-2013.pdf

[12] Saffir-Simpson Hurricane Wind Scale http://www.nhc.noaa.gov/pdf/sshws_2012rev.pdf

referenced in Table 5. Changing global climate conditions may lead to stronger, more intese storms with hurricane-force winds in the region.

Location

All of Scituate is susceptible to hurricane-force winds and rain.

History

The two hurricanes that resulted in the largest loss of life in the State were "The Great New England Hurricane of 1938" and "Hurricane Carol". "The Great New England Hurricane" occurred on September 21st, 1938, and is considered the worst disaster in Rhode Island history. It resulted in the deaths of 262 people and caused damage estimated at $100,000,000. The eye of this hurricane tracked to the west of Rhode Island and hit at high tide. During the storm, two storm surges almost 30' high destroyed most of the beach homes along the South Shore of Rhode Island. In downtown Providence, the surge flooded the area to a depth of more than 13'9" above the mean high-water mark. As a result, persons drowned trying to escape automobiles submerged in the streets and from buildings where the first floors were flooded to the ceiling.[13]

Throughout Rhode Island, the American Red Cross (ARC) spent $433,485 for the rehabilitation of 3,074 families after "The Great New England Hurricane". A total of 19,695 families suffered property loss; 797 permanent homes were destroyed; 1,169 summer homes were washed away; 899 boats destroyed and 888 damaged, 177 barns and 1,800 other buildings of various types were destroyed.[14]

On August 31, 1954, "Hurricane Carol" hit Rhode Island, in the same manner as "The Great New England Hurricane of 1938". As a result, downtown Providence was flooded when the water reached 13' above mean high-water level.

The winds from Hurricane Gloria in 1985, Hurricane Bob in 1991, and Hurricane Irene in 2011 caused downed tree limbs and power outages.

The most recent significant weather event to affect the state was a downgraded hurricane. On October 29th 2012, Hurricane Sandy which had been sweeping up the Mid-Atlantic Coast had been downgraded by the time it had reached Rhode Island. Super Storm Sandy hit Rhode Island with strong winds, and storm surge, causing significant coastal erosion. Along the south coast, the storm surge was 4 to 6 feet and seas from 30 to a little over 35 feet were observed in the outer coastal waters. The very large waves on top of the storm surge caused destructive coastal flooding along stretches of the Rhode Island exposed south coast. Washington and Newport Counties suffered the most damage and received FEMA disaster declarations. More than $39 million has been paid in federal support. Sadly, at least 182 people nationwide lost their lives in what turned out to be the nation's second most costly weather disaster. Fortunately there were no disaster-related deaths in Rhode Island. Scituate did not have any significant damage from Super Storm Sandy, just fallen trees and brush.

[13] Providence Journal-Bulletin, 1998 Journal-Bulletin: Rhode Island Almanac 112th ed. (Providence, RI: Providence Journal Company, 1998) 255.

[14] Providence Journal-Bulletin, 1998 Journal-Bulletin: Rhode Island Almanac 112th ed. (Providence, RI: Providence Journal Company, 1998) 255.

Table 5: Hurricane History in Rhode Island[15]

Hurricane	Date	Description
1938	September 21, 1938	The hurricane of September 21, 1938 brought major devastation to the State, with 262 persons losing their lives and damage estimated at $100 million. Another major hurricane occurred on September 14, 1944; no lives were lost, but property damage was over $2 million. The coastal area from Westerly to Little Compton experienced the heaviest damage, but there was no tidal wave, since the storm hit at ebb tide. Sustained winds of 95 MPH recorded; damage estimated at $100 million; 262 fatalities. Tide 15 feet above mean sea level (at USGS gage in Westerly). Virtually all the State was without power. Ten percent of electric customers still without power 12 days after hurricane.
1944	September 14, 1944	Affected Rhode Island and southeastern Massachusetts; $2 million property damage, no loss of life.
Carol	August 31, 1954	On August 31, 1954, Hurricane Carol swept into Rhode Island with little warning. The result was 19 deaths and $200 million in property damage. The storm center passed to the west of Providence and came at high tide. The central area of Providence was flooded to a depth of 13 feet, and 3,500 cars were inundated in the downtown areas. Hurricane Edna occurred 12 days after Carol, with heavy rain and major river flooding. There were 19 fatalities in New England, $200 million property damage and 13' flooding. In Providence, wind speed of 90 MPH, with 115 MPH gusts; nearly 3,800 homes destroyed. Tide 12.2 feet above mean seal level (at USGS gage in Westerly). Most of State without power. Four days after storm, approximately 50% had power restored; 90% after seven days.
Edna	September 11, 1954	Heavy rain and major flooding in the Blackstone River Valley.

[15] Rhode Island Hazard Mitigation Plan, 2013 http://www.riema.ri.gov/prevention/mitigation/RI%20SHMP%2011-26-2013.pdf

Hurricane	Date	Description
Diane	August 17-20, 1955	In 1955, remnants of the August Hurricane Diane swept over Rhode Island, but its wind velocities were far below hurricane force because of its long inland trip over North Carolina, Virginia, and Pennsylvania. Damage to power lines was high, and at one time 82% of Rhode Island's homes were without electricity. Ample warning permitted people to return home from school and work early, and as a result, only two lives were lost. Property damage amounted to $170 million, most resulting from torrential rains which caused serious river flooding. Heavy rain; Blackstone River crests 15' above normal; $170 million in property damage. Heavy rain and 6' tidal surge; $5 million in property damage; 82% of electric customers lose power.
Donna	September 12, 1960	Heavy rain and major flooding in the Blackstone River Valley.
Esther	September 21, 1961	Heavy shore damage at Sakonnet Point in Little Compton and Misquamicut in Westerly.
Gloria	September 27, 1985	Two fatalities in New England; property damage estimated at $19.8 million; 8,596 of electric customers lose power an estimated 23,700 people evacuated.
Bob	August 18, 1991	Southern New England damage at $1.5 billion; 60% of residents across Southeastern New England lost power; 6'-10' storm surge in Narragansett Bay; Two (2) unconfirmed tornadoes in Rhode Island. There were 18 fatalities in Southern New England, although none in Rhode Island.
Irene	August 27, 2011	Preliminary damage assessment report from FEMA brings the total Public Assistance cost to $9,260,898. Irene knocked down trees and power lines, leaving up to half of Rhode Island residents without power. Gusts of wind up to 71 MPH were reported, and storm surge in Narragansett Bay caused some coastal damage. However, the majority of damage was caused by wind. The storm surge experienced along the coast was generally in the two to four foot range with a high of 4.78 feet at Fox Point in Providence, Rhode Island. The highest sustained windspeed was 54 knots (62 MPH) at the Physical Oceanographic Real Time System station at Conimicut Light in Narragansett Bay, RI.
Sandy	October 29, 2012	Hurricane Sandy swept through the region in October 2012 leaving significant damage all along the coast. Beaches along Westerly, including Misquamicut, were devastated and almost unrecognizable. More than 122,000 people lost power. It is estimated that more than $39.4 million in support from four federal disaster relief programs is helping RI recover from this disaster, a majority of which is from the NFIP ($31.1 million).

Probability of Future Occurrence

High- The SHMC agreed that there is a 75-100% chance of a hurricane affecting Scituate within the next year. Although Scituate is an inland community and not subject to wave energy, a hurricane's strong winds and heavy rain will still have a likely impact on this heavily forested town.

Extent and Impact

Hurricanes that strike the Eastern United States originate in the tropical and subtropical North Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico. The Atlantic hurricane season spans a six-month period (June 1st through November 30th). The wind speed of a hurricane decreases as it moves inland due to the absence of warm ocean water and the presence of land, vegetation, and structures that offer frictional resistance to the storm winds. The wind and rain that precede a hurricane can cause severe damage even to those communities that are further inland, such as Scituate. Hurricanes can also spawn tornadoes that are extremely dangerous and that contribute to the overall damage.

The Saffir-Simpson Scale can be used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane landfall."[16]

Table 5: Saffir-Simpson Scale of Hurricane Intensity

Wind Speed	Typical Effects
Category 1 Hurricane- Weak	
74-95 mph (64-82 kts)	Minimal Damage: Damage is primarily to shrubbery, trees, foliage, and unanchored mobile homes. No real damage occurs in building structures. Some damage is done to poorly constructed signs.
Category 2 Hurricane- Moderate	
96-110 mph (83-95 kts)	Moderate Damage: Considerable damage is done to shrubbery and tree foliage, some trees are blown down. Major structural damage occurs to exposed mobile homes. Extensive damage occurs to poorly constructed signs. Some damage is done to roofing materials, windows, and doors; no major damage occurs to the building integrity of structures.
Category 3 Hurricane- Strong	
111-129 mph (96-112 kts)	Extensive Damage: Foliage torn from trees and shrubbery; large trees blown down. Practically all poorly constructed signs are blown down. Some damage is done to roofing materials, windows, and doors. Some structural damage occurs to small buildings, residences and utility buildings. Mobile homes are destroyed. There is a minor amount of failure of curtain walls in framed buildings.
Category 4 Hurricane- Very Strong	
130-156 mph (113-136kts)	Extreme Damage: Shrubs and trees are blown down; all signs are down. Extensive roofing material and window and door damage occurs. Complete failure of roofs on many small residences occurs, and there is a complete destruction of mobile homes. Some curtain walls experience failure.
Category 5 Hurricane- Devastating	
Greater than 157 mph (136 kts+)	Catastrophic Damage: Shrubs and trees are blown down; all signs are down. Considerable damage to roofs of buildings. Very severe and extensive window and door damage. Complete failure of roof structures occurs on many residences and industrial buildings, and extensive shattering of glass in windows and doors occurs. Some complete buildings fail. Small buildings are overturned or blown away. Complete destruction of mobile homes.

[16] Hurricanes and Tropical Storms: Saffir-Simpson Hurricane Scale" *Weather.com*. The Weather Channel, 1995-2001. http://www.thefreedictionary.com/hurricane

Source: National Hurricane Center and RI 2013 State Hazard Mitigation Plan

Winter Related Hazards (Snow & Ice)

Description

The majority of Rhode Island lies outside the heavy snow and ice regions of the northeast. Due to its maritime climate, Rhode Island generally experiences cooler summers and warmer winters than inland areas. However, snow and ice do occur and can result in more extensive damage than one would expect. The two major threats from these hazards are loss of power due to ice on electrical lines and snow loading on rooftops.

Heavy snow outside the North Scituate Fire Department

For the purpose of this plan, winter related hazards include heavy amounts of snow, and ice. All of which may occur independently or at the same time. Scituate has the capacity to handle low to moderate amounts of snow. In fact, Scituate schools were the only ones in the state to be open immediately following winter storm Nemo in 2013. When snow fall totals reach 18 or more inches, the Town has difficulty keeping the roads clear. People become isolated in their neighborhoods, roads are impassable, utility wires break under heavy ice loads, and it's difficult to get response staff to where they need to be.

Location

Winter storms are expected every year in the Town of Scituate. The northern and western communities usually see greater amounts and frequency of snow storms.

History

Historically, severe winter storms for Rhode Island have resulted in the closing of schools/businesses, power outages, fallen trees/wires, disruption of transportation systems, and damage to commercial and residential property. The winter of 1978 is considered one of the worst winters on record for the State. On January 13, 1978 an ice storm hit the State. Statewide the storm destroyed thousands of trees and left nearly 120,000 people without power and heat in some circumstances. A little more than three weeks later, on February 6, 1978, the State was pounded by what became known as the "Blizzard of 78". In Warwick, the official measure of snowfall at T.F. Green Airport was 28.6". Snow accumulations ranged from 10" on Block Island to 56" in northern areas. Because the heavy snowfall arrived during rush hour, nearly 30,000 vehicles were left stranded. The State was immobilized for almost a week and the President declared Rhode Island a disaster area. During that week 400 Army and Navy personnel aided local crews to clear streets and highways. The statewide estimated losses from the blizzard were near $15 million and there were 26 storm-related deaths.[17] Table 7 highlights severe winter storm events that have affected Rhode Island.

