

SEPTEMBER 2015



Town of
North Providence, RI
Hazard Mitigation Plan

DRAFT



CDR | MAGUIRE

Acknowledgements

The Town of North Providence commends the efforts of its Hazard Mitigation Planning Committee in completing this important plan. The effort is sure to result in the protection of life and property and special thanks are extended to Committee members:

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Executive Summary

This Hazard Mitigation Plan (HMP) is a product of the North Providence Hazard Mitigation Planning Committee (NPHMPC). It has been approved by the North Providence Town Council, the Rhode Island Emergency Management Agency, and the Federal Emergency Management Agency in accordance with the Disaster Mitigation Act of 2000.

Its overview of past natural hazard occurrences verifies that the area is vulnerable to diverse events including winter storms and flooding. The discussion puts the likelihood of these events into historical perspective and recognizes that although the probability of thunderstorm, high wind and lightning events may be higher; the intensity and potential impacts from less likely events such as hurricanes and earthquakes can be far greater.

The risk assessment portion of the plan confirms that the Town has much to lose from these events. The four highest ranking risks identified include flood prone drainage systems, potential dam failures, damage to care facilities, critical municipal hazard response facilities.

To address these risks the 2015 Hazard Mitigation Plan puts forth a clear mission, a distinct set of goals and 19 specific mitigation actions. The Town's hazard mitigation mission is to protect and enhance the quality of life, property and resources by identifying areas at risk and implementing appropriate mitigation actions. The specific goals include upgrading infrastructure, protecting property, integrating planning and management approaches, improving response effectiveness, and maintaining open space. Each of the subsequent mitigation actions for achieving these goals summarizes specific problems and possible solutions, details the primary tasks to be undertaken, identifies an appropriate lead and anticipated funding sources.

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Section1: Introduction

1.1 Plan Purpose

The purpose of the North Providence Hazard Mitigation Plan (Plan) is to create a comprehensive review of the Town's existing capabilities, vulnerabilities, risks, and mitigation actions, before a disaster occurs. This plan was constructed using input from a variety of municipal and private stakeholders and the general public involved in the planning process. This plan serves as guidance to help the Town reduce their losses and vulnerabilities relating to floods, winter storms, hurricanes, wind, lightning, and hail, tornadoes, earthquakes, coastal erosion, wildfire, and drought.

1.2 Hazard Mitigation and its Benefits

Hazard mitigation planning is advance action taken to identify specific areas that are vulnerable to natural and man-made hazards within a city, and seeks to permanently reduce or eliminate the long-term risk to human life and property. It coordinates available resources and identifies community policies, actions, and tools for implementation that will reduce risk and the potential for future losses town-wide. The process of natural hazard mitigation planning sets clear goals, identifies appropriate actions, and produces an effective mitigation strategy that can be updated and revised to keep the plan current.

States and communities across the country are slowly, but increasingly, realizing that simply responding to natural disasters, without addressing ways to minimize their potential effect, is no longer an adequate role for government. Striving to prevent unnecessary damage from natural disasters through proactive planning that characterizes the hazard, assesses the community's vulnerability, and designs appropriate land-use policies and building code requirements is a more effective and fiscally sound approach to achieving public safety goals related to natural hazards.¹

In the past, federal legislation has provided funding for disaster relief, recovery, and some hazard mitigation planning. The Disaster Mitigation Act of 2000 (DMA 2000) is the latest federal legislation to improve this planning process. It reinforces the importance of natural hazard mitigation planning and establishes a pre-disaster hazard mitigation program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). Section 322 of the Act specifically addresses mitigation planning at the state and municipal levels of government. It identifies new requirements that allow HMGP funds to be used for planning activities. As a result of this Act, states and communities must now have an approved natural hazard mitigation plan in place prior to receiving post-disaster HMGP funds. In the event of a natural disaster; municipalities that do not have an approved natural hazard mitigation plan will not be eligible to receive post-disaster HMGP funding.²

The Town of North Providence also recognizes the important benefits associated with hazard mitigation, its interaction with municipal land use and infrastructure planning, and the need for a comprehensive planning approach, which accommodates these interdependencies. The Town's current comprehensive plan addresses land use, housing, economic development, services and facilities, natural resources, cultural resources, open space and recreation, and circulation. While the entire hazard mitigation plan will not be formally incorporated into the Comprehensive Plan, natural hazards and applicable mitigation actions will be incorporated. The Town recognizes coordination between the HMP and the Comprehensive Plan to be of benefit because it will ensure a unified planning approach into the future and ensure that risk reduction remains a critical element of municipal planning.

A second benefit of hazard mitigation allows for a careful selection of risk reduction actions through an enhanced collaborative network of stakeholders whose interests might be affected by hazard losses. Working side by side with this broad range of stakeholders can forge partnerships that pool skills, expertise, and experience to achieve a

¹ American Planning Association (APA) Growing Smart Legislative Guidebook, *Model Statute for a Natural Hazards Element of a Comprehensive Plan*. 2002

² FEMA, *State and Local Mitigation Planning - How to Guide: Getting Started Building Support for Mitigation Planning*, FEMA 386-1. (Washington, DC: FEMA Publications, September 2002) Foreword i.

common goal. Proceeding in this manner will help the Town ensure that the most appropriate and equitable mitigation projects are undertaken.³

A third benefit of hazard mitigation would be endorsing a proactive planning approach focused on sustainability, whereby the Town of North Providence could minimize the social and economic hardships that have resulted from the occurrence of previous natural disasters. These social and economic hardships include: destruction of property, interruption of jobs, damage to businesses, and the loss of historically significant structures and facilities. This proactive planning approach would look for ways to combine policies, programs, and design solutions to bring about multiple objectives and seek to address and integrate social and environmental concerns. Linking sustainability and loss reduction to other goals can provide a framework within the state and local governments that will bring the comprehensive planning process full circle.⁴

Lastly, the participation in a hazard mitigation planning process will establish funding priorities. The formal adoption and implementation of this plan will allow the Town of North Providence and its residents to become more involved in several programs offered by the Federal Emergency Management Agency (FEMA) including: the Community Rating System Program (CRS); the Pre-Disaster Flood Mitigation Assistance Program (FMA); and the Hazard Mitigation Grant Program (HMGP). Money spent today on preventative measures can significantly reduce the cost of post-disaster cleanup tomorrow.

1.3 Background

The Town of North Providence is located in Northern Rhode Island, bordered by the capital city of Providence to the south, Johnston to the west, Smithfield and Lincoln to the north, and Pawtucket RI to the east (see Map 1). The Town's 5.8 square miles of area are primarily drained by the Woonasquatucket and West Rivers.

Demographics/Census, Housing

The 2013 U.S. Census estimates the North Providence population to be at 32,135. The median age of our residents is 44. Approximately 20% of the population is over 65 (compared to 14% in Providence County and 15.5% in the entire state). According to the 2013 US Census Bureau the town is predominantly (87%) white. The town has approximately 15,439 housing units with an occupancy rate of 93%. 17% of the homes were built before 1940. The median income for a family household is \$71,184. Six percent of the population has income in the poverty level.

Land Use and Infrastructure

Open Space and Conservation land uses included the Peter Randall Reservation, state and town park areas such as Greystone Park, the Captain Stephen Olney Park, Fells Park, Governor Notte Park, and Camp Meehan, as well as other significantly, detached recreation sites.



Map 1: North Providence, Rhode Island

³ FEMA, State and Local Mitigation Planning - How to Guide: Getting Started Building Support for Mitigation Planning. FEMA 386-1. (Washington, DC: FEMA Publications, September 2002) Foreword i.

⁴ Ibid

Table 1: North Providence 2011 Land Use⁵

Land Use Zone	Acres
Forest	234
Residential	187
Commercial/Industrial	104
Institutional	70
Recreation	56
Transportation/Utilities	33
Other	28
Wetland	23
Water	18



North Providence is one of six communities served by the Narragansett Bay Commission’s (NBC) Field’s Point Wastewater Treatment Facility. NBC is responsible for providing wastewater collection (interceptors) and treatment. The system of lateral sewer lines, those that run down the side streets that collect waste from individual homes and businesses, are owned and maintained by the Town. Maintenance of these lines is done on an as needed basis.

Community Development Trends

Historically, North Providence was built around the mill villages along the western border of the Woonasquatucket River. By the 1960s, most of the mills had been demolished. In the 1950s and 1960s, the Town of North Providence became an attractive residential community for people from Providence and Pawtucket who wished to move away from more congested settings. During the 1970s and 1980s development reached into formerly rural areas north of Mineral Spring Avenue. This development took the form of new single family subdivisions, apartments and condominiums. New apartment construction occurred along Douglas Avenue, while condominiums dominated the area near Smithfield Road and Louisquisset. Single family homes were primarily developed in the western part of town. Without a true town center, North Providence's commercial growth was characterized by strip development, particularly along Mineral Spring Avenue. This road, with its extensive retail and service base, is now the commercial heart of the town. It stretches roughly 2.5 miles from Pawtucket to Centredale.⁶ North Providence has developed into a nearly fully developed suburban community.

Since 2000, as the economy has gone through a boom and bust period, North Providence has experienced a decline in population, and new housing permits.

Historic and Natural Resource/Environmental Significance

According to the 2013 Comprehensive Plan, “...the topography of North Providence is determined by its bedrock geology as influenced by glaciation and erosion. Most of the Town, being composed of igneous rock, is typified by pronounced hills. The existing wooded swamps in North Providence are relatively small isolated systems, most prominent in the undeveloped areas of the town's northwest section. In most cases these wetlands are red maple swamps. Ponds within the town are scattered throughout, with most being located west of Louisquisett Pike. Areas considered as deeper lakes are: Canada Pond; Wenscott Reservoir and the mill ponds on the lower portion of the Woonasquatucket River.” The Woonasquatucket and West Rivers run along the western border and through the middle of the town, respectively. As important natural resources, North Providence is working with neighboring communities to promote restoration and preservation of both watersheds.

North Providence has four historic sites and two historic districts which have been placed on the National and State Register of Historic Places on the following dates:

⁵ Rhode Island GIS (RIGIS) Land Use Data, 2011

⁶ Town of North Providence Comprehensive Community Plan, 2013

- Joseph Smith House/Smith - Cushing House (11/28/78)
- Captain Stephen Olney House (pictured at right, 5/1/74)
- Allendale Mill (5/7/73)
- Whipple-Angell-Bennett House (7/28/1995)
- Greystone Mill Historic District (4/28/04)
- Greystone Historic District (1/02/08)



f. Commerce, Industry, Academic

North Providence is comprised of the following commercial districts: Marieville (retail), Geneva (commercial), Fruit Hill (commercial/professional), Centredale (commercial), Allendale- Upper Smith Street (mix residential and commercial), and Mineral Spring Avenue (commercial). Although industrial uses have largely diminished in North Providence, there are a few smaller manufactures in the Lymansville section of town. Local businesses are paramount to the vitality of the town's commercial and industrial tax base.

The Community College of Rhode Island has a campus that borders the south western border of the town.

g. National Flood Insurance Program

The Town of North Providence has been a compliant member of the National Flood Insurance Program (NFIP) since June 1977. 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 234 NFIP insurance policies in North Providence, 163 of which are in a Special Flood Hazard Area (SFHA) A and AE Zone. The combined coverage on those policies is \$55,534,800. Since 1978, there have been 126 flood claims resulting in a total payment of \$1,130,529. There are a total of 45 repetitive loss properties in North Providence, 28 of which are in a SFHA.⁷

1.3 Recent Significant Natural Events

Nor'easters are a common winter storm event in North Providence 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 North Providence'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.

⁷ 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 Purpose, Overview and Background

The Town of North Providence initiated hazard mitigation planning in March 2015 at the recommendation of the North Providence Emergency Management Director. A draft plan was developed but it was never adopted and sat dormant until 2015 when the Town decided to hire a consultant to resume planning efforts.

2.2 Building the Team and Support

The NPHMC was organized by invitation from the local Emergency Management Director. The resulting NPHMC is comprised of the Emergency Management Director, Deputy EMA Director, Building Inspector, GIS Planner, Town Planner, Communications Technology Director, and Assistance Fire Chief, EMS Bureau Chief. The Town also hired a consultant to aid in the hazard mitigation planning process. The first meeting of the NPHMC was March 10, 2015. Meeting agendas were posted according to the Open Meetings Act (OMA) by the North Providence Town Clerk's office. This includes posting the notice at Town Hall as well as on the Town's website.

2.3 Understanding the Community's Risks

This new 2015 Plan is the result of a seven step process. It was initiated in February 2015 with the establishment of the North Providence Hazard Mitigation Committee by invitation from the local Emergency Management Director. The next step of the plan update process included the first meeting of the NPHMC on March 10, 2015 which focused on identifying and ranking natural hazards, and discussing the process for updating the plan. The hazards of most concern to the NPHMC are winter storms and flooding (riverine). Also of lesser concern are hurricanes/Nor'easters, lightning, high winds, extreme heat and cold, wildfire, brushfire, drought, tornadoes, dam failure, earthquakes, and hail.

The second meeting of the NPHMC on March 31, 2015 began with the group reviewing the hazards of concerns identified in the previous meeting and then identifying the critical infrastructure and community assets that will be part of the mitigation plan.

2.4 Developing the Mitigation Strategy

At the April 28, 2015 meeting, the NPHMC 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 NPHMC encouraged the public to participate by advertising the public hearings and soliciting input during the sessions.

Based on information from previous NPHMC meetings, the consultant drew up a draft plan for the NPHMC 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 XXX for public review as well as sent to the following individuals in neighboring communities for their input.

The plan was presented to the Council for review...

The draft plan was approved by the Town Council...

After initial approval, the plan was submitted to RIEMA...

2.5 Bringing the Plan to Life: Implementation & Maintenance

The Town of North Providence and the North Providence Hazard Mitigation Committee 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, and Emergency Operations Plan. It is intended that this plan and the ongoing efforts of the NPHMC will preserve and enhance the quality of life, property, and resources for the Town of North Providence.

Adoption of this mitigation strategy increases North Providence'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.)

a. Monitoring

The NPHMC, under the leadership of the Town's Emergency Management Director, will meet annually, in September, 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 and meeting minutes recorded. The NPHMC will also continue to reevaluate membership on the committee to ensure effective engagement of the appropriate parties.

b. Evaluation

At the annual meetings, the NPHMC will evaluate both the actions and the planning process. The NPHMC 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. The NPHMC will involve the public in the action evaluation process by holding an annual advertised public meeting in order to review the evaluation and solicit input.

c. Revisions

Recognizing that this is a living document, the NPHMC 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 the 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 NPHMC 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 NPHMC will involve the public in the annual meeting by posting it on the website and in the local newspaper to encourage involvement.

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Section 3: Risk Assessment

This history of natural hazard events verifies that the area is vulnerable to diverse events including blizzards, floods and strong storms. This discussion puts the likelihood of these events into historical perspective and recognizes that although the probability of brushfires, thunderstorm, high wind and lightning events may be higher; the intensity and potential impacts from less likely events such as hurricanes and earthquakes can be far greater.

The hazards identified by the NPHMC are in line with those discussed in the State Hazard Mitigation Plan and are of greatest concern to the Town. However, there are a few hazards discussed in the State plan that are not addressed in this Hazard Mitigation Plan. Wildfires that burn through thousands of acres of forest are not a concern given the urban landscape of the Town. The NPHMC chose to discuss the brushfire threat rather than wildfires.

The following hazards will not be addressed in this Hazard Mitigation Plan: avalanche, expansive soils, land subsidence, landslides, volcanoes, and tsunamis. These hazards were not considered due to the lack of frequency in which they occur and the minimal probability of their occurrence.

The primary sources of data researched to identify occurrences of natural hazard events in North Providence were the RI State Hazard Mitigation Plan 2014 Update, National Climatic Data Center within the National Oceanic Atmospheric Administration (NCDC-NOAA) (<http://www.ncdc.noaa.gov/stormevents/>), the United States Geological Survey (USGS) Earthquake Hazards Program (<http://neic.usgs.gov/>), the 1998 Journal-Bulletin: Rhode Island Almanac, and the Taunton, MA, National Weather Service Forecast Office. The parameters and description of particular events are limited to the availability of information contained in the aforementioned sources.

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 North Providence, and, reviewing North Providence's and the State of Rhode Island's hazard history. The section also assesses the vulnerability of people, structures, and critical facilities to these hazards and examines the capabilities in place to mitigate them. This section also takes a look at the mitigation efforts that the Town currently has in place.

3.2 Hazards

a. Hazard Identification

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

- Winter Storm
- Flooding (Riverine)
- Hurricane/Nor'easter
- Lightning Storm
- High Winds
- Extreme Heat and Cold
- Brushfire
- Drought
- Tornado
- Dam Failure
- Earthquake
- Hail

The hazards identified by the NPHMC are in line with those discussed in the State Hazard Mitigation Plan and are of greatest concern to the Town. However, there are a few hazards discussed in the State plan that are not addressed in this Hazard Mitigation Plan. Wildfires that burn through thousands of acres of forest are not a concern for the Town. The NPHMC chose to discuss the brushfire threat rather than wildfires. The NPHMC did not consider storm surge, sea level rise, or coastal erosion due to the inland nature of the Town of North Providence.

The following additional hazards will not be addressed in this Hazard Mitigation Plan: avalanche, expansive soils, land subsidence, landslides, volcanoes, and tsunamis. These hazards were not considered due to the lack of frequency in which they occur and the minimal probability of their occurrence.

At the kick-off meeting on March 10, 2015, the Committee identified the following hazards in Table 1 and associated risks.

Frequency

Low - 1%- 10% probability within 100 years

Medium - 10%-100% probability within 10 years

High - 100% probability within 1 year-5 years

Damage Potential

Low - some local property damage not town wide, minor injuries/ loss of life

Medium - 50 % of property could be damaged and possible injuries/ loss of life

High - major town wide property damage, injuries and loss of life

Priority Rank

Developed by the NPHMC to rank the various hazards based on frequency and damage potential.

Low - Not expected to occur with any frequency, damages will be limited.

Medium - Will occur within the next 10 years but the Town has resources to reduce risks.

High - Expected to occur within the next 5 years, and is a major concern for the Town.

Table 2: Hazard Impacts

Type	Frequency (High, Medium, Low)	Damage Potential	Impacts (populations, infrastructure, natural environment, economy)	Risk Rank (High, Medium, Low)
Winter Storm	High	Medium	Road infrastructure, flat shelter roofs, access to communications and hospital, wear and tear on snow removal equipment, local businesses close when state shuts down roads	High
Flooding	High	Low/Medium	Basements, roads	High
Hurricane/Nor'easter	Low/Medium	High	Infrastructure, tree debris, roads blocked, telecom systems	Medium
Lightning Storm	Low	High	Fire alarm system, communication systems, structure fires, trees downed, long term power outages	Medium

Type	Frequency (High, Medium, Low)	Damage Potential	Impacts (populations, infrastructure, natural environment, economy)	Risk Rank (High, Medium, Low)
High Winds	Medium	High	Infrastructure, tree debris, roads blocked	Medium
Wildfire	Low	Low	Randall Reservation, recreational outbuildings, air and water quality	Low
Brushfire	Medium	Low/Medium	Loss of forest cover	Low
Drought	Low	Low	High fire risk	Low
Tornado	Low	Low	Depends on where it hits.	Low
Dam Failure	Low	Low/Medium (depending on location)	Flooding of neighborhoods downstream	Low
Earthquake	Low	Medium/High	All infrastructure, especially the Longview Reservoir	Low
Extreme Heat and Cold	High	Medium	Fire hazards during high temps, frozen pipes during cold temps, sensitive populations	Medium
Hail	Low	Low	Vehicles, roofs	Low

The primary sources of data researched to identify occurrences of natural hazard events in North Providence were the United States Geological Survey (USGS) Earthquake Hazards Program (<http://neic.usgs.gov/>), the National Climatic Data Center within the National Oceanic Atmospheric Administration (NCDC-NOAA) (<http://www.ncdc.noaa.gov/stormevents/>), and the Rhode Island Hazard Mitigation Plan 2014 Update. The parameters and description of particular events are limited to the availability of information contained in the aforementioned sources.

b. Hazard Profiles

Flood Related Hazards

Description

The biggest natural threat to North Providence is flooding. According to the RI State Hazard Mitigation Plan, "Flooding is a localized hazard that is generally the result of excessive precipitation. Flooding is the most commonly occurring natural hazard, due to the widespread geographical distribution of river valleys and coastal areas, and the attraction of human settlements to these areas. Floods are among the most frequent and costly natural disasters in terms of human hardship and economic loss.