[17] NOAA National Weather Service http://www.erh.noaa.gov/box/papers/blizzard78/mainblizzardof78.htm

Since then, numerous winter storms events dumping 2 feet or more of snow have occurred:

- January 7, 1996 (12-24 inches across the state),
- January 22, 2005 (15-25 inches across the state),
- February 8, 2013 (24 inches-30 inches across the state), and
- March 22, 2013 (12-24 inches reported).

On February 8 and 9, 2013, the Town of Scituate was impacted by a significant winter snowstorm, named Nemo by the Weather Channel. Nemo dumped up two feet of heavy wet snow and caused significant power outages. A large amount of vegetative debris was also generated as a result of this storm's heavy snow and high winds, which gusted between 50 and 60 mph. A Federal Disaster was declared due to the significant impact of the storm.

The severe winter storm that swept through Rhode Island on March 22, 2013 was declared a major disaster (DR-4107) by the Federal Emergency Management Agency. This large storm which stretched from New Jersey into Canada brought more than two feet of snow to Rhode Island in less than 24 hours. National Grid estimated more than 180,000 customers in Rhode Island lost power.

Most recently, the winter storm that hit in January 26, 2015 was also declared a disaster (DR-4212) by the Federal Emergency Management Agency. This 48 hour event dumped record amounts of heavy snow throughout the region and forced road closures to ensure public safety. After the storm, temperatures remained frigid. As a result subsequent storms added to the already large piles of snow that were beginning to form on the side of the roads.

Table 7: Recent Winter Related Events[18]

Date	Precipitation	Damage	Comments
1/12/11	Heavy Snow	0	A developing nor'easter coastal storm dumped nearly two feet of snow across portions of Rhode Island in a 24 hour period. This was the second major storm of an above average winter of snowfall. The first occurred December 26 and 27, with several other relatively minor snowfalls in the month of January, and a third major storm February 1 and 2. With only a brief thaw in between the December storm and the January storm, snow piled up across southern New England resulting in numerous roof collapses, towns seeking permission to dump excess snow in area rivers and bays, and numerous disruptions to transportation. Eight to fourteen inches of snow fell across southeastern Providence County.
1/26/11	Heavy Snow	0	A strong low pressure system moved up the coast and southeast of Nantucket producing up to a foot of snow across Rhode Island. Nine to eleven inches of snow fell across southeast Providence County.
2/1/11	Winter Storm	0	A series of low pressure centers impacted the Southern New England Region with a combination of heavy snows and ice. The first area of low pressure on February 1st lifted northeastward offshore of the Southeastern New England shoreline ushering heavy snows across the interior portions of New England,

[18] NOAA, http://www.ncdc.noaa.gov/stormevents Note: NCDC only reports hail data from 01/01/1950 to 09/30/2003.

Date	Precipitation	Damage	Comments
			especially north and west. A second area of low pressure deepened through the Ohio River Valley, redeveloping over the Southeastern New England shoreline bringing a combination of heavy snows, sleet and freezing rain over much of the region February 2nd, before changing back to all snow into the end of the event. A total of 6 inches of snow fell across Southeast Providence County over the two day period, with upwards of a tenth of an inch of ice accumulation for isolated locations falling during the morning period on the 2nd.
10/29/11	Heavy Snow Halloween Nor'easter		The Nor'easter brought strong winds across the region, but nothing too strong inland. Nantucket, Massachusetts recorded a 69-mile-per-hour wind gust, which is nearly hurricane strength (74 mph). Fallen trees with wet, heavy leaves still on caused wide spread power outages (over 3 million across New England). About 6 inches of snow fell in Rhode Island.
1/19/12	Winter Weather	0	A cold front moved across Southern New England, resulting in a period of light snow overnight into the morning of the 20th. Two to five inches of snow fell across Southern New England, with the highest amounts focused across southeastern Massachusetts and Rhode Island. Amateur Radio operators reported 3 to 5 inches of snow on the ground.
1/21/12	Winter Weather	0	A weak low pressure system moved southeast of southern New England, bringing snow to much of southern New England. While most of the area received at least an inch of snow, a mesoscale band set up along the south coast of Massachusetts and Rhode Island resulting in incredible snowfall rates. Eight to twelve inches of snow fell along the coast with five to eight inches falling on Martha's Vineyard and Nantucket. Amateur Radio operator reported 3 to 5 inches of snow on the ground.
2/29/12	Winter Weather	0	Several waves of low pressure moved south of southern New England bringing a prolonged period of snow to the region. Anywhere from 1 to 12 inches of snow fell across the area. Three to four inches of snow fell across southeast Providence County.
11/7/12	Winter Weather	0	Low pressure moved up the east coast spreading snow, rain, and wind across southern New England. Cloudy skies coupled with evaporational cooling to keep temperatures cooler than expected which resulted in snow spread across all but the south coasts of RI and MA as well as portions of southeastern MA. This in turn resulted in higher snow accumulations across much of southern New England. In Rhode Island, accumulations ranged from less than an inch to five inches.
12/29/12	Heavy Snow	0	A rapidly intensifying low moved out of the mid-Atlantic, passing southeast of Southern New England. This spread heavy snow across much of Southern New England, resulting in six to twelve inches of snow across the area. Snowfall totals between eight and ten inches were reported in southeast Providence County.
2/8/13	Blizzard "Blizzard of 2013/ Winter storm Nemo"	0	An historic winter storm deposited tremendous amounts of snow over all of southern New England, mainly from the mid-afternoon on Friday, February 8 and lasting into the daylight hours of Saturday, February 9. What made this an amazing storm was the widespread coverage of heavy snowfall. Most locations received 2 to 2.5 feet of snow! Isolated thunderstorms were common across the entire region during the height of the storm.

Date	Precipitation	Damage	Comments
			A low pressure system advancing from the Great Lakes region combined forces with a very moist low pressure system moving northeast from the Gulf Coast states. Explosive deepening took place Friday evening, February 8, as a low center moved from the North Carolina coast to south of Nantucket. Strong high pressure to the north of New England helped ensure that cold air remained in place over the area. Snowfall gained intensity during the afternoon, but during the night, 2 to 3 inch per hour amounts were common throughout the region. Snow ended in the morning in western and central MA, southwest NH, most of CT and RI, and in the early afternoon across eastern MA. The Blizzard of 2013 also produced a prolonged period of very strong winds Friday night along the MA and RI coasts. Gusts exceeded hurricane force (74 mph) at a few locations. Gale force gusts (to 50 mph) continued on the MA coast through Saturday afternoon. The strong winds, combined with a wet snow, led to extensive power outages from downed trees and wires in southeast coastal MA and in southern RI. Elsewhere, farther inland, the snow became drier and did not cling to trees like it did along the south and southeast coast of New England. Some wind gusts included: 76 mph at Logan Intl. Airport (Boston, MA), 75 mph at Bedford, MA, 77 mph at Hyannis, MA and 68 mph in Jamestown, RI. Damaging gusts to 60 mph were recorded as far west as Worcester County, MA. Wind gusts of 35 to 50 mph were common elsewhere in southern New England. Minor tidal flooding occurred along the south coasts of Connecticut, Massachusetts, and Rhode Island during times of high tide Friday night and Saturday morning. The Providence Journal reported that almost 170 people sought treatment for storm-related heart attacks, falls, and other injuries related to the storm at Lifespan network hospitals (which includes 4 major Rhode Island hospitals). In addition 10 people were hospitalized with carbon monoxide poisoning. No further information was available. Seventeen to twenty-one inches of snow fell across southeastern Providence County. A Rhode Island man died from a heart attack while shoveling snow from the blizzard. No further details were available, including what city or town the man was from.
2/17/13	Winter Weather	0	A strengthening ocean storm spread advisory level snow across much of southern New England. Two to four inches of snow fell across southeastern Providence County.
3/7/13	Winter Weather	0	This storm brought heavy snow and significant coastal flooding to the forecast area. This was an unusual synoptic set-up, with low pressure lingering off the coast of southern New England for several days. Snowfall was difficult to forecast due to concerns about precipitation type and boundary layer temperature. In the end, precipitation type turned out to be all snow for much of the area, with most locations receiving 1 to 2 feet of snow. In addition, the Massachusetts east coast was hit by widespread moderate and pockets of major coastal flooding for two high tide cycles and beach erosion for at least 5 high tide cycles. Five to six inches of snow fell across southeastern Providence County.
12/14/13	Heavy Snow	0	Low pressure moved out of the Midwest, off the mid-Atlantic coast and northeastward across Nantucket and the outer arm of Cape Cod bringing

Date	Precipitation	Damage	Comments
			accumulating snow to much of southern New England. Four to eight inches of snow fell across northwestern Providence County.
1/2/14	Heavy Snow	0	A significant, rapidly developing coastal storm moved southeast of Southern New England bringing heavy snow, bitter cold temperatures, and strong winds to the entire region. Seven to eight inches of snow fell across northwestern Providence County.
1/21/14	Heavy Snow	0	Low pressure tracked along an arctic front bringing heavy snow and strong winds to much of southern New England. Ten to twelve inches of snow fell across northwestern Providence County.
2/5/14	Heavy Snow	0	Low pressure moving off the mid-Atlantic coast intensified as it moved northeastward over Nantucket. This spread heavy snow across all of southern New England. Five to ten inches of snow fell across northwestern Providence County.
2/13/14	Heavy Snow	0	A significant winter storm brought six to twelve inches of snow across much of southern New England. Lesser amounts fell east of the Interstate 95 corridor where snow changed to rain. Five to ten inches of snow fell across northwestern Providence County.
1/26/15	Heavy Snow "Winter Storm Juno"	0	Near blizzard conditions occurred at Smithfield State Airport. Sixteen to thirty inches of snow fell across northwestern Providence County.

Probability of Future Occurrence

High- The SHMC agreed that there is a 100% likelihood of a heavy snow or ice storm affecting Scituate within the next year. Recent history has shown that the Town needs to continue to prepare annually for winter storms.

Extent and Impact

Winter storms can range from a few inches of snow to a coating of ice to a major blizzard. Scituate is susceptible to all types of winter storms. According to the Rhode Island 2014 Hazard Mitigation Plan, "the impact of a winter storm is primarily measured in terms of the financial costs associated with preparing for, responding to, and recovering from the event. Modeling the relationship between actual financial impact and winter storm magnitude is difficult". In Scituate, the impacts of a winter storm vary depending on the storm characteristics. Heavy snow collapses roofs and snarls traffic, ice can bring down power lines and tree branches. During the colder winter months the loss of power due to a winter storm can put many people at risk.

Severe Storms (Hail, Lightning, Wind)

Description

The SHMC decided that hail, lightning, and wind tend to occur concurrently during thunderstorms so they were grouped together. A thunderstorm is formed from a combination of moisture, rapidly rising warm air and a force capable of lifting air, such as the meeting of a warm and cold front, a sea breeze, or a mountain. Most thunderstorms contain lightning. Thunderstorms can occur singly, in clusters, or in lines. Therefore, it is possible for several thunderstorms to affect one location in the course of a few hours. Thunderstorms usually bring heavy rains (which can cause flash floods), strong winds, hail, lightning, and tornadoes.[20] Lightning is caused by the attraction between positive and negative charges in the atmosphere, resulting in the buildup and discharge of electrical energy. Most thunderstorms produce lightning and are dangerous. Lightning is one of the most underrated severe weather hazards, yet ranks as the second-leading weather killer in the United States. Lightning often strikes as far as 10 miles away from any rainfall. In Scituate, strong wind storms usually result in downed trees. One of the less life-threatening yet very damaging natural hazard events is hail. Large hail can dent automobiles, break windows, and destroy roofs.

Location

Severe storms and the damage they cause are rarely isolated, localized events in Rhode Island. Storm systems move through the state, affecting many municipalities, including Scituate.

History

Table 8 highlights recent wind, lightning, and hail storms that have affected Scituate and other parts of Rhode Island.