"A flood, which can be slow or fast rising but generally develops over a period of days, is defined by the National Flood Insurance Program (NFIP) as:

- A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties from: overflow of inland or tidal waters; unusual and rapid accumulation or runoff of surface waters from any source; or a mudflow; or
- The collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above.”ⁱ

For the purpose of this plan, flooding related hazards include riverine flooding, flash floods, urban flooding, and dam breaches. Flooding occurs in North Providence during heavy rainfall events when the rivers overtop their banks and spill out into the developed areas.

Location

According to the Town’s 2013 Comprehensive Community Plan, North Providence contains approximately 380 acres of Special Flood Hazard Area flood zone, 10.3% of the entire area of North Providence. This flood zone is generally associated with the two rivers within the town, the Woonasquatucket River and the West River, and their tributaries. Much of this floodplain is developed and therefore at particular risk due to flooding.

The Town’s older mills and associated villages such as Greystone, Allendale, Lymanville, and Geneva are all located close to the river for access to water power and at low elevation, where they are very vulnerable to flooding. Several residential neighborhoods were also developed prior to the adoption of restrictions on construction in floodplains and are also vulnerable. In particular, homes in the vicinity of Gillen Avenue, Evergreen Parkway, West River Parkway, Brown Ave. and Humbert Street have experienced problematic flooding.

Extent/Severity

The severity of flooding in North Providence is dependent upon many factors including how saturated the ground is, the amount of rainfall, and the amount of pervious surfaces in the area. Major flooding is not a common occurrence as of late but as climate patterns change North Providence may experience more intense rain events and consequently more riverine and urban flooding.

Table 3: Recent Flooding Events in North Providence

Date	Type	Comments
10/15/2005	Flood	Excessive rain and flooding across Rhode Island. Many roads closed region wide, and approximately 500 evacuations occurred along the Pawtucket, Pocasset, Woonasquatucket, and Blackstone Rivers. The Woonasquatucket River at Centerdale experienced a new record flood from this event. A new record flood stage of 8.26 feet was observed at the U.S. Geological Survey (USGS) gage location. This flood stage caused flooding, and subsequent road closure, at Route 44 approaching Centerdale.
7/9/2009	Flash Flood	Heavy rain from a slow moving front caused street flooding. The intersection of Main and Charles Streets in North Providence were closed due to flooding.
3/29/2010	Flood	6-9 inches of rain fell across Providence County. Woonasquatucket River rose above flood stage at Centredale. In North Providence, a dam was breached, emptying Geneva Pond into West River. A nearby bridge that carries Douglas Avenue over West River sustained damage to its abutments and was closed.
9/8/2011	Flood	Remnants of Tropical Storm Lee produced heavy rainfall and a four day total of 4-6 inches of rain. Bulk of the flooding was in the urban areas.
6/7/2013	Flood	Remnants of Tropical Storm Andrea brought heavy rain (3-5 inches) to the region. Street flooding.
9/2/2013	Flash Flood	A nearly stationary warm front draped across southern New England, coupled with a very moist atmosphere, resulted in showers and thunderstorms across the area for the third day in a row. Heavy rain fell within these showers and storms and flash flooding occurred, particularly over portions of Rhode Island.

Source: <http://www.ncdc.noaa.gov/stormevents>

Winter Related Hazards

Description

For the purpose of this plan, winter related hazards include heavy amounts of snow, ice, and extreme cold. All of which may occur independently or at the same time. 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.

Location

Winter storms affect the entire region. Snow totals and wind speeds do vary slightly from town to town depending on the storm.

Extent/Severity

North Providence has been hit with crippling snow storms that close roads, damage trees, knock out power, and damage property. The entire town is equally susceptible to winter-related events.

Previous Occurrences

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. Heavy ice cover was most severe in Cranston and Warwick. 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 \$110 million and there were 21 storm-related deaths.⁸

Since then, numerous winter storms events dumping 2 feet or more of snow have occurred: March 1993, "Storm of the Century(13 inches of snow in North Providence), 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). 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.

The Town prepares for these significant winter storms by stockpiling sand and salt, and securing personnel and equipment for snow removal. Road and parking surfaces are treated before winter storms and all major roads are kept clear during winter storms for safety and emergency response.⁹

Table 4 highlights severe winter storm events that have affected Rhode Island.

Table 4: Recent Winter Related Storm Events

Date	Precipitation	Damage	Comments
12/26/10	Winter Storm	\$15,000	A strengthening winter storm passed southeast of Nantucket and brought heavy snow and strong winds to much of Rhode Island, resulting in near blizzard conditions at times. More than 2000 flights were cancelled along the east coast due to the storm and Amtrak service between New York and Boston was suspended during the storm. Despite numerous flight cancellations, T.F. Green Airport in Warwick remained open. Snowfall totals ranged from 6 to 8 inches along the south coast to as much as 8 to 15 inches elsewhere. Snowfall totals of 8 to 12 inches were observed in southeast Providence County, including 11 inches in downtown Providence. High winds brought down wires on Pawtucket Avenue in Providence.

⁸ NOAA National Weather Service <http://www.erh.noaa.gov/box/papers/blizzard78/mainblizzardof78.htm>

⁹ Town of North Providence, Rhode Island Comprehensive Community Plan, 2013

Town of North Providence Hazard Mitigation Plan- July, 2015

1/12/11	Heavy Snow	0	<p>A developing nor'easter coastal storm dumped nearly two feet of snow across portions of Rhode Island in a 24 hour period.</p> <p>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.</p>
1/26/11	Heavy Snow	0	<p>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.</p>
2/1/11	Winter Storm	0	<p>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, 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.</p>
10/29/11	Heavy Snow Halloween Nor'easter		<p>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.</p>
1/19/12	Winter Weather	0	<p>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.</p>
1/21/12	Winter Weather	0	<p>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.</p>
2/29/12	Winter Weather	0	<p>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.</p>
11/7/12	Winter Weather	0	<p>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.</p>
12/29/12	Heavy Snow	0	<p>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.</p>
2/8/13	Blizzard "Blizzard of 2013/Winter storm Nemo"	0	<p>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.</p> <p>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</p>

			<p>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.</p> <p>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.</p> <p>Minor tidal flooding occurred along the south coasts of Connecticut, Massachusetts, and Rhode Island during times of high tide Friday night and Saturday morning.</p> <p>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.</p>
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.
1/21/14	Heavy Snow	0	6-10 inches of snow fell across Providence County
2/5/14	Heavy Snow	0	5-7 inches of snow fell in Providence County
1/29/15	Blizzard	?	Blizzard Juno

Source: NOAA <http://www.ncdc.noaa.gov/stormevents>

Hurricanes

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.”¹⁰

The Saffir-Simpson scale below is based primarily on wind speeds and includes estimates of barometric pressure and storm surge associated with each of the five categories. It is used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane landfall.”¹¹

Table 5: Saffir-Simpson Hurricane Wind Scale¹²

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

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

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

¹⁰ Rhode Island Hazard Mitigation Plan, 2013 <http://www.riema.ri.gov/prevention/mitigation/RI%20SHMP%2011-26-2013.pdf>

¹¹ Hurricanes and Tropical Storms: Saffir-Simpson Hurricane Scale" *Weather.com*. The Weather Channel, 1995-2001. <http://www.thefreedictionary.com/hurricane>

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

Location

Hurricanes and tropical storms are large scale events that affect most of Rhode Island when they occur. The coastal regions of the State may experience coastal erosion and storm surge but inland communities like North Providence still get heavy rain and strong winds.

Extent/Severity

Most tropical storms in North Providence cause heavy rainfall, localized flooding and high winds which bring down trees, block roadways, and damage power lines. Most of the power lines and telephone wires are above ground on poles, particularly vulnerable to storm damage. The entire town is vulnerable.

Previous Occurrences

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 persons 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. 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. 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 most recent significant hurricane 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. 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. In North Providence, almost half of the population was without electricity for several days.

Table 6: Historic Hurricane Events in Rhode Island¹⁵

Date	Name	CAT	Tracking of Eye	Sustained Winds (mph)	Wind Gust (mph)	Property Damage (\$ million)	Deaths
09/21/38	N/A	3	New Haven, CT	100	125	100	262
09/14/44	N/A	3	Narragansett & Warwick, RI	82	100	2	0
8/31/54	Carol	3	Old Saybrook, CT	90	105-115	90	19
09/11/54	Edna	3	Cape Cod, MA	75-95	110	0.1	0
08/19/55	Diane	Tropical Storm	South of Block Island, RI	45	N/A	170	1
09/12/60	Donna	2	New Haven, CT	58	81	2.4	0
9/21/61	Esther	Tropical Storm	Offshore, SE of Block Island	35-50	45-65	<2	0
09/27/85	Gloria	1	New Haven, CT	81	120	19.8	1

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

¹⁴ Ibid.

¹⁵ NOAA <http://www.ncdc.noaa.gov/stormevents>

10/19/91	Bob	2	Newport, RI	75-100	100	115	0
8/28/11	Irene	Tropical Storm	Bridgeport, CT	44 (on land)	N/A	127.3	1
10/29/12	Sandy	Super Storm	New Jersey	60-80	90	0.02	0

Lightning Storms

Description

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. 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.

All thunderstorms produce lightning, and therefore all thunderstorms are dangerous. Lightning often strikes outside of areas where it is raining, and may occur as far as 10 miles away from rainfall. It can strike from any part of the storm, and may even strike after the storm has seemed to pass. Hundreds of people across the nation are injured annually by lightning, most commonly when they are moving to a safe place but have waited too long to seek shelter. Lightning strike victims often suffer long-term effects such as memory loss, sleep disorders, weakness and fatigue, chronic pain, depression and muscle spasms. Lightning has the potential to start both house fires and wildfires. Lightning causes an average of 55-60 fatalities, 400 injuries, and over \$1 billion in insured losses annually nationwide.¹⁶

Location

Thunderstorms occur throughout the region.

Extent/Severity

North Providence is no more or no less susceptible to lightning than other parts of Rhode Island. A structure’s vulnerability to lightning is impacted by building construction, and location to trees, or other tall structures. The pole mounted electrical and communication lines to increase their vulnerability to damage from falling trees that have either been blown over or struck by lightning.

Human vulnerability is largely determined by the availability and reception of early warnings for the approach of severe storms, and by the availability of nearby shelter. Individuals who immediately seek shelter in a sturdy building or metal-roofed vehicle are much safer than those who remain outdoors. Early warnings of severe storms are also vital for aircraft flying through the area.¹⁷

Previous Occurrences

Table 7 highlights recent lightning storms that have affected North Providence and other parts of Rhode Island.

Table 7: Lightning Storms in Providence County, Rhode Island¹⁸

Date	Location	Injuries	Property Damage
6/25/2012	Lincoln	0	\$150,000
7/1/2012	Glocester	3	\$0
7/20/2013	Providence	0	\$5,000

¹⁶ Rhode Island 2014 Hazard Mitigation Plan Update

¹⁷ Rhode Island 2014 Hazard Mitigation Plan Update

¹⁸ NOAA: <http://www.ncdc.noaa.gov/stormevents>

High Wind

Description

Wind is the movement of air caused by a difference in pressure from one place to another. Local wind systems are created by the immediate geographic features in a given area, such as mountains, valleys, or large bodies of water. Wind effects can include blowing debris, interruptions in elevated power and communications utilities, and intensification of the effects of other hazards related to winter weather and severe storms.¹⁹

A storm that is not a hurricane, tornado, or Nor'easter can generate damaging wind gusts. The chart below, created by Admiral Beaufort, indicates the wind strength on a scale of 0 (calm) to 12 (hurricane).



¹⁹ Rhode Island 2014 Hazard Mitigation Plan Update

Beaufort Wind Chart – Estimating Winds Speeds

Beaufort Number	MPH		Terminology	Description
	Range	Average		
0	0	0	Calm	Calm. Smoke rises vertically.
1	1-3	2	Light air	Wind motion visible in smoke.
2	4-7	6	Light breeze	Wind felt on exposed skin. Leaves rustle.
3	8-12	11	Gentle breeze	Leaves and smaller twigs in constant motion.
4	13-18	15	Moderate breeze	Dust and loose paper is raised. Small branches begin to move.
5	19-24	22	Fresh breeze	Smaller trees sway.
6	25-31	27	Strong breeze	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult.
7	32-38	35	Near gale	Whole trees in motion. Some difficulty when walking into the wind.
8	39-46	42	Gale	Twigs broken from trees. Cars veer on road.
9	47-54	50	Severe gale	Light structure damage.
10	55-63	60	Storm	Trees uprooted. Considerable structural damage.
11	64-73	70	Violent storm	Widespread structural damage.
12	74-95	90	Hurricane	Considerable and widespread damage to structures.

Source: NOAA National Weather Service

Location

High winds occur throughout the region.

Extent/Severity

North Providence is no more or no less susceptible to high wind than other parts of Rhode Island. The pole mounted electrical and communication lines to increase their vulnerability to damage from falling trees that have been blown over.

Previous Occurrences

Table 8 highlights recent high wind events that have affected North Providence and other parts of Rhode Island.

Table 8: High Wind in Rhode Island²⁰

Date	Event	Magnitude	Comments
6/28/10	Wind	57 mph	A cold front moved across Southern New England producing showers and thunderstorms. An amateur radio operator recorded a wind gust of 58 mph on their home weather station. No damage was reported.
1/25/10	Wind	51 mph	Unseasonably warm temperatures moved into southern New England ahead of a cold front which allowed for excellent atmospheric mixing. This resulted in strong to damaging winds across much of eastern Massachusetts and Rhode Island. A weather station at a spotter's home in Cranston recorded a wind gust of 51 mph. A tree in East Providence was downed. In Cranston, a telephone pole was downed. A 30 foot tall pine tree in Providence was downed.
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. Numerous trees, large branches, and wires were downed, including trees on Route 10 South and Maplewood Avenue in Cranston.
4/29/12	Wind	50 mph	Low pressure over the Canadian Maritimes produced winds gusts of 40 to 50 mph throughout southern New England, resulting in scattered wind damage. Strong winds brought down wires on Pawtucket Avenue near Taunton Avenue in East Providence.
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	<p>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 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.</p> <p>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.</p>

²⁰ NOAA <http://www.ncdc.noaa.gov/stormevents>

			<p>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.</p>
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Hail

Description

Hail is formed in towering cumulonimbus clouds (thunderheads) when strong updrafts carry water droplets to a height at which they freeze. Eventually, these ice particles become too heavy for the updraft to hold up, and they fall to the ground at speeds of up to 120 MPH. Hail falls along paths called swaths, which can vary from a few square acres to up to 10 miles wide and 100 miles long.²¹ Hail larger than ¾ inch in diameter can do great damage to both property and crops, and some storms produce hail over two (2) inches in diameter. Hail causes about \$1 billion in damages annually in the U.S.²²

Location

All areas of North Providence are vulnerable to the severe thunderstorms that cause hail.

Extent

Structure vulnerability to hail is determined mainly by construction and exposure. Metal siding and roofing is better able to stand up to the damages of a hailstorm than many other materials, although it may also be damaged by denting. Exposed windows and vehicles are also susceptible to hail damage.²³

Human vulnerability is largely determined by the availability and reception of early warnings for the approach of severe storms, and by the availability of nearby shelter. Individuals who immediately seek shelter in a sturdy building or metal-roofed vehicle are much safer than those who remain outdoors. Early warnings of severe storms are also vital for aircraft flying through the area.²⁴

Previous Occurrences

There are occasional reports of hail in Providence County but only one record of a storm causing measurable property damage. On June 24, 2008, quarter to golfball sized hail in Pawtucket damaged several windshields, dented cars, smashed windows of a local YMCA, and caused a bank's roof to collapse. Total property damage was \$20,000.²⁵

²¹ University Corporation for Atmospheric Research, <http://www.ucar.edu/communications/factsheets/Hail.html>.

²² Rhode Island 2014 Hazard Mitigation Plan Update

²³ Ibid

²⁴ Ibid

²⁵ NOAA <http://www.ncdc.noaa.gov/stormevents>

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.²⁶ 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.²⁷

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. 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 8 highlights tornado events that have affected Rhode Island.

Location

While tornadoes do not occur frequently, they are considered low frequency, high-impact events in Rhode Island. All people are equally vulnerable to tornadoes in North Providence. Transportation and road closures 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.

Extent/Severity

A tornado could inflict major, isolated damage if it were to hit North Providence. Mobile homes and wood-framed structures are more likely to be damaged by tornadoes than stronger steel structures. However, this part of the country is not known to spur tornadoes.

Previous Occurrences

There has been no recent tornado activity (within the last 10 years) in or around North Providence.

Table 9: Recent Tornado Events in Providence County, Rhode Island²⁸

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

Geologic Related Hazards: Earthquakes

Description

The 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 the old masonry buildings and large structures.

Location

The entire Town of North Providence has the potential to be impacted by earthquakes.

Extent/Severity

²⁶ Rhode Island 2014 Hazard Mitigation Plan Update

²⁷ National Weather Service, <http://www.erh.noaa.gov/box/hurricane/hurricaneBob.shtml>

²⁸ NOAA <http://www.ncdc.noaa.gov/stormevents>

Although earthquakes are not considered to be a major problem in the Northeast United States, they are more prevalent than one might expect. When earthquakes occur, much of the damage is a result of structures falling under the stress created by the earth’s movement. Building failure can cause damage to the building, deaths, injuries, and loss of function. 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.

Previous Occurrences

Table 9 presents historical seismic activity for Rhode Island. It highlights the earthquake epicenter, the Richter magnitude at the epicenter, and the Mercalli Intensity Level. 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. Mercalli intensity levels are based on qualitative criteria that use the observations of the people who have experienced the earthquake to estimate the intensity level. The Mercalli scale ranges from I to XII. The higher the intensity level on the scale, the closer the person is to the epicenter.