Table 8: Recent Wind, Lightning and Hail Storms in Rhode Island[19]

Date	Event	Magnitude	Comments
6/9/11	Wind	57 mph	A Mesoscale Convective System moved out of the Great Lakes and across New York state providing a focus for convection across southern New England. One overnight thunderstorm produced a severe microburst in Providence, RI that downed numerous trees throughout town.
7/1/12	Wind	57 mph	A weak cold front produced showers and thunderstorms, a few of which became severe producing both large hail and gusty winds. Quarter size hail fell on Hartford Avenue in Scituate.
9/18/12	Wind	NA	A strong cold front moved through southern New England, resulting in a line of thunderstorms that produced strong to severe winds. In addition, a strong low level jet produced gusty strong to high winds with the front. A branch and wires were downed on Sunset Drive in North Providence.
10/29/12	Wind	60-80 mph	Superstorm Sandy, a hybrid storm with both tropical and extra-tropical characteristics, brought high winds and coastal flooding to southern New England. Easterly winds gusted to 50 to 60 mph for interior southern New England; 55 to 65 mph along the eastern Massachusetts coast and along the I-95 corridor in southeast Massachusetts and Rhode Island; and 70 to 80 mph along the southeast Massachusetts and Rhode Island coasts. A few higher gusts occurred along the Rhode Island coast. A severe thunderstorm

[19] NOAA http://www.ncdc.noaa.gov/stormevents. Note: NCDC only reports hail data from 01/01/1950 to 09/30/2003.

Date	Event	Magnitude	Comments
			embedded in an outer band associated with Sandy produced wind gusts to 90 mph and concentrated damage in Wareham early Tuesday evening, |a day after the center of Sandy had moved into New Jersey. In general, moderate coastal flooding occurred along the Massachusetts coastline, and major coastal flooding impacted the Rhode Island coastline. The storm surge was generally 2.5 to 4.5 feet along the east coast of Massachusetts, but peaked late Monday afternoon in between high tide cycles. Seas built to between 20 and 25 feet Monday afternoon and evening just off the Massachusetts east coast. Along the south coast, the storm surge was 4 to 6 feet and seas from 30 to a little over 35 feet were observed in the outer coastal waters. The very large waves on top of the storm surge caused destructive coastal flooding along stretches of the Rhode Island exposed south coast. Sandy grew into a hurricane over the southwest Caribbean and then headed north across Jamaica, Cuba, and the Bahamas. As Sandy headed north of the Bahamas, the storm interacted with a vigorous weather system moving west to east across the United States and began to take on a hybrid structure. Strong high pressure over southeast Canada helped with the expansion of the strong winds well north of the center of Sandy. In essence, Sandy retained the structure of a hurricane near its center (until shortly before landfall) while taking on more of an extra-tropical cyclone configuration well away from the center. Sandy's track was unusual. The storm headed northeast and then north across the western Atlantic and then sharply turned to the west to make landfall near Atlantic City, NJ during Monday evening. Sandy subsequently weakened and moved west across southern Pennsylvania on Tuesday before turning north and heading across western New York state into Quebec during Tuesday night and Wednesday. In Southern New England, Rhode Island was hardest hit. A peak wind gust of 86 mph occurred in Westerly, and nearly the entire Rhode Island shoreline experienced moderate to major coastal flooding. Numerous power outages occurred with winds gusting to 60 mph over the interior and to 80+ mph along the south coast. Major coastal flooding struck the Rhode Island ocean exposed south coast during the Monday evening high tide. This storm tide, especially destructive across shorelines in Westerly, Charlestown, South Kingston, Narragansett, and Block Island, rivaled the impact from Hurricane Bob in 1991. Along the Rhode Island south coast, the damaging coastal flooding was fueled by a storm surge around 5 feet and waves of 30+ feet that propagated on a long fetch into Block Island and Rhode Island Sounds. A survey of impact along Misquamicut Beach revealed an inundation extent consistent with the upper boundary of a category 1 Hurricane and very severe erosion. It should also be noted that the previous high tide during Monday morning produced minor to moderate impacts along the Rhode Island coast and likely weakened dunes and other coastal structures in advance of the more destructive Monday evening high tide. A tree was downed onto a car on Veterans Memorial Parkway in East Providence. Those in the car were transported to the hospital. The roof of the U.S. Postal Service building on Newman Avenue in East Providence was partially collapsed after being damaged by high winds. Wind gusts in southeast Providence County were reported by spotters in North Providence and in the Rumford section of East Providence to be between 46 and 52 mph.

Probability of Future Occurrence

High- The SHMC agreed that there a 100% likelihood of severe storms (hail lightning, wind) in Scituate within the next year. Not all thunderstorms result in cloud to ground lightning strikes but the conditions present themselves enough throughout the year that is a hazard that the Town will continue to prepare for. Wind is especially a concern for the heavily forested town.

Extent and Impact

June, July, and August are peak months for lightning activity in the United States. This holds true for the Town of Scituate. The charge and temperature of each bolt of lightning is different yet each could be lethal or cause damage. 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 (Rhode Island 2014 State Hazard Plan).

High winds and damaging hail can take down trees, knock out power, and damage infrastructure.

Tornadoes

Description

A tornado is a violent windstorm with a twisting, funnel-shaped cloud. They are often spawned by thunderstorms or hurricanes. Tornadoes are produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. The damage from a tornado is a result of the high wind velocity and wind-blown debris. Tornado season is generally March through August, although tornadoes can occur at any time of year. Over 80 percent of all tornadoes strike between noon and midnight.[18] During an average year, about 1,000 tornadoes are reported across the United States, resulting in 80 deaths and over 1,500 injuries. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be in excess of one mile wide and 50 miles long.[19]

Tornadoes are categorized according to the damage they produce using the Fujita Scale (F-scale). An F0 tornado causes the least amount of damage, while an F5 tornado causes the most amount of damage. Relatively speaking, the size of a tornado is not necessarily an indication of its intensity.

Direct measurements of tornado wind speeds are difficult (and dangerous) to obtain. In 1971 Theodore Fujita, a meteorology professor at the University of Chicago, devised a classification system based on damage to manmade structures. His Fujita-scale classification system (F-scale) ranks tornado damage as weak (F0 and F1), strong (F2 and F3), or violent (F4 and F5). The weakest tornadoes (F0) may damage chimneys and signs, whereas the most violent tornadoes (F5) can blow houses completely off their foundations. Scientists are able to correlate F-scale values roughly using only wind speeds. For instance, a wind speed of 145 km/h (90 mph) might do minor F0 damage to a well-constructed building but significant F2 damage to a poorly constructed building. Scientists estimate that F0 tornadoes may have wind speeds up to 110 km/h (70 mph), while F5 tornadoes may have wind speeds somewhere in the range of 420 to 480 km/h (260 to 300 mph). Despite its drawbacks, the F-scale system is a convenient means for scientists to classify and discuss the intensity of

tornadoes. In 2007, the National Weather Service updated the Fujita scale to the Enhanced Fujita Scale. Table 9 compares the old Fujita Scale and the new Enhanced Fujita Scale.[20]

Table 9[21]: Tornado Fujita Scale

EF-Scale:	Old F-Scale:	Typical Damage:
EF-0 (65-85 mph)	**F0 (65-73 mph)**	**Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.**
EF-1 (86-110 mph)	**F1 (73-112 mph)**	**Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.**
EF-2(111-135 mph)	**F2 (113-157 mph)**	**Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.**
EF-3 (136-165 mph)	**F3 (158-206 mph)**	**Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.**
EF-4 (166-200 mph)	**F4 (207-260 mph)**	**Devastating damage. Whole frame houses Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.**
EF-5 (>200 mph)	**F5 (261-318 mph)**	**Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yd); high-rise buildings have significant structural deformation; incredible phenomena will occur.**

Location

Rhode Island ranks 49th out of 50 states for the occurrence of tornadoes. Rhode Island does not typically experience tornadoes; there is approximately one every four years. The entire town of Scituate can be affected by a tornado.

[20] http://www.spc.noaa.gov/efscale/

[21] http://www.wunderground.com/resources/severe/fujita_scale.asp

History

According to the Rhode Island State Hazard Mitigation Plan, Rhode Island has had ten tornadoes since 1972 with property damages amounting to $3.545 million. There have been no fatalities but 23 injuries were reported.[22] There were reports of four tornadoes as Hurricane Bob came ashore in Rhode Island[23]. A devastating tornado occurred across the border in Worcester, MA in 1953. More than 90 people were killed and over 1,300 injured. Damage estimates were over $52 million. More recently in 2011, an F3 tornado struck Springfield, Massachusetts (60 miles away), killing three people and injuring hundreds.

On August, 7th, 1986, a rare outbreak of seven tornadoes occurred in New England. One such tornado, rated F2 on the Fujita Scale, carved its way through Cranston, RI, and Providence, RI, causing twenty injuries and $2,500,000 in damages. Table 10 highlights tornado events that have affected, Rhode Island.

Table 10: Recent Tornado Events in Providence County, Rhode Island

Date	Magnitude	Injuries	Damage	Location
08/26/85	F1	0	$0	Providence County
08/07/86	F1	0	$250,000	Providence County
08/07/86	F2	20	$2,500,000	Cranston
08/08/86	F1	0	$250,000	Providence County
09/23/89	F0	3	$250,000	Providence County
8/20/97	F0	0	0	Providence County
8/16/00	F0	0	$0	North Foster

Probability of Future Occurrence

Low- The SHMC estimates a less than 25% occurrence of a tornado in their town within the next year.

Extent and Impact

All people are equally vulnerable to tornadoes in Scituate. Road closures from tree debris could isolate some neighborhoods and services may be compromised. However, due to the unpredictability destructive capacity of tornadoes, it is costly to mitigate in a Town that has infrequent tornado activity.

[22] Rhode Island Hazard Mitigation Plan, 2013 http://www.riema.ri.gov/prevention/mitigation/RI%20SHMP%2011-26-2013.pdf

[23] National Weather Service, http://www.erh.noaa.gov/box/hurricane/hurricaneBob.shtml

Extreme Heat

Description

Extreme summer weather is characterized by a sometimes dangerous combination of very high temperatures and exceptionally humid conditions. When such a pattern persists over an extended period of time is known as a heat wave.

The National Weather Service uses a heat index that includes the combined effects of high temperature and humidity when measuring the severity of a heat wave. They also gather and compile information used to estimate the index and then distribute the determined value to the public and the weather broadcasting industry.

The estimation of the heat index is a relationship between dry bulb temperatures (at different humidities) and the skin's resistance to heat and moisture transfer. Because skin resistance is directly related to skin temperature, a relation between ambient temperature and relative humidity versus skin temperature can be determined. If the relative humidity is higher or lower than the base value, then the apparent temperature is higher or lower than the ambient temperature. [24]

Location

Extended periods of hot weather are not localized in Rhode Island. The coast may remain cooler than inland areas but more than one town at a time can be affected by excessive heat. All of Scituate is susceptible to periods of extreme heat.

History

Changing climate conditions may lead to more frequent or extreme heat waves in Rhode Island. While summer temperatures seem to be rising, there is only one NOAA reported case of excessive heat since 1950. On July 22, 2011, a strong upper level ridge brought very hot temperatures to Southern New England. A moist southwest low level flow increased humidity levels such that heat index values rose above 105 degrees for a period of a few hours. A weather station near Smithfield, RI recorded heat indexes of 105 to 107 for over a five hour period.[25]

Probability of Future Occurrence

Medium- The SHMC agrees that extreme heat has a 25-75% chance of occurring each year. The frequency isn't high enough to warrant extensive readiness actions but it is something to be prepared for.

Extent and Impact

Extended periods of high temperature are likely to affect public health and drive up energy costs.