Table 10: Seismic Activity In/Near Rhode Island²⁹

Date	Epicenter	Epicenter Magnitude	Mercalli Intensity Level
02/28/25	St. Lawrence River Region	7	Intensity level V shock effects were felt on Block Island. Intensity level IV effects were felt in Charlestown. The total area affected by this earthquake was over 5,000,000 sq. km.
11/01/35	Quebec, Canada	6.25	Intensity level IV shock effects were felt on Block Island and at Providence and Woonsocket. The total area affected by this earthquake was about 2,500,000 sq. km.
10/16/63	Massachusetts Coast	4.5	Intensity level V shock effects felt at Chepachet. Other places in the Northern Rhode Island felt shock effects with less intensity.
06/14/73	Western Maine	5.2	Intensity level IV shock effects were felt at Charlestown. Intensity level I - III shock effects were felt at Bristol, East Providence, Harmony, and Providence. This earthquake was felt over an area of 250,000 sq. km.
03/11/76	Near Newport, RI	3.5	Intensity level VI shock effects felt throughout Southern New England. This earthquake has the distinction of being the largest earthquake to originate in Rhode Island.
04/20/02	Plattsburgh, NY	5.2	Intensity level II to III shock effects felt throughout Rhode Island.
03/11/08	Central Connecticut	2.9	No data reported for Rhode Island
6/23/10	Ontario-Quebec	5.0	Felt throughout Rhode Island.
2011	Rhode Island	0.9	Felt locally
2012	Rhode Island	1	Felt locally
2013	Kingston, RI	Unknown	Felt locally
2015	Cranston, RI	2.3	Felt locally

Source: http://neic.usgs.gov/neis/states/rhode_island/rhode_island_history.html

²⁹ USGS http://neic.usgs.gov/neis/states/rhode_island/rhode_island_history.html

Brushfire and Drought

Description

A brushfire is a fire burning in vegetation that is predominantly shrubs, brush, and scrub growth.³⁰ Favorable fire conditions arise from extended periods of hot, dry weather and accumulated vegetation. While wildfires are generally associated with thousands of acres of trees burning, brushfires tend to be smaller, confined to the understory, and manageable.

Various natural (i.e. lightning) and human actions (i.e. campfires or auto accidents) can ignite brushfires. Fuel (dry grasses, leaves, and dead trees), topography and weather (wind conditions and humidity) will dictate the extent of a brushfire.

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. In Rhode Island, drought conditions can trigger fire hazard warnings.

Location

The northwest section, north of Mineral Spring Avenue and west of Wenscott Reservoir is still undeveloped. The forested land in this area is becoming scarce as residential and commercial development expand.³¹

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.

Extent/Severity

Drought conditions do not usually last for extended periods of time in New England. However, North Providence promotes efficient use of water and implement programs to mitigate the impacts of drought in accordance with State Guide Plan Element 724: Rhode Island Drought Management Plan. Each of the Town's water suppliers has a current Water Supply Management Plan which includes Emergency and Drought Management Procedures. These plans describe in detail the processes for responding to water related emergencies, including drought. The districts continue to update their plans regularly and the Town will continue cooperate with the districts to ensure appropriate drought response and ensure water service is maintained.³²

The Town is also pursuing opportunities to establish emergency connections between neighboring water suppliers such as the Town of Lincoln in compliance with State Guide Plan Element 723: Water Emergency Response Plan. Interconnections between suppliers could provide emergency back-up supplies to North Providence residents in the event of a catastrophic incident at the Scituate Reservoir which provides water to all three North Providence Water Districts.³³

Previous Occurrences

For specific statewide mitigation efforts, refer to the current Rhode Island State Hazard Mitigation Plan located online <http://www.riema.ri.gov/prevention/mitigation/index.php>.

³⁰ National Park Service, USDA Forest Service <http://www.fs.fed.us/nwacfire/home/terminology.html>

³¹ Town of North Providence Community Comprehensive Plan, 2013

³² Ibid

³³ Ibid

Table 11: Drought Activity in Rhode Island³⁴

Date	Type	Location	Injuries	Comments
4/12/12	D2	Regional	0	<p>The U.S. Drought Monitor declared a severe drought across Rhode Island, the eastern half of Massachusetts, and most of northern Connecticut. A moderate drought was declared over western Massachusetts and southwestern New Hampshire. This was declared as the result of a meteorological drought determined 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. No southern New England state issued drought declarations as reservoirs were at normal levels, thanks largely to above normal precipitation falling between August 2011 and November 2011.</p> <p>The main impact of the meteorological drought was periods of very high fire danger. In addition, small pond levels were reduced. While soil moisture was well below normal, this drought occurred prior to the beginning of the growing season. Thus, no agricultural impacts were realized.</p> <p>From January 1 through April 15, precipitation levels were 6 to 8 inches below normal across northeast Connecticut, Rhode Island, and southeast Massachusetts. Across the remainder of southern New England, precipitation levels were 5 to 7 inches below normal. This translates to around or less than 50 percent of normal precipitation for much of southern New England.</p> <p>The U.S. Drought Monitor declared severe drought (D2) over southeastern Providence County from April 12 through April 24. This was deemed a meteorological drought due to precipitation levels approximately one half of normal</p>

Source: <http://www.ncdc.noaa.gov/stormevents>

Extreme Temperatures- Heat and Cold

Description

HEAT

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.

COLD

Extreme cold, often associated with winter storms, also presents a hazard to human health.

Hypothermia and frostbite can occur if precautions are not taken to stay warm during periods of extreme cold temperature.

³⁴ NOAA <http://www.ncdc.noaa.gov/stormevents>

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.

Extent/Severity

Periods of extreme high heat typically last two or more days and can have significant effects on human health. Heat stroke and hyperthermia caused by extreme high temperatures can result in death, particularly among the elderly and infirm. Heat waves can also be accompanied by or exacerbate droughts, causing additional hazards as described above. Heat waves can also tax power systems as people run air conditioners which can overload power circuits causing brown outs and/or power failure.

A heat wave, meaning daily maximum temperatures reaching or exceeding 90°F for three days in a row, affected the Town in of July 2010. Surface temperatures approaching 100°F were experienced in North Providence while Boston, Providence and Philadelphia all saw temperatures in the 100s that broke records.³⁵

Outdoor workers, users of public transportation who must wait outside and lower-income citizens without access to sufficient warm winter clothing or heating fuel are particularly at risk during extended cold periods. Damage can occur to roadways and building foundations due to frost heaving. Frozen pipes can cause damage to utility infrastructure and buildings.

Previous Occurrences

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.³⁶

3.3 Vulnerability

HAZUS modeling was conducted to estimate the amount of damage would be sustained by a hurricane similar to that of 1938 with the current build-out.

a. Community Assets

People

North Providence is a heavily populated town with about 5,500 people per square mile. There were 32,135 residents reported in the 2013 U.S. Census. Nearly 20% of the population is over the age of 65. Currently, there is one designated emergency shelters in North Providence. The North Providence High School is a local shelter, not a Red Cross approved shelter. The town is able to provide shelter for 300 individuals in the event of a natural disaster. In recent years the shelter was open during Winter Storm Nemo in February 2013, and Winter Storm Juno in January 2015. Generally, the majority of the evacuated population (87%) do not use public shelters.³⁷ Evacuees will likely seek shelter by making other arrangements such as staying with family or friends, particularly if the event is forecasted or predicted to occur.

³⁵ McGeehan, Patrick and Santos, Fernanda, *New York Wilts Under Record-Breaking Heat Wave*. New York Times. July 6, 2010 <http://www.nytimes.com/2010/07/07/nyregion/07heat.html?pagewanted=all& r=0>

³⁶ NOAA, <http://www.ncdc.noaa.gov/stormevents/>

³⁷ Mileti, Dennis S., John H. Sorensen and Paul W. O'Brien. 1992. "Toward an Explanation of Mass Care Shelter Use in Evacuations." *International Journal of Mass Emergencies and Disasters* 10 (1): 25-42.

Economy

North Providence has moved from a manufacturing/industrial base to a commercial based economy. Much of the new development has been focused on retail and commercial businesses. Similar to state trends, most North Providence residents work in the educational services and health care and social assistance industries.³⁸

According to the Community Comprehensive plan, the North Providence commercial districts are: Marieville, Geneva, Fruit Hill, Centerdale, Allendale-Upper Smith Street, and Mineral Spring Avenue. Lymansville represents the small industrial area still in existence.

HAZUS-MH was used to further understand the potential risk from a 100 year flood and a large hurricane³⁹. HAZUS-MH is a software tool that contains models for estimating potential losses from earthquakes, floods, and hurricanes. For the purpose of this plan, two scenarios were run that capture the town’s risk from flooding and hurricanes/Nor’easters. The table below summarizes some of the potential damages. The hurricane scenario is model uses the same path as the hurricane which tracked west of Rhode Island.

Table 12: HAZUS-MH Scenarios for North Providence, RI⁴⁰

	100-Year Flood Event	1938 Hurricane Scenario
DAMAGE	AMOUNT	AMOUNT
Debris generated	909 tons	6,657 tons
Buildings destroyed	21	1
Buildings at least moderately damaged	28	154
Displaced households	182	64
Essential Facility Damage	1	1
Residential Property (capital stock)	\$12 million	\$33.7 million
Business interruptions	\$60,000	3.4 million

Built Environment

The Town of North Providence is reaching build-out capacity, with about 90% of the available land already developed. Most of this land is occupied by residential development. Following a Statewide economic downturn, the Town is focused on re-development- occupying previously vacant or underutilized properties with new businesses. Vacant land (once 42% of total area) has decreased over the years as infill development occurs.⁴¹

There are an estimate 9,990 buildings in North Providence with an aggregate total replacement value of \$3,577,000,000. An estimate 80% of that are residential structures (valued at \$2,850,896,000) and 15% are commercial (valued at \$536,641,000).⁴²

³⁸ Town of North Providence, Rhode Island, Community Comprehensive Plan, 2013

³⁹ HAZUS modeling conducted by CDR Maguire on 6/23/2015 using HAZUS-MH 2.2

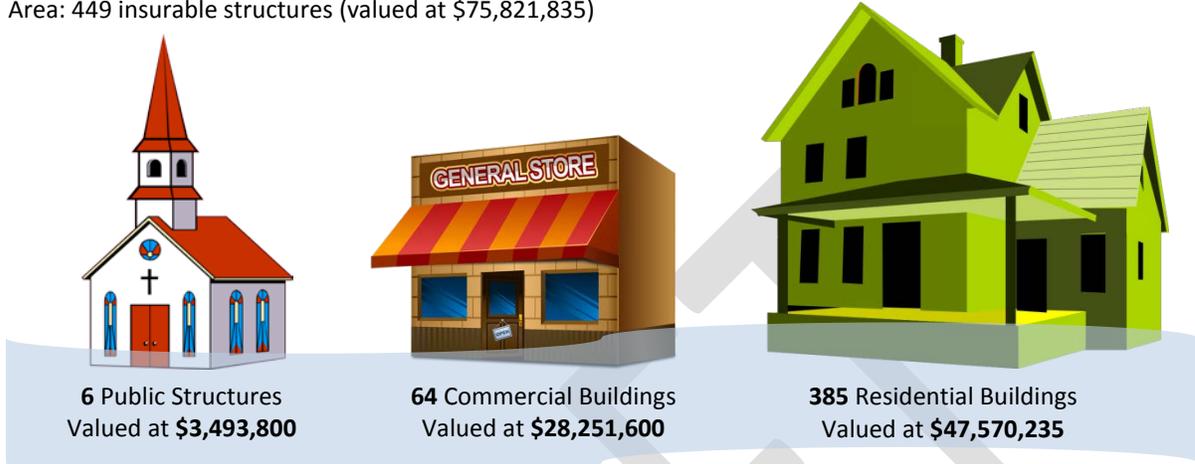
⁴⁰ Ibid.