[24] National Weather Service, http://www.srh.noaa.gov/ama/?n=heatindex
[25] NOAA, http://www.ncdc.noaa.gov/stormevents/

Earthquakes

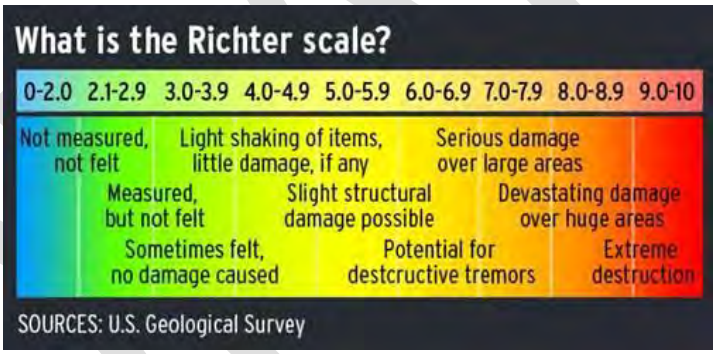
Description

Earthquake frequency, impact, and intensity ratings were derived by examining both historical seismicity and probabilistic seismic hazard maps. In general, the region around Scituate does not suffer from frequent earthquakes; however historical events in New England have been of moderate to high intensity and impact area.

The US Geological Survey (USGS) estimates that there is a 40 to 60 percent chance of experiencing an earthquake of magnitude 6.0 or greater on the Richter Scale in the central or eastern United States within the next 30 years. Buildings that are most at risk from earthquakes are old masonry buildings and large structures.

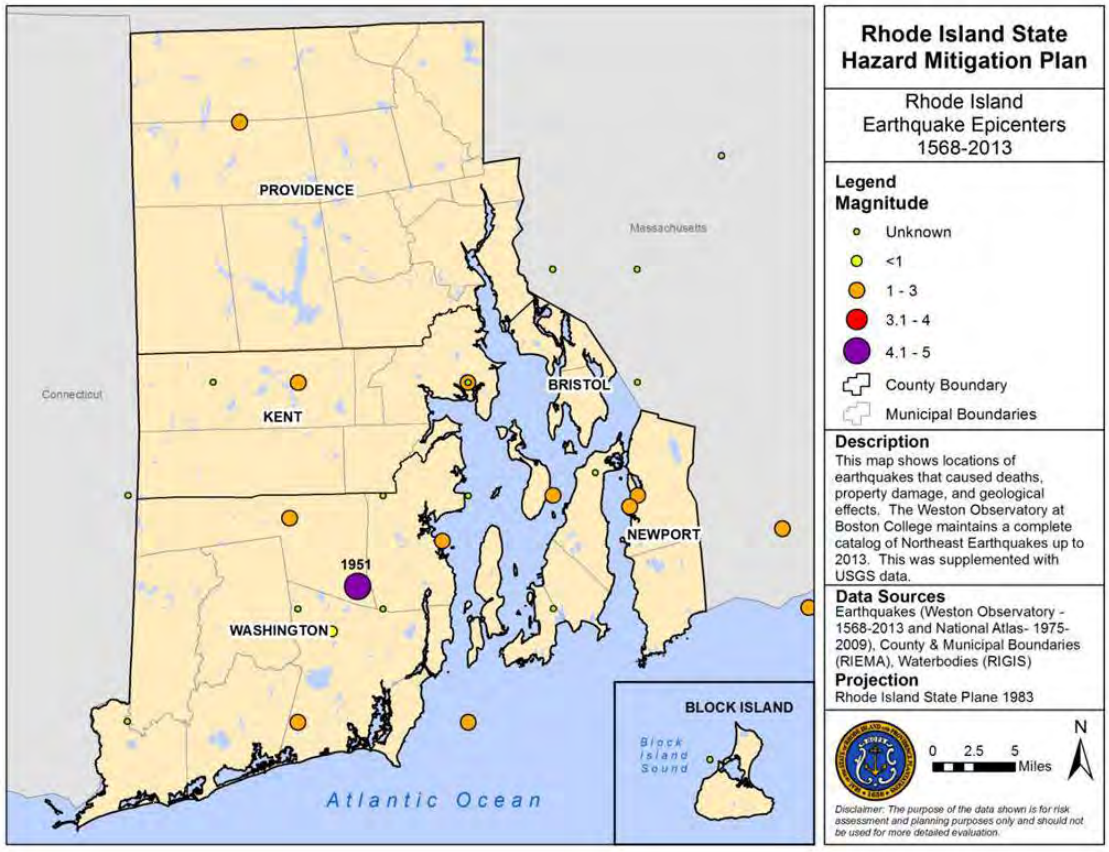
All earthquakes produce both vertical and horizontal ground shaking. This ground movement begins at the focus or hypocenter, deep in the earth, and spreads in all directions. The felt motion is the result of several kinds of seismic vibrations. The magnitude of these vibrations is expressed by a value on the Richter Magnitude Scale.

Richter magnitudes are technical quantitatively based calculations that measure the amplitude of the largest seismic wave recorded. Richter magnitudes are based on a logarithmic scale and are commonly scaled from 1 to 8. The higher the magnitude on the Richter Scale, the more severe the earthquake.



Map 3 was created to show the historic earthquake (since 1700) epicenters in relation to the Town of Scituate and surrounding areas. The map shows that several minor earthquakes and a moderate earthquake have occurred in and around the Town of Scituate and the state of Rhode Island. The entire state of Rhode Island lies within the same earthquake hazard zone.

Map 3: Earthquake epicenters near RI (1568-2013)[26]



Location

The entire Town of Scituate has the potential to be impacted by earthquakes. Table 11 below reflects the magnitude of the significant earthquakes in the region when they happened.

History

The severity of earthquakes to the Town of Scituate is low. Of the three types of earthquakes (subduction zone, Benioff, and crustal), crustal earthquakes are currently thought to present the greatest risk to the Rhode Island. While they tend not to last as long as the other types of earthquakes, the short shock waves associated with them cause more violent ground shaking for the entire region than the other types of earthquakes.

[26] Rhode Island Hazard Mitigation Plan, 2013 http://www.riema.ri.gov/prevention/mitigation/RI%20SHMP%2011-26-2013.pdf and Weston earthquake center.

Table 11: History of Significant Earthquakes Affecting New England – Present[27]

Year	Magnitude	Epicenter Location
1766	Unknown	Newport
1849	Unknown	RI
1849	Unknown	Newport
1876	Unknown	Newport
1883	Unknown	Newport
1888	Unknown	Fall River, MA
1925	Unknown	Fall River, MA
1925	Unknown	Wareham/Taunton, MA
1926	Unknown	Voluntown, CT
1940	Unknown	Block Island
1948	Unknown	Westerly
1949	Unknown	N Kingstown
1951	4.6	Kingstown RI
1956	Unknown	Swansea, MA
1962	Unknown	East Greenwich
1965	2.6	Warwick
1967	3	Narragansett Bay
1974	2.5	West Warwick
1976	1.8	Portsmouth
1976	2.9	Portsmouth
1976	2.7	New Bedford, MA
1978	2.8	RI Sound
1978	1.7	Block Island Sound
1978	1.9	South of Dartmouth, MA
1981	2.7	Portsmouth
1982	1.8	West of Providence
1983	2.2	NW of Newport
1983	1.8	SW of New Bedford, MA
1989	Unknown	Island Park
2001	Unknown	East Greenwich
2005	Unknown	Newport
2007	Unknown	RI

Probability of Future Occurrence

Low- There is very little earthquake activity in Scituate yet the probability is enough for the SHMC to include it in this plan. The Committee agreed that there is a less than 25% chance of a significant earthquake to occur in Scituate within the year.

Extent and Impact

When earthquakes occur, much of the damage is a result of structures falling under the stress created by the earth's movement. Local topography and soil type also affects earthquake severity. Steep slopes composed of loose material may produce large landslides during an earthquake. The type of construction also affects the risks of damages to a property. For these reasons, earthquake hazards are highly localized and difficult to assign regional earthquake boundaries that share the same relative degree of hazard.

Impacts from earthquakes can be severe and cause significant damage. Ground shaking can lead to the collapse of buildings and bridges and disruption of gas and electric lines, phone service, and other critical utilities. Death,

[27] Rhode Island Hazard Mitigation Plan, 2013 http://www.riema.ri.gov/prevention/mitigation/RI%20SHMP%2011-26-2013.pdf

injuries, and extensive property damage are possible vulnerabilities from earthquakes. Some secondary hazards caused by earthquakes may include fire, hazardous material release, landslides, flash flooding, avalanches, tsunamis, and dam failure. (RI 2014 State Hazard Mitigation Plan)

Drought

Description

Drought is a gradual phenomenon that occurs slowly, over a multi-year period. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response. Due to its coastal location in a temperate climate, Rhode Island rarely experiences extended periods of drought. However, seasonal droughts have occurred when precipitation levels are low. Drought conditions can impact crops, water available for fire suppression, and reservoir levels.

Location

Drought season, like wildfire season for Rhode Island is typically early July to September or October, when the weather is the driest. The greatest risk is in the northern part of the state, which has a drier climate than southern Rhode Island. All of Scituate is susceptible to drought conditions.

History

Two drought events have occurred throughout Rhode Island since 1993, both in the Spring/Summer of 2012. A meteorological drought was documented by precipitation that had been approximately one half of normal from January 2012 through April 2012. Rivers and streams were most affected as most ran at record low levels during the spring run-off season. However, Rhode Island did not issue drought declarations as reservoirs were at normal levels, due to above normal precipitation falling between August 2011 and November 2011.

Probability of Future Occurrence

Low- The SHMC anticipates a less than 25% chance of extended drought conditions within the next year.

Extent and Impact

In Scituate, extended drought may reduce the availability of water in the private drinking water wells as well as increase the fire risk.

Past drought events in Rhode Island have affected the entire state. It is generally not an issue that is handled at the local level although the Town can enforce particular water bans as dictated by the State. Due to the broad nature of droughts, the Town of Scituate does not have specific mitigation actions. For specific statewide mitigation efforts, refer to the current Rhode Island State Hazard Mitigation Plan located online at: http://www.riema.ri.gov/prevention/mitigation/index.php.

Wildfire

Description

A wildfire is a natural or human caused uncontrolled burning of vegetative fuel such as grasslands, trees, or woodland. There are many causes of wildfire, from naturally-caused lightning fires to human-caused fires linked to activities such as smoking, campfires, equipment use, and arson. There are three major factors that sustain wildfires and predict a given area's potential to burn. These factors are fuel, topography and weather.

The following conditions, particularly when combined, can increase the potential for wildfire to occur:

- High temperatures
- Low humidity
- High winds
- Drought
- Lightning

Wind is the most treacherous weather factor. The greater the wind, the faster a fire will spread and the more intense it will be. In addition to wind speed, wind shifts can occur suddenly due to temperature changes or the interaction of wind with topographical features such as slopes or steep hillsides. Drought conditions also contribute to concerns about wildfire vulnerability. During periods of drought, the threat of wildfire increases.

Once a wildfire has been detected and the area assessed, the wildfire is assigned one of the following categories from lowest to highest: category 1 (incipient- initial), category 2 (growing and threatening), category 3 (major aggressive fires), category 4 (major aggressive fire of at least 5,000 acres expanding at 400 acres per hour), or category 5 (major very aggressive fire of at least 16,000 acres expanding at 1000 acres per hour or more). These categories may change as the wildfire continues to burn.

Location

Most of Scituate's land area is forested making the entire town susceptible to the low risk of wildfires.

History

There is no reported history of notable wildfires in Scituate or Providence County. There have only been small brushfires and low burn events.

Probability of Future Occurrence

Low- The mostly forested area and temperate climate make Scituate vulnerable to wildfires. However, the region rarely has the kind of excessive drought conditions that dry out the forests. This reduces Scituate's risk of large wildfires breaking out.

Extent and Impact

The brushfires that have occurred have been low to the ground so impacts have been few. The Providence Water Supply Board (PWSB) has been working with the Town to create access roads into the land surrounding the reservoir to aid in firefighting efforts.

3.3 Vulnerability

Vulnerability indicates what resources, structures, and populations, are likely to be damaged by the identified hazards and how severe that damage could be. This section focuses on Scituate's vulnerable areas in regards to the identified hazards, what is at risk (structures, population, natural resources) and what the impacts will be (loss of life, environmental damage, inconvenience to residents.) The Community Assets Matrix located below summarizes the major vulnerable areas in Scituate.

The consultant worked with the Town of Scituate to create maps for the Town of Scituate 2016 Hazard Mitigation Plan. The maps portray the community facilities, sewer infrastructure, and flood zones. See Map 4.

COMMUNITY ASSETS MATRIX **SCITUATE HAZARD MITIGATION PLAN 2016**

AT RISK	LOCATION	HAZARD	PROBLEM	ACTIONS	BENEFITS
I. Flood Prone Drainage Systems	A. Route 115 (Jackson Flat Road) in Hope Village B. Hope Avenue (Main Street) in Hope Village C. Route 6 (Hartford Ave.) and Village Plaza Way D. Hope Ring Rock Acres (Bunny Trail to Locust Grove) E. Frosty Valley (Robinwood Drive) F. Dexter Road G. Howard Avenue/Hope Furnace Road H. St. Mary's Road/ Danielson Pike I. Darby Road/Danielson Pike	Riverine flooding, development has reduced drainage area	Flooding of local roads limit access and may strand residents.	Drainage (1a, 1b, 1c), Create open space (2).	Improves floodplain function, reduces infrastructure losses.
II. Dams	A. Gainer/Kent Dam B. Hope Mill Dam C. Moswansicut Dam D. Barden Reservoir Dam E. Burton Pond Dam F. Potterville Pond Dam G. Potter Pond Dam H. Abner's Pond Dam I. Peabody Reservoir (lower) Dam J. Jordan Pond Dam K. Peeptoad Pond Dam L. Brush Meadow Pond Dam M. Horseshoe Dam N. Pine Swamp Reservoir Dam #1 O. Pine Swamp Reservoir Dam #2 P. Duck Pond Dam Q. Mathewson Dam R. Kings Pond Dam S. Peck Farm Pond Dam T. Keebler Pond Dam U. Curran Lower Reservoir (Hope Road) in Cranston?	Flooding related to heavy rain events and structural damage due to earthquake. Deterioration due to lack of ongoing maintenance.	Extreme rain and earth quake events have the potential to cause structural failure resulting in catastrophic flooding. Potential damages from failure of the Gainer dam… [see PWSB inundation report].	Enforce dam management (3).	Reduces risk to lives and property.
III. Care Facilities	Rockland Oaks (Low Income Housing), 104 Rockland Road 7 Cooke Drive (Mental Needs) Scenic Hill Group Home, 4 Testa Circle Scituate Commons, 29 Institute Lane Scituate Senior Center (day programs only), 1315 Chopmist Road	Special needs populations that may need assistance during hazard events.	Unsure if these facilities have adequate supplies to shelter in place for extended periods of time. May need advanced or assistance with evacuation.	Promote heating and cooling centers at senior center and senior living centers (4).	Care facilities for welfare improvement of special needs populations

AT RISK	LOCATION	HAZARD	PROBLEM	ACTIONS	BENEFITS
IV. Critical Municipal Hazard Response Facilities	**Municipal Offices** Scituate Town Hall - 195 Danielson Pike **Shelters** Chopmist Hill Fire Department Potterville Fire Department Former Chopmist Hill Inn **American Red Cross Approved Shelters** none **Emergency Response** North Scituate Fire Department Hope-Jackson Fire Department Potterville Fire Department Chopmist Hill Fire Department Scituate Ambulance & Rescue Corps Scituate Police Department Department of Public Works RI State Police- 311 Danielson Pike Rhode Island Urban Search and Rescue (USAR)- 279 Danielson Pike	Depended upon for responding to all natural hazard events.	Potential loss of physical access, power supply and critical systems, thus hindering the governmental response to natural hazard events. Scituate's communication facilities are located at the police station. [Public works heavy equipment?] The emergency shelters are critical in protecting the lives of Scituate residents. Check water quality of wells at critical facilities to support sheltering during a hazardous event.	Require that all re-built or new critical facilities be located outside flood-prone areas (5). Relocate police station outside the SFHA (5a). Update Town communication system (6). Install lightning protection devices on critical facilities (7). Install surge protection on critical electronic equipment (8). Install transfer switches on all critical facilities (9). Develop zoning ordinance to require pharmacies to have generator hook-ups (9a). Retrofit fire and police station doors and windows to withstand hurricane force winds (10). Evaluate and if necessary, improve well supply to sheltering facilities (11). Increase or improve supply of well water to shelter facilities (11a). Increase shelter capabilities in Hope and Potterville areas (12). Floodproof Town Hall to protect records (13).	Protection of essential public services, records, evacuation routes, and the general livelihood of Scituate's residents and their property.
V. Electrical Facilities	General Transmission Lines Chopmist Hill Substation Hope Furnace Sub Station	High winds, ice damage, and earthquakes	High winds and ice damage resulting in falling objects breaking transmission lines and damaging substations.	Install surge protection on critical electronic equipment (8).	Provision of essential utility service, reduction in cleanup and repair costs, and the promotion of public health, safety, and welfare.
VI. State Concerns	State Police Barracks/E911 [located under critical response facilities] Rhode Island Urban Search and Rescue (USAR) [located under critical response facilities]	High winds, flooding	Loss of dispatch communication during a high wind or loss of access during a flood.	State Concern	Statewide emergency response.
VII. Water	Providence Water Safety Board owns land surrounding Scituate Reservoir Hope Village serviced by Kent County Water	Dam failure	Decrease in available potable water, and water available for firefighting. Effects would be felt statewide.	Enforce dam management (3).	Safe and abundant drinking water.
VIII. Recreational Facilities	Tasca Field Hope Park	Flooding, Lightning	Recreational areas tend to draw large groups of people and families with small children. Flooding or lightning may come on quickly, stranding people or putting them in harm's way.	Storm safety message on Town's Recreation Department's website and signage at the field (14).	Reducing risk to residents.

AT RISK	LOCATION	HAZARD	PROBLEM	ACTIONS	BENEFITS
IX. Historic Resources	**National Historic Districts** (all have a portion in the SFHA) A. Andres-Luther Farm, Elmadale Rd. B. North Scituate Village Historic District C. Clayville Historic District D. McGonagle Site, Hartford Pike **National Historic Sites** (none in SFHA) A. Battey-Barden H.S. B. Dexter Arnold Farmstead, Chopmist Hill Rd. C. Amos Cooke H.S. D. Double L Site, Hartford Pike E. Moswanicutt Pond Site, Hartford Pike F. Millrace Site G. Old Congressional Church H. Smithville Seminary/Lapham Institute **Other Historical Sites** Old School House next to Town DPW Grange Former Potterville School (on Old Plainfield Pike) Former Clayville School; Community House Clayville Post Office	Flooding from heavy rain, high winds, ice damage, and earthquake	These historic resources, susceptible to property damage, contribute to Scituate's culture, heritage, and general character.	Compile a list of historic preservation grants to help with pre-disaster mitigation and post-disaster recovery (15). Enact or amplify local regulatory measures to encourage preservation by purchasing property development rights (16).	Protecting irreplaceable property that contributes to Scituate's culture, heritage, and general character.
X. Forested Areas	A. Area around the Scituate Reservoir B. Most of the Town	Brushfire, lightning	Most of the land area of Scituate is forested. There needs to be a better coordinated effort with the entities that own the forested land to reduce fire risk.	Exchange maps between Providence Water Supply Board (PWSB) and Scituate Fire and Police Departments (17). Educate residents about removing dead trees (18).	Enhance fire protection and response. Improve forest health and reduce fire risk

N

Town of Scituate

DOUBLE L SITE

MILLRACE SITE

MOSWANSICUTT POND SITE

OLD CONGREGATIONAL CHURCH

North Scituate Elementary School

SMITHVILLE SEMINARY / LAPHAM INSTITUTE

Scituate High School

Scituate Middle School

DEXTER ARNOLD FARMSTEAD

AMOS COOKE HS.

BATTEY-BARDEN HS.

Clayville Elementary School

Hope Elementary School

Legend

- Town Hall
- Police
- Fire/Rescue
- Schools
- Dams
- SFHA Structures
- Historic Places
- Historic Districts
- Special Flood Hazard Area
- Town Boundary

0 1 2 Miles

CDR MAGUIRE

Map 4: Critical Infrastructure

3.3.1 Community Assets

People

Scituate is not a heavily populated town. There were 10,329 Scituate residents reported in the 2013 U.S. Census. The following are some basic demographics for the town[28].

- 33% between the ages of 35 and 54
- 16% are 65 and over (1,670)
- 98.6% speak English "very well"
- Average household income is $92,396
- 83% of the housing stock are single family, detached homes (3,539)
- 20.8% of the homes are built before 1939
- Average value of homes is $307,900

Currently, there are two designated emergency shelters in Scituate. The town is cooperating with the local chapter of the American Red Cross to have its designated shelters approved. The town is able to provide shelter for 100 individuals in the event of a natural disaster. Historically, there has only been one natural hazard event (a flood below the Gainer Memorial Dam) in Scituate that resulted in a small portion of the population being evacuated. Approximately 100 people were displaced for two days. Typically, only 25% of an evacuated population will seek public shelter[29], the remainder will make their own arrangements staying with friends or relatives.

Economy

By design strict zoning regulations, limit on the number of businesses that can operate in Scituate. Approximately 88% of Scituate's revenue is generated from property tax (59% from residential and 29% from PWSB and commercial). Should any of the properties forming the tax base be destroyed by a hazardous event, a causal effect would be those property owners whose parcels remain intact would carry and increased financial burden with regards to property taxes. It is an important course of action for the town to protect both lives and property from natural disasters. However, as Scituate's population grows, the burden of protecting lives and property grows.

FEMA has developed software, HAZUS-MH, for estimating the potential losses to natural disasters. The HAZUS-MH was used to estimate losses should the 1938 Hurricane hit today. Since Scituate is mainly a residential community, the economic losses (lost jobs, business interruptions, and repair and reconstruction costs) were estimated at $18 million. Capital losses (costs for building repair, replacement, and contents losses, and building inventory losses were estimated at $17 million. Losses due to business interruption were estimated at $1 million.[30]

[28] American Fact Finder, U.S. Census 2013 http://factfinder.census.gov

[29] *American Red Cross Disaster Services Regulations and Procedures*, Mass Care Preparedness and Operations, ARC 3031

[30] HAZUS modeling conducted by CDR Maguire on 8/12/2014 using HAZUS-MH 2.1

Built Environment

According to HAZUS-MH, Scituate has 4,009 residential buildings, 194, commercial, and 125 classified as other. If the 1938 Hurricane were to occur today with peak wind gusts of 106 mph, the value of all properties susceptible to hurricane damage would be $875 million.

The SHMC identified the critical infrastructure in the Community Assets Matrix. The list includes: dams (21), Care Facilities (4), low income housing (1), town hall, shelters (3), municipal hazard response facilities (9), state hazard response facilities (2), electrical facilities (2), recreational facilities (2), and historic resources (16). All of these important community resources have the potential to be affected by a natural hazard. The magnitude of the losses would be dependent upon the type, location, and extent of the hazard.

The town's zoning laws help dictate future development while maintaining Scituate's rural character. Strict enforcement of building codes and new regulations as required will lessen potential damage caused by a natural hazard event. The codes range from building codes and design standards, to zoning regulations. For the purpose of this plan, it is difficult to ascertain the amount of damage caused by a natural hazard because the damage will depend on the hazard's extent, location, and severity, making each hazard event somewhat unique.

The 100-year flood (base flood) is an event that has a one-percent probability of happening in any given year and is the storm event used to identify the flood zones which impact zoning and building requirements throughout the Town.

FEMA lists 30 properties in Scituate that are insured by the National Flood Insurance Program (NFIP) with a total value of $6,964,500. There are 39 structures in Scituate's Special Flood Hazard Area. Only 3 of the 39 have flood insurance coverage. Since 1979, there have been 30 flood claims resulting in a total payment of $555,951. There are a total of 5 repetitive loss properties in Scituate, two of which have been mitigated.