⁴¹ Town of North Providence, Rhode Island, Community Comprehensive Plan, 2013

⁴² HAZUS-MH 2.2 report run by CDR Maguire on 3/18/2015

HAZUS estimates that a Category 3 hurricane like the Hurricane of 1938 would at least moderately damage 154 buildings in North Providence, with maybe one, if any, being completely destroyed. A similar hurricane would also generate over 6,000 tons of debris, brick and wood comprising 65% of the total.

A heavy rain event with rising stream levels could have a devastating impact on the North Providence building stock. The following summarizes the values of buildings located in the North Providence Special Flood Hazard Area: 449 insurable structures (valued at \$75,821,835)



Natural Environment

Being largely urban, North Providence’s existing wooded swamps are relatively small and isolated areas of red maple swamps. Most of the smaller ponds are located west of Louisquisset Pike; deeper bodies of water are: Canada Pond, Wenscott Reservoir, and the mill ponds on the lower portion of the Woonasquatucket River.⁴³ These areas are sensitive to damages from water pollution, overdevelopment, disease, and climatic stressors (extreme weather).



Wenscott Reservoir

The North Providence Land Trust and the Environmental Commission maintain open space for conservation, promote green infrastructure development, and support resource protection.

To protect the natural functions of the floodplains, and other features, the North Providence Zoning Ordinance designates a Flood Hazard District. A permit is required by the “Building Inspector for all proposed construction, development, or storage of equipment and/or materials within a floodplain or flood hazard area. Flood-carrying capacity within the floodplain, flood hazard area, or watercourse cannot be altered or relocated.”⁴⁴

In order to increase the level of protection offered by the natural systems, the Town has outlined a Future Natural Resource Plan which includes: establishing a Woonasquatucket River Corridor, expand drainage regulations, add groundwater protection to site plan review process, develop an overlay district to protect surface water resources, identify areas that may need the floodplain elevation reevaluated, develop a dam management plan.

⁴³ Town of North Providence, Rhode Island, Community Comprehensive Plan, 2013

⁴⁴ Ibid.

3.4 Risk Assessment Matrix

The matrix below (Table 13: Critical Infrastructure/Community Assets) represents the culmination of the risk assessment process and is the final product. Its purpose is to gather all the pertinent results in one place for ease of presentation and to serve as a starting point for discussion of specific mitigation actions. It not only lists the specific areas of concern, but provides detailed location information, summarizes the applicable hazard, problem, and mitigation benefits.

Table 13 Risk Assessment Matrix

DRAFT

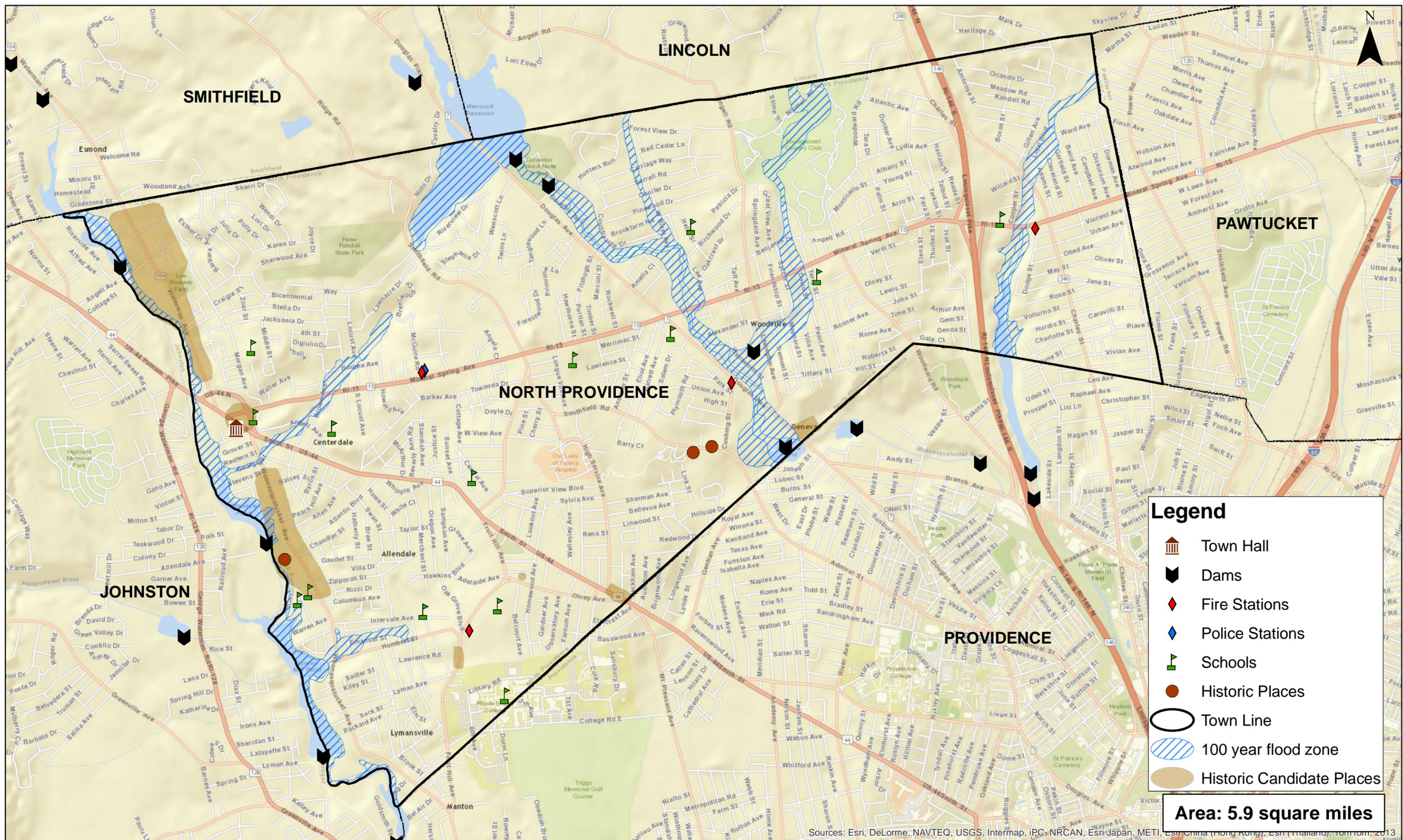
AT RISK	LOCATION	HAZARD	PROBLEM	MITIGATION BENEFITS
I. Flood Prone Drainage Systems	A. May Street at Charles Street B. Evergreen Parkway C. 1100 Block of Douglas Avenue D. Smith Street at Town Line E. Centerdale Brook F. Walter Ave. G. Warren Ave. H. Allendale Ave. at Town Line I. Elliot and Barrett Aves J. Bellevue Ave. neighborhood K. Woonasquatucket Ave. at Humbert Street L. Oak Street M. Terry Street N. Cleveland at Lojai O. Brook Street P. Gill and Platt	Riverine flooding, poor drainage, undersized culvers, low topography/runoff	Flooding of local roads limit access and may strand residents. Damage to homes. Undersized culverts result in flooding during heavy rain events Low topography acts as a basin, collecting rainwater	Improved drainage, road access, reducing infrastructure loss
II. Dams	A. Wenscott Reservoir (high hazard) B. Louisquisset Flood Control (high hazard) C. Geneva Sportsmen's Club Pond D. Shippee Pond E. Allendale Pond F. Lymanville G. Centredale H. Greystone I. Douglas Terrace Pond	Flooding related to heavy rain events and structural damage due to earthquake. Deterioration due to lack of ongoing maintenance.	Extreme rain and earthquake events have the potential to cause structural failure resulting in catastrophic flooding.	Structural preservation preventing catastrophic flooding, reducing property loss and protecting public health, safety, and welfare.
III. Care Facilities/ Special Needs School	A. Salvatore Mancini Resource and Activity Center B. George N. Hunt Campus School (440 Fruit Hill Avenue) C. Our Lady of Fatima Hospital D. Hopkins Health Center E. Golden Crest F. Fogarty Center	Special needs populations that may need assistance during hazard events.	These care facilities play a vital role in housing North Providence's elderly and special needs populations. The occurrence of a natural hazard event creates a higher potential for these special populations to become vulnerable due to their reduced mobility, thus placing their lives and living quarters in danger.	Care facilities for welfare improvement of special needs populations
IV. Critical Municipal Hazard Response Facilities	A. Town Hall (2000 Smith Street) B. Old Town Hall (2026 Smith Street) C. Town Hall Annex (1995 Smith Street) D. Public Safety Complex (1951 Mineral Spring Ave.) E. Police/Fire Department on 1967 Mineral Spring Ave. F. Fire Department on Fruit Hill G. Fire Department on 1080 Mineral Spring H. Public Works on 2 Mafalda Street I. North Providence High School- Shelter (Town Shelter, not Red Cross approved) at 1828 Mineral Spring Ave. J. Back up 911 Center at RI Fire Marshall Investigation Division buildings (1951 Smith Street) K. Communication Towers L. Mineral Spring Avenue- key viaduct for evacuation, utilities, and emergency response	Depended upon for responding to all natural hazard events.	Potential loss of physical access, power supply and critical systems, thus hindering the governmental and emergency response to natural hazard events.	Protection of essential public services, records, evacuation routes, and the general livelihood of North Providence residents and their property.
V. Electrical Facilities	National Grid high voltage Q line	High winds, ice damage, and earthquakes	Not owned by the town but the right of way crosses through the eastern quarter of the town. Downed lines could create an electrocution hazard	Provision of essential utility service, reduction in cleanup and repair costs, and the promotion of public health, safety, and welfare.
VI. Water	Longview (High Service) Reservoir- services part of the town -rest of town serviced by Providence Water, Smithfield Water Supply Board, and East Smithfield Water District Sewer pump stations at Lojai Blvd pumps up Adams Street connector	Freezing, earthquake, contamination	Failure of the reservoir structure could cause catastrophic flooding. Contamination of the reservoir could leave a third of North Providence without potable water. Providence Water and East Smithfield Water District currently provide water to 2/3 of the town. If that main were to rupture a large population of the City would be without water.	Safe and abundant drinking water.
VII. Recreational Facilities	A. Governor Notte Park B. Camp Meehan C. Ivan Street Playground D. Ivan Street Lot E. Captain Joseph DeNinno Field F. Captain Steven Olney Memorial park G. Miller-Waite-Evans Memorial Park H. North Providence Little League West	Flooding, storm damage, brush fire	These facilities provide residents of North Providence places to go for recreational and leisure activity. The occurrence of a natural hazard event creates a threat of property damage.	Preservation of recreational facilities and reducing risk to residents.

<p>VIII. Historic Resources</p>	<p>A.Allendale Mill (494 Woonasquatucket Ave.) B.Captain Stephen Olney House (138 Smithfield Road) C.Smith-Cushing House (109 Smithfield Road) D.Old Town Hall (2226 Mineral Spring Avenue) E.Fruit Hill Avenue School (354 Fruit Hill Avenue) F. William W. Angell House (157 Fruit Hill Avenue) G. Blacksmith Shop/Belvedere Club (1596 Smith Street) H. Joseph Smith House (109 Smithfield Road) I. Greystone Historic District</p>	<p>Structure damage, weather extremes</p>	<p>These historic resources, susceptible to property damage, contribute to North Providence’s culture, heritage, and general character.</p>	<p>Protecting irreplaceable property that contributes to North Providence’s culture, heritage, and general character.</p>
<p>IX. Schools</p>	<p>A. Early Years Learning Center (in the SFHA) B. Rhyme and Reason Nursery School C. Green Acres Country Day School D. Centredale School E. James L. McGuire School F. Greystone School G. Stephen Olney School H. Dr. Joseph A. Whelan Elementary School I. Marieville Elementary School J. Dr. Edwards A. Ricci School K. Birchwood Middle School L. George N. Hunt Campus School (St. Mary’s) M. North Providence High School N. Rhode Island College</p>	<p>Heavy rain flooding, high winds, and earthquake</p>	<p>These school facilities play a vital role in educating North Providence’s youth. The occurrence of a natural hazard event creates a higher potential for students to be rendered vulnerable, thus placing their lives in danger. Furthermore, the physical structures themselves are put at-risk for severe property damage.</p>	<p>Provision of a safe and secure learning environment, as well as the protection of school infrastructure from property damage.</p>

Risk Assessment Maps

Map 2: Community Facilities

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Legend

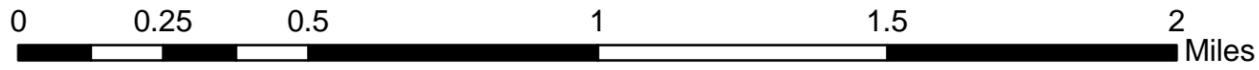
- Town Hall
- Dams
- Fire Stations
- Police Stations
- Schools
- Historic Places
- Town Line
- 100 year flood zone
- Historic Candidate Places

Area: 5.9 square miles

Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Taiwan), TomTom, 2013

NORTH PROVIDENCE, RI

Data Sources: RIGIS, 2008



March 10, 2015



Chapter 4: Programmatic Capability Assessment

4.1 Purpose

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. North Providence 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. Section 4.2 details the Town's existing plans, programs, and policies.

4.2 Primary Programs

4.2.1. North Providence Comprehensive Plan

The North Providence Comprehensive Plan was originally adopted in September 22, 1998. In 2012 the Town updated its comprehensive plan. The updated plan was approved by the Planning Board and adopted by the Town Council in 2013. The plan provides a long-range guide for the Town's future with a comprehensive look at the community as a whole. It addresses land use, housing, economic development, natural resources, services and facilities, open space and recreation, and circulation, with some hazard mitigation activities. The Town recognizes the importance of hazard mitigation, its interaction with municipal land use and infrastructure planning, and the need for a comprehensive planning approach which accommodates these interdependencies.

4.2.2. North Providence Land Trust

The North Providence Land Trust (NPLT) was established in 2000 to preserve open space in North Providence. The purpose of the NPLT is "... to preserve open space, protect wetlands, water bodies, ground and surface water resources, farm lands, historical or cultural places on interest, scenic views, unusual, exceptional or exemplary natural habitats, provide opportunities for research and education on natural resources on land trust held properties and to secure for the town the goals and objectives established in the comprehensive plan."⁴⁵ They have the ability to acquire land for the benefit of all North Providence residents.

4.2.3. North Providence Environmental Commission

The Environmental Commission was created to help create green infrastructure, spearhead environmental education, conserve the town's natural resources, involve neighborhoods in beautification and recycling efforts, and help residents understand the value of a healthy and beautiful place to live.

4.2.4. Zoning Ordinance

The North Providence Zoning Ordinance provides tools the town can use to reduce impacts to natural resources. The Flood Hazard District requires a permit to be issued by the Building Inspector for all proposed construction, development, or storage of equipment and/or materials within a floodplain or flood hazard area. Flood-carrying capacity within the floodplain, flood hazard area, or watercourse cannot be altered or relocated. Hydrological and hydraulic analyses must be performed to demonstrate that that the proposed project will not increase flood levels within the town during the occurrence of the base flood discharge. FEMA's FIRMs are used by the ordinance to identify floodplain and flood hazard areas.

4.2.5 Rhode Island State Building Code

All municipalities within the State of Rhode Island share a single building code (RIGL 23-27.3-100 et. Al.). The Code itself (which incorporates the International Building Code) was last amended in 2012 and provides comprehensive construction requirements designed to mitigate the impacts from natural hazards, such as high wind events. The Code is enforced by the North Providence Building Inspections Department and provides an additional layer of regulatory control to those discussed above.

⁴⁵ Town of North Providence website <http://northprovidenceri.gov/land-trust/>

4.2.6. Emergency Operations Plan (EOP)

The North Providence EOP was last updated in 2009. Its primary purpose is to plan for the coordination and execution of specific roles, duties and responsibilities of individual municipal emergency response personnel in the event of a disaster or general emergency. North Providence’s plan combines mitigation, preparedness, response, and recovery. It is currently up to date.

4.3 Other Resources

The other resources included within this capability assessment are located in Appendices G, and H. Appendix G highlights existing state federal, as well as other entities that provide technical and financial assistance for mitigation. Appendix H identifies existing federal and state protection systems. Lastly, Appendix I details additional financing options not identified in Chapter 5.

Actions In 2015 Plan		Action Type	Status
1	Ordinance to regulate dumping in streams and ditches	Prevention	New
2	Require and maintain FEMA elevation certificates	Prevention	New
3	Expand zoning regulations to promote low impact development	Prevention	New
4	Require soil percolation test for new development	Prevention	New
5	Widen culvert along Woonasquatucket Avenue	Structural Project	New
6	Construct a detention basin to manage stormwater flow from RICC	Structural Project	New
7	Adopt October 2015 flood maps	Prevention	New
8	Create EOP for Wenscott Reservoir and Louisquisset Flood Control dams	Planning	New
9	Repairs at Wenscott dam	Structural Project	New
10	Promote Special Needs Registry	Public Education & Awareness	New
11	Incorporate hazard mitigation principals into all aspects of publically-funded building projects.	Prevention, Natural Resource Protection	New
12	Install secure broadband town-wide	Emergency Services Protection	New
13	Public education piece on protecting your property in the winter	Public Education & Awareness	New

Actions In 2015 Plan		Action Type	Status
14	Create an urban forest management plan	Planning	New
15	Re-establish the volunteer North Providence Historic District Commission	Prevention	New
16	Hazard safety for school children	Public Education & Awareness	New
17	Conduct one active shooter exercise per school annually	Prevention	New
18	Improve building structure for Greystone, Centerdale, and Whelen schools	Structural Project	New
19	Demolish and replace Marieville, James L. McGuire, and Stephen Olney schools	Structural Project	New

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Chapter 5: Identification of Mitigation Actions

Whereas the two preceding Chapters identify risks from natural hazards and programmatic capabilities, this chapter defines a broad mission for the Town in mitigating these risks, and establish a series of hazard mitigation goals and specific implementation actions.

5.1 Mission Statement

It is the mission of the Town and the NPHMC to protect and enhance the quality of life, property and resources by identifying areas at risk from natural hazards and implementing hazard mitigation actions to protect the Town's residents; infrastructure; economy and its historical, natural and cultural resources.

5.2 Mitigation Goals

To achieve its mission the North Providence Hazard Mitigation Committee established a series of goals that could be used to focus mitigation efforts and provide a framework for discussion of specific actions. These goals include: upgrading infrastructure and protecting property, strengthening capabilities, and improving emergency response effectiveness.

5.3 Identified Actions and Objectives

The following mitigation actions and objectives were developed by the NPHMC with review and opportunity for input from each of the prospective project leads. They are organized in accordance with the topical areas of the three mitigation goals discussed above and each summarizes the specific problem and proposed possible solution, details the primary tasks to be undertaken, identifies an appropriate lead and anticipates financing options. Each action was given a priority ranking of low, medium, or high as determined by the NPHMC.