Using building structure values from September 2014, the following table represents the potential loss estimates of structures in the Special Flood Hazard Area.

Flood Zone	Sum Building Values
A	$55,884,600
AE	$11,725,000

In addition to flood hazards, buildings in Scituate are also at risk from wind. Wind events are generally normal for Rhode Island and regularly occur each year. Winter storms and Nor'easters cause high winds in the winter months and severe thunderstorms are prevalent in the spring and summer seasons. Tropical events or hurricanes provide high winds in late summer and fall. Most damage that occurs to property from this hazard is due mainly to fallen trees and limbs.

HAZUS-MH was used to estimate current building losses if the 1938 hurricane were to hit Rhode Island today. With peak wind gusts of 106 mph, the storm would cause damage to 800 residential buildings and 30 commercial buildings, most of the damage being minor (no structural failure, or roof sheathing failure).

Natural Environment

Nearly three quarters (73%) of the land in Scituate is forested. Preservation of the forested areas in Scituate is important not only for maintaining community character and providing habitat for wildlife, but also for water quality. Undeveloped land absorbs water and traps sediments and pollutants from runoff. Most of the land immediately surrounding the reservoir is undeveloped and owned by the Providence Water Supply Board. By keeping large areas around the reservoir undeveloped, fewer stormwater pollutants are entering the water supply and flood levels are managed naturally.

The natural environment is relatively resilient in Scituate but a widespread forest fire, flood, an ice storm, or strong winds could damage the forest environment. This would be devastating but not necessarily economically damaging to Scituate. Providence Water, which owns most of the land surrounding the reservoir, does regular thinning of the pine forests to increase resiliency. A pine stand with trees all the same age can be wiped out in a single hurricane event. However, a forest with trees of different ages has a better chance of regrowth after damaging winds.

HAZUS-MH was again used to estimate the amount of debris that would be generated in Scituate should the 1938 Hurricane hit today. Of the 38,651 tons of debris, 96% of it (36,962 tons) would be tree debris. The remaining 4% of debris would be other materials such as brick and wood. The Town does not currently have a debris management plan.

Section 4: Capability Assessment

The Town Scituate has initiated studies and activities over the years that have laid the foundation for the development of this mitigation strategy. This capability assessment examines the existing studies, plans, programs, and policies that have incorporated hazard mitigation and other pro-active tools into the Town system. The purpose of the capability assessment is to highlight successes, identify shortcomings, and to lay the groundwork for possible improvement. Scituate recognizes that the inclusion of mitigation initiatives would not only benefit the community by reducing human suffering, damages and the costs of recovery, but would also help build and maintain the sustainability and economic health of the Town. Mitigation planning elements will be incorporated as necessary during the regular updates or as required. The following details the Town's existing plans, ongoing programs, and policies.

REGULATIONS & PLANS

The Town of Scituate enforces **Rhode Island State Building Code** which incorporates the International Building Code (IBC). The IBC provides comprehensive construction requirements designed to mitigate the impacts from natural hazards, such as high wind events. The 2010 RISBC also requires one foot of freeboard for all new and substantially improved construction in the floodplain. The Code is enforced by the Scituate Building Department and provides an additional layer of regulatory control to those discussed above.

Scituate has adopted the **RI Fire Safety Codes** to safeguard life and property from the hazards of fire and explosives in accordance with safe practice. The Code is enforced by the Scituate Fire Department and provides reasonable minimum requirements for fore prevention and protection.

The Town of Scituate participates in the **State Dam Safety Program** because 1 of the of 28 high hazard dams within the State are in Scituate. The State Dam Safety Program was created to facilitate the enforcement of the primary dam inspection law (RIGL 46-19, Inspection of Dams and Reservoirs). RIGL 46-19 states that dam owners are responsible for the safe operation, maintenance, repair, and rehabilitation of a dam, which are the essential elements in preventing dam failure; furthermore, dam owners are liable for the consequences of accidents or failures of their dams. According to the State of Rhode Island 2014 Dam Safety Program Report, the following have been identified as program limitations: unclear ownership of numerous high hazard dams, construction of buildings within inundation areas below dams, lack of funding to repair of remove privately owned dams, inadequate spillway capacities and engineering analyses, lack of Emergency Action Plans across the state, inadequate staffing, increase in rainstorm intensities.

The Town of Scituate has a close working relationship with Providence Water Supply Board (PWSB) which controls the Scituate Reservoir and owns most of the land immediately adjacent to it. PWSB has a Gainer Memorial **Dam Emergency Action Plan** that outlines the chain of command and operations to follow during a dam breach. This includes inundation maps for the State, should the dam fail. There are also Emergency Action Plans on file with the State for all the other dams in Scituate.

In 1995, the Town developed its first Comprehensive Plan under the Comprehensive Planning and Land Use Act of 1990. **The 2004 Comprehensive Plan** (update in progress) outlines goals, policies, issues, and actions to provide a framework for future decision making. It also addresses increased development pressures, economic

development, open space, recreation, and public services and facilities. The Town of Scituate and the SHMC recognize that by incorporating mitigation initiatives (both pre-disaster and post-disaster) into the Comprehensive Plan it would not only benefit the community by reducing human suffering, damages and the cost of recovery, but would also assist in building and maintaining the economic health of the town. Hazard mitigation identification and activities are expected to be incorporated into the updated Comprehensive Plan update that is currently under way as per State recommendations.

The Town of Scituate's **Emergency Operation Plan (EOP)**, a local planning document designed for preparing for, responding to, and recovering from a disaster, is currently being updated. The EOP and the Hazard Mitigation Plan support each other through mutual disaster planning efforts. This plan is reviewed and updated every few years to include changes in policy, new information, or changes in hazard threats.

The Town's **Zoning Ordinance** promotes orderly growth and development which recognizes the unique or valuable natural resources and features; and to shape and balance urban and rural development. Section 9 of the Zoning Ordinance discusses floodplain district requirements. As mentioned later in the mitigation actions, it may be prudent to require that all re-built or new critical facilities including the emergency operations center (EOC), police station, and fire departments be located outside of flood-prone areas. This should be implemented through an ordinance (crated by the Building Official) that will be brought to the Town Council for approval..

The **Land Development and Subdivision Regulations,** approved by the Town Council, promote safety from fire, flood, and other hazards or damages.

Participation in the National Flood Insurance Program (**NFIP**) enables Scituate residents to purchase flood insurance to protect their property against flood losses. The local NFIP Coordinator (Building/Engineering Official) is available for floodplain management questions and compliance.

Since the local hazard mitigation committee met in 2014, Town officials have implemented a **CodeRed** warning program throughout the town. This newer, web-based system delivers email blasts and reverse 911 calls only to those in immediate danger. Those with the advanced warning are able to make smarter choices about their safety and possible evacuation.

Scituate's Highway Department has a draft **Highway Storm Emergency Policy** which outlines weather notifications, pre-storm safety and assignments, and debris clean-up. Needs to be finalized.

The Scituate Public Works, in conjunction with National Grid, engage in an ongoing **tree-trimming program** which reduces the probability of downed utility lines, and reduces storm debris.

The Town's Public Works Department is responsible for **regular sanding of the roads** and **local plowing** during snow events. The department also does **street sweeping** from March through June with their Town-owned Elgin sweeper. **Catch basins are cleaned and inspected** as needed due to time and staff availability. The Town owns a Vacall truck used for catch basin cleaning.

ADDITIONAL PROGRAMS AND DEPARTMENTS

The Town maintains an **Emergency Management Director**. The Town Council President is responsible for declaring emergencies and is the final authority for all emergency management decisions.

The Scituate **Building/Engineering Official** reviews development plans, investigates Public Works complaints such as drainage, sewers, traffic, etc. The Building/Engineering Official is also responsible for GIS data and mapping. This hazard mitigation plan will help prioritize public improvement projects and provide maps highlighting vulnerable areas.

Between the time the committee met in late 2014, and again in early 2016, the Emergency Management department has established a **CERT program** with 18 active volunteers. These volunteers have been exercised/trained in radio communications, safety, patrols, and search and rescue. This team has even been invited to co-lead an upcoming State exercise which is a huge honor for a small community.

In the past year, the Town has also purchased a new **emergency response trailer** which acts as a mobile command center.

The Town of Scituate maintains **web-based GIS maps** and online property information for public use. http://www.mainstreetmaps.com/ri/scituate/public.asp. These maps include parcel information, paved areas, FEMA flood zones, hydrants, structures, soils, and land use.

Police and Fire Departments in Scituate ensure the safety and wellbeing of town citizens. As part of the hazard mitigation planning committee, members of the police and fire department can suggest actions that can improve disaster response. They can also use this plan as guidance when applying for grant funding. The Police Department has recently been awarded a grant to purchase a backup generator to supply electricity to the building in the event of a power loss.

The **Scituate Town Council** is comprised of 7 members. These elected members are the governing body by which new plans and policies but be adopted. They take a holistic view of the Town's operations when formulating policies and exercising town powers. Educating the Town Council members about the importance of hazard mitigation is not only beneficial for the Town's resiliency but also facilitates plan adoption.

Through a closely coordinated effort among many different departments, personnel, and vendors, the Town hosts the **Scituate Art Festival** every October. This event, which shuts down part of Route 6, draws 150,000 people to the area over the 3 day period.

Section 5: Mitigation Strategy

5.1 Goals

The goals of the proposed actions are to reduce or eliminate long-term risk to people and their property from the effects of natural hazards (i.e. floods, hurricanes, snow storms, severe wind storms, etc.).

Preventative measures can significantly reduce the cost of post-disaster clean-up. In addition, mitigation actions conducted before hazards occur greatly reduces the impact and costs associated with the aftermath of a natural hazard. By planning ahead, the Town of Scituate will minimize economic and social disruption that can result from natural hazards (the loss or interruption of jobs and the loss of businesses).

5.2 Methodology

Based on the identified hazards and vulnerable area priorities, the SHMC has recommended mitigation actions for the Town of Scituate. Since this is a new hazard mitigation plan, all actions are new and there are no previous actions to review. The purpose of these recommendations is to minimize social and economic loss that result from natural hazard events. It is intended that the actions will assist the town in making proper needs and budget decisions and assigning departmental responsibility concerning specific mitigation projects. The actions also serve as objectives for town government and the SHMC to:

- Review and strengthen existing emergency plans
- Revise the town's comprehensive plan
- Incorporate hazard mitigation actions into the new construction plan review process
- Enforce building and fire codes
- Implement public education/outreach programs for hazard mitigation
- Develop post-disaster recovery strategies

The recommended actions are listed based on multiple discussions among SHMC members, the critical infrastructure, and how susceptible the committee feels the Town is to a particular hazard event. The Town of Scituate is continually implementing projects to improve their town and the lives of their residents. The proposed mitigation actions are not dependent on the approval and adoption of this hazard mitigation plan. An approved and adopted plan does however, qualify the town to receive FEMA funding for some of the projects.

Since this is a new plan for Scituate, there are necessary planning elements that need to be completed before additional mitigation actions can be considered. The SHPC has identified a range of actions below, some of which are planning. However, there is a mitigation action identified for each vulnerable area where applicable.

To assist the Town of Scituate with implementation of the recommendations, the following actions suggest who will implement, when it will occur, that resources are available, and the vulnerable area it addresses. The vulnerable areas, as listed in the Community Assets Matrix are:

- Flood Prone Drainage Systems
- Dams

- Care Facilities
- Critical Municipal Hazard Response Facilities
- Sewerage Treatment Facilities
- Electrical Facilities
- State Concerns
- Providence Water
- Recreational Facilities
- Historic Resources

The action priority levels are identified as such:

High = of critical importance for the town to become more disaster resilient
Medium = actions that are important to pursue as money becomes available
Low = projects for when time and money are available

The time frame for the completion of each action is identified as short, medium, and long-term. The ranges provided are measured from the plan adoption date but are non-binding.
Short-term = 0-6 months
Medium-term = 6-18 months
Long-term = 18 months to 5 years

5.3 Mitigation Actions Listed by Vulnerable Entity (Structure, Area, Population)

The following list of actions address each identified vulnerability. While some hazards such as earthquakes, and tornadoes are profiled in Section 3, their occurrence and potential damage is low. Therefore the Committee decided to develop actions that met their most vulnerable populations/areas. These areas are subject to change during each plan update.

Flood Prone Drainage Systems and Streets

There are certain areas of Scituate that are prone to street flooding during heavy rain events (Route 115, Hope Avenue, Route 6 at Village Plaza Way, Hope Ring Rock, Frosty Valley, Dexter Road, Howard avenue, St. Mary's Road, Darby Road). Although the problem is known, solutions have not been identified for these portions or roads or neighborhoods.

Action 1: Increase drainage or absorption capacities with detention and retention basins, debris removal, extra/wider culverts, or grassy swales along roadsides.

1a) Perform a drainage study on the areas of concern (see Community Assets Matrix)

Action Type: Planning
Pre or Post Disaster: Pre Disaster
Priority Level: High
Lead: Scituate Public Works Department
Supporting: Scituate Town Engineer
Estimate Costs: Upwards of $50,000
Financing Options: FEMA Hazard Mitigation Assistance grants

Time Frame: Medium-term

1b) Identify the appropriate improvement method following completed drainage study.

Action Type: Planning
Pre or Post Disaster: Pre Disaster
Priority Level: High
Lead: Scituate Public Works Department
Supporting: Scituate Town Engineer
Estimate Costs: Part of the drainage study above
Financing Options: Part of the drainage study above
Time Frame: Medium-term

1c) Construct appropriate drainage projects which reduce road flooding

Action Type: Mitigation
Pre or Post Disaster: Pre Disaster
Priority Level: High
Lead: Scituate Public Works Department
Supporting: Scituate Town Engineer
Estimate Costs: Dependent upon approved design
Financing Options: Town budget, FEMA Hazard Mitigation Assistance grants
Time Frame: Long-term, maybe not within this plan period

Action 2: Purchase property on 171 Dexter Lane that has been flooded out repeatedly. Require that the land be kept as public, undeveloped, open space.

Action Type: Mitigation
Pre or Post Disaster: Pre Disaster
Priority Level: Medium
Lead: Scituate Public Works Department
Supporting: Scituate Town Engineer
Estimate Costs: $175,000 for purchase price, environmental, legal, demolition fees, and staff time
Financing Options: Town budget, FEMA Hazard Mitigation Assistance grants
Time Frame: Long-term, maybe not within this plan period

Dams

There are 19 dams in Scituate, the largest of which is the Gainer Memorial Dam. The Providence Water Supply Board has disaster response plans but the Town and SHMC have proposed an additional pre-disaster mitigation action as well as a public warning system.

Action 3: Implement a maintenance and enforcement program to help ensure continued structural integrity of local, privately owned dams. Identify which dam owners have filed dam safety plans with the State. Rhode Island Department of Environmental Management has classified dams by their hazard class but the individual dam conditions are unknown. This action may lead to structural projects in the future but right now, this assessment is a preventative action.

Smaller dam west of the Scituate Reservoir

Action Type: Planning
Pre or Post Disaster: Pre Disaster
Priority Level: High
Lead: Scituate Public Works Department
Supporting: Providence Water Supply Board
Estimate Costs: $2,500-$3,500 per dam
Financing Options: Town budget
Time Frame: Medium-term

Care Facilities

Action 4: Conduct outreach to vulnerable populations (homebound or elderly), including establishing and promoting accessible heating and cooling centers in the community (senior center, library, high school). Information to be posted on the new emergency management website and presentations and leaflets to be distributed at senior centers and senior living centers.

Action Type: Mitigation
Pre or Post Disaster: Pre Disaster
Priority Level: Low
Lead: Scituate Emergency Management Director
Supporting:
Estimate Costs: $2,000
Financing Options: Town budget (Senior Services)
Time Frame: Medium-term

Critical Municipal Facilities

Action 5: Require that all re-built or new critical facilities including the emergency management center (EOC), police station, and fire departments be located outside of flood-prone areas. This will be implemented through an ordinance that will be brought to the Town Council.

Action Type: Planning
Pre or Post Disaster: Pre Disaster
Priority Level: High
Lead: Scituate Building Official, Town Council

Supporting: Scituate Emergency Management Director
Estimate Costs: Staff time
Financing Options: Town budget (Emergency Management)
Time Frame: Short-term

Action 5a: Relocate the Police Station to a building that is outside the Special Flood Hazard Area. The current location at 116 Main Street is adjacent to a flood zone. The building holds the Town's main communication equipment.

Action Type: Mitigation
Pre or Post Disaster: Pre Disaster
Priority Level: High
Lead: Scituate Police Chief
Supporting: Scituate Police Chief, Building Official, Emergency Management Director
Estimate Costs: Depends if the Town builds a new structure or re-purposes an existing one.
Financing Options: FEMA Preparedness grant, FEMA Hazard Mitigation Assistance grant, Town budget (Emergency Management)
Time Frame: Long-term

Action 6: Update the communication system (dispatch center, CAD, support equipment) which is 16 years old and not compatible with other systems. Currently the Town Communication Center is in the same building as the Police Department. So until the building is improved/relocated, the communication upgrade will have to wait.

Action Type: Mitigation
Pre or Post Disaster: Pre Disaster
Priority Level: High
Lead: Scituate Police Chief
Supporting: Scituate Police Chief, Building Official, Emergency Management Director
Estimate Costs: Unavailable at this time
Financing Options: FEMA Preparedness grant, FEMA Hazard Mitigation Assistance grant, Town budget (Emergency Management and Police Department)
Time Frame: Long-term

Action 7: Install lightning protection devices and methods such as lightning rods and grounding, on critical facilities (Police and Fire stations, shelters, Public Works, Town Hall). The Town Hall and the police station have been struck by lightning in the past. Proper protection will reduce the risk of fire and power outages from lightning.

Action Type: Mitigation
Pre or Post Disaster: Pre Disaster
Priority Level: Medium
Lead: Scituate Emergency Management Director
Supporting:
Estimate Costs: $3,000 per system
Financing Options: FEMA Preparedness grant, FEMA Hazard Mitigation Assistance grant, Town budget (Emergency Management)

Time Frame: Medium-term

Action 8: Install and maintain surge protection on critical electronic equipment. This could be a very simple and low-cost way to reduce electrical damage to computers and systems that are used by first responders.

Action Type: Mitigation
Pre or Post Disaster: Pre Disaster
Priority Level: High
Lead: Scituate Emergency Management Director
Supporting: none
Estimate Costs: $40 per unit x 100 installations
Financing Options: FEMA Preparedness grant, Town budget (Emergency Management)
Time Frame: Medium-term

Action 9: Install transfer switches on all critical facilities to allow for trailer mounted generators in the event of a storm that knocks out power.

Action Type: Mitigation
Pre or Post Disaster: Pre Disaster
Priority Level: High
Lead: Scituate Emergency Management Director
Supporting: none
Estimate Costs: $20,000 per site
Financing Options: FEMA Hazard Mitigation grant, Town budget (Emergency Management)
Time Frame: Long-term

Action 9a: Develop zoning ordinance to require major pharmacies in Scituate to have external generator hook-up capabilities. During an extended period of power outages, maintaining basic power to the pharmacies can allow them to continue to distribute medication.

Action Type: Mitigation
Pre or Post Disaster: Pre Disaster
Priority Level: Medium
Lead: Scituate Emergency Management Director
Supporting: Scituate Building Official
Estimate Costs: $300
Financing Options: Town budget (Emergency Management and Buildling/Zoning Dept.)
Time Frame: Long-term

Action 10: Retrofit fire and police station doors and windows to withstand hurricane force winds.

Action Type: Mitigation
Pre or Post Disaster: Pre Disaster
Priority Level: High
Lead: Scituate Emergency Management Director

Supporting: none
Estimate Costs: $572 per impact-resistant window or $210 per rolling shutter; $9,000 for four barrier screens 12 feet by 14 feet (x 4 stations)
Financing Options: FEMA Hazard Mitigation Grant Program, FEMA Pre-disaster Mitigation grant, Town budget (Emergency Management)
Time Frame: Long-term

Action 11: Evaluate structural health and assure that wells supplying water to sheltering facilities are adequate to support sheltering during a hazard event. It has already been determined that even after extensive pipe replacement, there are still unsafe levels of lead in the drinking water at the Senior Center.

Action Type: Planning
Pre or Post Disaster: Pre Disaster
Priority Level: Low
Lead: Scituate Emergency Management Director
Supporting: none
Estimate Costs: $5,000 to $10,000 per well depending on if records are up to date.
Financing Options: FEMA Pre-disaster Mitigation grant
Time Frame: Medium-term

Action 11a: If necessary (depending on the outcome of Action 10), increase or improve the supply of well water to sheltering facilities or arrange for delivery of potable water for sheltering needs during an emergency.

Action Type: Mitigation
Pre or Post Disaster: Pre Disaster
Priority Level: Low
Lead: Scituate Emergency Management Director
Supporting: none
Estimate Costs: Depending on Action 10
Financing Options: FEMA Hazard Mitigation Assistancegrant
Time Frame: Medium-term

Action 12: Increase shelter capabilities to Hope and Potterville areas by securing additional facilities to be used during an evacuation emergency. These areas could benefit from additional shelter space. Consider Hope Associates' Howland Bard on Ryefield Road if owners re able to bring the second floor into compliance with the fire code (insulation).

Action Type: Mitigation
Pre or Post Disaster: Pre Disaster
Priority Level: Medium
Lead: Scituate Emergency Management Director
Supporting: none
Estimate Costs: Staff Time
Financing Options: Town budget (Emergency Management)
Time Frame: Medium-term

Action 13: Protect the non-critical records at Town Hall from water and fire damage. In addition to fixing holes in the roof above the vault, specific mitigation actions include floodproofing the building, or installing fire proof doors. Additional mitigation actions will not be considered until the repairs are made first.

Action Type: Mitigation
Pre or Post Disaster: Pre Disaster
Priority Level: High
Lead: Scituate Emergency Management Director
Supporting: Town Clerk (Peggy Long)
Estimate Costs: Depends on damage to roof
Financing Options: FEMA Pre-disaster Mitigation grant
Time Frame: Short-term

Recreational Facilities

Action 14: Tasca Field and Hope Park draw large groups of people and families with small children. Flooding or lightning may come on quickly, stranding people or putting them in harm's way. The Town of Scituate would like to educate residents about the dangers of being caught out in the open during a thunderstorm by including a storm safety message on the Town's Recreation and Emergency Management Departments websites and signage at the field. Better informed citizens will make smarter decisions about staying out of vulnerable areas.

Action Type: Preparedness/Mitigation
Pre or Post Disaster: Pre Disaster
Priority Level: Low
Lead: Scituate Fire Departments
Supporting: Scituate Recreation Department
Estimate Costs: $5,000
Financing Options: Town budget (Recreation Department)
Time Frame: Short-term

Historic Resources

Action 15: Scituate has many historic sites and districts, none of which are located entirely in a Special Flood Hazard Area. The areas can still be impacted by strong winds, earthquakes, and other natural hazards. Predicting how a hazard will affect these resources is difficult. Should a disaster hit, Scituate would like financial assistance restoring the historic charm. Compiling a list of historic preservation grants ahead of time will help the town recover more quickly.

Former Clayville School; Community House

Former Smithville Seminary (1839)

Action Type: Planning
Pre or Post Disaster: Pre Disaster
Priority Level: Medium
Lead: Scituate Building Official
Supporting: Scituate Historic Preservation Society
Estimate Costs: Staff time
Financing Options: Town budget (Building Department)
Time Frame: Short-term

Action 16: Enact or amplify local regulatory measures to encourage preservation by purchasing property development rights. By preventing modern development on historic property, not only are cultural resources preserved, but there are no additional strains on open space.

Action Type: Mitigation
Pre or Post Disaster: Pre Disaster
Priority Level: Medium
Lead: Scituate Planning
Supporting: Scituate Historic Preservation Society
Estimate Costs: Staff time
Financing Options: Town budget (Building Department)
Time Frame: Short-term

Forested Area

Action 17: Exchange maps between Providence Water Supply Board (PWSB) and Scituate Fire and Police Departments so that all first responders know where the fire lanes and access gates are. If needed, incorporate onto the maps more detailed information for access points on private property. This coordinated effort will enhance fire response around the Scituate Reservoir.

Action Type: Planning
Pre or Post Disaster: Pre Disaster
Priority Level: High
Lead: Scituate Fire Departments and Providence Water Supply Board
Supporting: Scituate Emergency Management Director
Estimate Costs: Staff time
Financing Options: Staff time
Time Frame: Short-term

Action 18: Improve forest health and management by educating property owners about removing dead trees that have been infested by insects, and wildfire mitigation techniques. Removal of dead wood reduces the available fuel for forest fires.

Action Type: Mitigation
Pre or Post Disaster: Pre Disaster
Priority Level: Medium
Lead: Providence Water
Supporting: Scituate Fire Departments/Fire Engineering Board
Estimate Costs: $5,000
Financing Options: Providence Water, Town budget, education grants, FEMA Pre-disaster Mitigation grants
Time Frame: Long-term

For the purpose of this planning document, the electrical substations and State police barracks are considered critical infrastructure but their upkeep and safety is managed by National Grid and the State of Rhode Island. The Town of Scituate will continue to engage in conversations about these resources with their owners as it relates to storm preparedness and mitigation.

Similarly, the Providence Water Safety Board (PWSB) owns the reservoir and the land surrounding it. The Town of Scituate will continue to work with PWSB on the safety of the water supply, the dam, and the surrounding area as it pertains to reducing the risk of natural hazards.

Section 6: Implementation Element

6.1 Prioritization of Mitigation Actions

Having identified appropriate mitigation actions the Scituate Hazard Mitigation Committee set about prioritizing them for implementation. To accomplish this for the 2015 plan, the SHMC ranked the actions as low, medium, or high priority. The prioritized results of this process are displayed in Table 12.

Table 12: Prioritization

	Mitigation Action
High Priority	1a Drainage Study
	1b Identify Drainage Improvement Project
	1c Construct Drainage Improvement Project
	3 Implement Dam Inspection and Enforcement Program
	5 Implement Ordinance to Keep New Critical Facilities Out of Flood-prone Areas
	5a Relocate Police Station to a Facility outside of the SFHA
	6 Update Communication System
	8 Install Surge Protection on Critical Electronic Equipment
	9 Install Generator Transfer Switch for All Critical Facilities
	10 Retrofit Fire and Police Station Doors
	13 Repair/Retrofit Town Hall
	17 Share Fire Land and Access Maps between PWSB and Scituate Fire Departments.
Medium Priority	2 Acquire 171 Dexter Lane and keep area as open space
	7 Install Lightning Protection Devices at Critical Facilities
	9 Develop zoning ordinance to require major pharmacies to have generator hook-ups
	12 Increase Shelter Capabilities in Hope and Potterville Areas
	15 Compile a List of Historic Preservation Grants
	16 Enact Preservation Ordinance To Support Property Acquisition
	18 Educate Property Owners About Wildfire Mitigation Techniques
Low Priority	4 Establishing and Promoting Heating and Cooling Centers
	11 Evaluate Structural Health of Wells at Shelters
	11a Increase or improve the supply of well water to sheltering facilities
	14 Signage for Weather Warnings at Tasca Field

Appendix A

Local Hazard Mitigation Committee

Scituate Local Hazard Mitigation Committee, 2014

Name	Affiliation
David Caruso	Town EMA Director
David Provonsil	Building Official/Town Engineer
Bob Dexter	Town Public Works
Peggy Long	Town Clerk
David D'Agostino	Town Solicitor
Chief David Randall	Scituate Police Department
Chief Adam Hebert	North Scituate Fire Department
Brenda Frederickson	Town Council, Business Owner
Sal Lombardi	Scituate Resident
Rich Blodgett	Providence Water Supply Board
Steve Soito	Providence Water Supply Board

Thanks also to Dennis Charland, a local resident and business owner who was unable to serve on the committee due to scheduling conflicts. Mr. Charland was consulted and provided valuable information used in the creation of this plan.

The next pages are a copy of the presentation to the general public at a Town meeting on 12/11/2014 at the Scituate Town Hall.

Appendix B

Technical and Financial Resources for Mitigation

State Resources

Coastal Resources Center
University of Rhode Island
Narragansett Bay Campus
Narragansett, RI 02882
(401) 874-6224

Coastal Resources Management Council
Steadman Government Center
4808 Tower Hill Road
Wakefield, RI 02879
(401) 222-2476

Department of Administration
Division of Statewide Planning
One Capitol Hill
Providence, RI 02908
(401) 222-6478

Department of Environmental Management
Division of Parks and Recreation
2321 Hartford Avenue
Johnston, RI 02919
(401) 222-2635

Department of Transportation-Design Section/Bridges
2 Capitol Hill, Room 231D
Providence, RI 02903
(401) 222-2053

Rhode Island Banking Commission/ Associate Director
233 Richmond Street
Providence, RI 02903
(401) 222-2405

Rhode Island Builders Association
The Terry Lane Corporation
Terry Lane
Glocester, RI 02814
(401) 568-8006

Rhode Island Department of Business Regulations
233 Richmond Street
Providence, RI 02903
(401) 222-2246

Rhode Island Emergency Management Agency
645 New London Avenue
Cranston, RI 02920
(401) 946-9996

Public Utilities Commission
100 Orange Street
Providence, RI 02903
(401) 222-3500 ext. 153

State Fire Marshall's Office
272 West Exchange Street
Providence, RI 02903
(401) 222-2335

State Building Committee Office
Building Commissioner's Office
One Capitol Hill
Providence, RI 02903
(401) 222-3529

Federal Resources

Federal Emergency Management Agency
Mitigation Division
Region I Office
99 High Street
Boston, MA
(617) 223-9561

U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751
(978) 318-8111)

U.S. Department of Agriculture
Natural Resources Conservation Service
(formerly Soil Conservation Service)
451 West Street
Amherst, MA 01002
(413) 253-4362

U.S. Department of Commerce
National Weather Service
Forecast Office
445 Myles Standish Boulevard
Taunton, MA 02780
(508) 823-2262

Economic Development Administration
Philadelphia Regional Office
The Curtis Center
601 Walnut Street, Suite 140 South
Philadelphia, PA 19106-3323
(215) 597-8822

U.S. Department of the Interior
National Park Service
Rivers and Trails Conservation Program
Regional Office
15 State Street
Boston, MA 02109
(617) 223-5203

U.S. Fish and Wildlife Service
Northeast Regional Office
U.S. Fish and Wildlife Service
300 Westgate Center Drive
Hadley, MA 01035-9587
(413) 253-8200

U.S. Department of Housing and Urban Development
Community Development Block Grants
Region I - O'Neill Federal Building
10 Causeway Street
Boston, MA 02222
(617) 565-5354

Small Business Administration
10 Causeway Street
Room 265
Boston, MA 02222
(617) 565-5590

U.S. Environmental Protection Agency
Region I Offices
5 Post Office Square - Suite 100
Boston, MA 02109-3912
(617) 565 3400

Other Resources

The Association of State Floodplain Managers (ASFPM):
The ASFPM is a professional association with a membership of almost 1,000 state employees that assists communities with the NFIP. ASFPM has developed a series of technical and topical research papers and a series of proceedings from their annual conferences. Many mitigation "success stories" have been documented through these resources and provide a good starting point for planning.

Floodplain Management Resources Center:
The Floodplain Management Resources Center is a free library and referral service of the ASFPM for floodplain management publications. Co-located with the Natural Hazards Center at the University of Colorado in Boulder, staff can use keywords to identify useful publications from the more than 900 flood-related documents in the library.

Institute for Business and Home Safety (IBHS) (formerly Insurance Institute for Property Loss Reduction):
The IBHS is an insurance industry sponsored nonprofit organization dedicated to reducing deaths, injuries and property damage resulting from natural hazards. IBHS efforts are directed at five specific hazards: flood, windstorm, hail, earthquake and wildfire. Through its public education efforts and information center, IBHS communicates the results of its research and statistical gathering, as well as mitigation information, to a broad audience.

Volunteer Organizations:
There are a number of volunteer organizations such as the American Red Cross, the Salvation Army, Habitat for Humanity, Interfaith and the Mennonite Disaster Service, that are often available to help after disasters. Service organization, such as the Lions, Elks and VFW are also available. These organizations have helped others with food, shelter, clothing, money, etc. Habitat for Humanity and the Mennonite Disaster Service provide skilled labor to help rebuild damaged buildings incorporating mitigation or flood proofing concepts. The offices of individual organizations can be contacted directly or the FEMA Regional office may be able to assist.

Flood Relief Funds:
After a disaster, local businesses, residents and out-of-town groups often donate money to local relief funds. They may be managed by the local government, one or more local churches or an ad hoc committee. No government disaster declaration is needed. Local officials should recommend that the funds be held until an applicant exhausts all sources of public disaster assistance. Doing so allows the funds to be used for mitigation and other projects that cannot be funded elsewhere.

New England States Emergency Consortium (NESEC) – Lakeside Office Park:
NESEC conducts public awareness and education programs on natural disaster and emergency management activities throughout New England. Brochures and videotapes are available on such topics as earthquake preparedness, mitigation and hurricane safety tips. NESEC maintains a web site that is accessible at http://www.serve.com/NESEC.

The New England Floodplain and Stormwater Managers Association (NEFSMA):
The NEFSMA is a professional organization for New England's floodplain and stormwater managers. This organization provides workshops, conferences and a newsletter to its membership and interested individuals and companies. NEFSMA web site is accessible at http://www.seacoast.com/~nefsma.

Appendix C

Local Mitigation Plan Review Tool

LOCAL MITIGATION PLAN REVIEW TOOL
Town of Scituate, RI

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: Town of Scituate, RI	**Title of Plan:** Local Hazard Mitigation Plan	**Date of Plan:** 2016
Local Point of Contact: Gerry Mosca EMA Director Town of Scituate 401-647-3000 MoscaG@scituateri.org	**Local Point of Contact:** Charles Collins, Jr., Town Council President 195 Danielson Pike North Scituate, RI 02857 CAC602@cox.net	
Single or Multi-jurisdiction: SINGLE	**New or Plan Update: NEW**	
State Reviewer:	**Title:**	**Date:**

FEMA Reviewer		
Date Received in FEMA Region I		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

SECTION 1:

REGULATION CHECKLIST (DRAFT FOR STATE REVIEW)

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been 'Met' or 'Not Met.' The 'Required Revisions' summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is 'Not Met.' Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Section 2 (page 9)	X	
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Section 2.4 (page 10)	X	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 2.4 (page 10)	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 4 (page 42)	X	
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 2.5.3 (page 11)	X	
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Section 2.5 (page 11)	X	
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Section 3 (page 12)	X	
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Section 3 (page 14) by hazard	X	

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Section 3 (page 14) under "Description"	X	
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Section 1.2 (page 8)	X	
ELEMENT B: REQUIRED REVISIONS			
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Section 4 (page 44)	X	
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Section 1.2 (page8)	X	
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 5 (page 47)	X	
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Section 5 (starting on page 48)	X	
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Section 6 (starting on page 57)	X	
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Section 4 (page 42)	X	
ELEMENT C: REQUIRED REVISIONS			
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	New plan- N/A	X	
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	New plan- N/A	X	

1. REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	New plan- N/A	X	
ELEMENT D: REQUIRED REVISIONS			
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	**NOT INCLUDED WITH FIRST DRAFT***		
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	N/A – single jurisdiction	N/A	
ELEMENT E: REQUIRED REVISIONS			