Time Frame

Short Term: within 1-3 years

Medium Term: within 3-5 years

Long Term: greater than 5 years

Priority Level

High: Reduces the greatest risks, is important to accomplish first

Medium: May need other actions to be completed first

Low: Less of an impact on safety and property

The mitigation actions below are grouped by the identified risk area. The plan documents steps that the Town will take to achieve a specific mitigation action that reduces risk to people or property.

5.3.1 Flood Prone Drainage Systems and Streets

There are certain areas of North Providence that are prone to street flooding during heavy rain events due to volume and/or low topography (i.e. Brook Street, Warren Ave., Bellevue Ave. neighborhood, Elliott and Barrett Aves, Evergreen Parkway, and May Street at Charles Street). Although the problems are known, solutions have not been identified for all of these portions of roads or neighborhoods.

Action 1: Create and pass an ordinance (as part of the Stormwater Pollution Prevention Plan) that regulates solid dumping in streams and ditches. This would include storm and yard debris, sand, dirt, and trash.

Action Type: Prevention

Pre or Post Disaster: Pre Disaster

Priority Level: High

Lead: Stormwater Coordinator (Louis Lanni)

Supporting: Planning Director, Planning Board, Town Council, Mayor

Estimate Costs: Staff time (\$1,200)

Financing Options: Planning Department budget

Time Frame: Short-term

Action 2: Require and maintain FEMA elevation certificates for all new and improved buildings in the Special Flood Hazard Area.

Action Type: Prevention
Pre or Post Disaster: Pre Disaster
Priority Level: Medium
Lead: Building Official (Michael Carnavale)
Supporting: Town Planner (David Westcott)
Estimate Costs: None
Financing Options: NA
Time Frame: Medium-term

Action 3: Expand the zoning regulations to promote low impact development techniques such as replacing curbs with grass channels along roadways to capture water, pollution, and sediments.

Action Type: Prevention
Pre or Post Disaster: Pre Disaster
Priority Level: Medium
Lead: Zoning Official (Ben Nascenzi)
Supporting: Stormwater Coordinator (Louis Lanni)
Estimate Costs: Staff time
Financing Options: Town Planning and Zoning Budget
Time Frame: Medium-term

Action 4: For all new development, require a percolation (perc) test to determine the absorption rate of soil at a planned site for a septic drain field or leach field. Implementing standards for length of line, depth of pit, etc. will improve quality of groundwater and reduce flooding in oversaturated areas.

Action Type: Prevention
Pre or Post Disaster: Pre Disaster
Priority Level: High
Lead: Building Official (Michael Carnavale)
Supporting: Town Planner (David Westcott)
Estimate Costs: Staff time
Financing Options: Town Planning and Zoning Budget
Time Frame: Medium-term

Action 5: Widen the culvert along Woonasquatucket Avenue to accommodate overland flooding and riverine flooding.

Action Type: Prevention
Pre or Post Disaster: Pre Disaster
Priority Level: High
Lead: RI Department of Transportation (RIDOT)
Supporting: North Providence Public Works
Estimate Costs: \$500,000
Financing Options: (already appropriated) RIDOT budget, EPA grants, Rhode Island College
Time Frame: Medium-term

Action 6: Construct a “duck pond” detention basin in the southwest corner of town to manage the overland flow of stormwater from nearby Rhode Island Community College.

Action Type: Prevention

Pre or Post Disaster: Pre Disaster

Priority Level: High

Lead: RI Department of Transportation

Supporting: North Providence Public Works

Estimate Costs: included in \$500,000 cost for Woonasquatucket Avenue reconstruction

Financing Options: (already appropriated) RIDOT budget, EPA grants, Rhode Island College

Time Frame: Medium-term

Action 7: Amend town floodplain ordinance to reflect effective flood maps as of October 2015.

Action Type: Prevention

Pre or Post Disaster: Pre Disaster

Priority Level: High

Lead: Town Planner (David Westcott)

Supporting: Town Council, Mayor

Estimate Costs: \$1,200

Financing Options: Planning Department budget

Time Frame: Medium-term

5.3.2 Dams

There are 9 dams in North Providence, two of which are high hazard dams. The Town currently coordinates with the RI Department of Environmental Management on an inspection program to monitor the structural integrity of the dams. However, further action is needed to improve the resiliency of some dams and the Town's response should a dam fail.

Action 8: Create Emergency Action Plans for the Wenscott Reservoir dam, and Louisquisset Flood Control dam. Both of these dams are classified by the State as high hazard.

Action Type: Prevention

Pre or Post Disaster: Pre Disaster

Priority Level: High

Lead: Town Planner (David Westcott)

Supporting: RI Department of Environmental Management

Estimate Costs: Staff time

Financing Options:

Time Frame: Medium-term

Action 9: Repairs at the Wenscott Dam

Action Type: Structural Project

Pre or Post Disaster: Pre Disaster

Priority Level: High

Lead: Public Works

Supporting: Mayor's Office

Estimate Costs: \$187,000

Financing Options: Town budget, EPA Watershed Initiative Grants, FEMA Pre-Disaster Mitigation Grants,

Time Frame: Medium-term

5.3.3 Care Facilities/Special Needs Populations

North Providence has a large percentage of older and special needs residents that may require additional assistance during an emergency. The Special Needs Emergency Registry lets police, fire, and other first responders better prepare for and respond to a community's needs during a hurricane, flood, or other emergency.

Action 10: Promote the State's Special Needs Registry at the National Night-Out event in August and at the Senior Center.

Action Type: Public Education & Awareness

Pre or Post Disaster: Pre Disaster

Priority Level: High

Lead: Communications Division (Ralph Nahigian)

Supporting: Fire Department, Police Department

Estimate Costs: \$1,500

Financing Options: Town Fire and Police public relations budget

Time Frame: Medium-term

5.3.4 Critical Municipal Facilities

The North Providence Hazard Mitigation Committee agreed that the Town currently has storm resistant infrastructure, facilities, and storm preparedness capabilities. The team brainstormed two new activities that they would like the Town to engage in.

Action 11: Incorporate hazard mitigation principals into all aspects of publically-funded building projects. Federal disaster assistance costs billions of dollars annually. To reduce the amount of disaster money spent, the Town can require certain mitigation actions to reduce the vulnerability of publically-funded buildings.

Action Type: Prevention

Pre or Post Disaster: Pre Disaster

Priority Level: High

Lead: Town Planner (David Westcott)

Supporting: None

Estimate Costs: \$500, staff time

Financing Options: Planning and Zoning budget

Time Frame: Medium-term

Action 12: Install secure broadband Wi-Fi throughout the Town to improve first responders' field operations and connectivity.

Action Type: Emergency Services Protection

Pre or Post Disaster: Pre Disaster

Priority Level: Low

Lead: Communications Division (Ralph Nahigian)

Supporting: None

Estimate Costs: \$450,000

Financing Options: Google forfeiture funds

Time Frame: Medium-term

5.3.5 Water

The Town's drinking water is managed three public water suppliers: the East Smithfield Water District (10%), the Providence Water Supply Board (75%), and the Smithfield Water Supply Board (15%). The districts do their own hazard and mitigation efforts for their customers but the Town can help further their efforts through print media.

Action 13: Place an ad or editorial piece in the local newspaper (Valley Breeze) at the beginning of the winter season reminding homeowners that letting a faucet drip during extreme cold weather can prevent the buildup of excessive pressure in the pipeline and avoid bursting.

Action Type: Public Education and Awareness

Pre or Post Disaster: Pre Disaster

Priority Level: Low

Lead: Communications Division (Ralph Nahigian)

Supporting: Emergency Management

Estimate Costs: \$270

Financing Options: Communications Division budget

Time Frame: Short-term

5.3.6 Recreation

North Providence has both developed and undeveloped recreation and conservation space that attracts various users throughout the year.

Action 14: Create an urban forest management plan based on recent tree inventory, equipment, and resources. The plan will describe activities and services such as pruning, required to maintain public trees.

Action Type: Prevention, Natural Resource Protection

Pre or Post Disaster: Pre Disaster

Priority Level: High

Lead: Town Planner (David Westcott)

Supporting: Rhode Island Tree Council

Estimate Costs: \$15,000

Financing Options: RI Tree, Rhode Island DEM, FEMA Pre-Disaster Management Grants, Wildland Urban Interface Community and Rural Fire Assistance grants

Time Frame: Long-term

5.3.7 Historic Resources

North Providence has numerous historic buildings and districts but a waning effort to protect the unique physical character and cultural identity of the Town.

Action 15: Re-establish the volunteer North Providence Historic District Commission to safeguard the heritage of the town by preserving historic elements.

Action Type: Prevention
Pre or Post Disaster: Pre Disaster
Priority Level: Low
Lead: Town Planner (David Westcott)
Supporting:
Estimate Costs: None, Staff time
Financing Options: None
Time Frame: Medium-term

5.3.8 Schools

As school enrollment increases and school buildings deteriorate. The Town wants to improve the physical structure of the schools to meet minimum health and safety requirements. Further hazard safety education is also needed for students.

Action 16: Educate school children about the dangers of all natural hazards in this plan and how to take safety precautions.

Action Type: Public Education and Awareness
Pre or Post Disaster: Pre Disaster
Priority Level: Low
Lead: Communications Division (Ralph Nahigian)
Supporting: Fire Department
Estimate Costs: \$2,000
Financing Options: Fire Department public relations budget
Time Frame: Medium-term

Action 17: Conduct one active shooter exercise per school annually.

Action Type: Prevention
Pre or Post Disaster: Pre Disaster
Priority Level: Low
Lead: North Providence Emergency Management
Supporting: RI Department of Education
Estimate Costs: \$15 Million
Financing Options: Rhode Island Department of Education, Homeland Security Grant Program, and Town Emergency Management budget
Time Frame: Medium-term

Action 18: Meet the health and safety requirements by improving building structure for the following schools: Greystone, Centerdale, and Whelen.

Action Type: Prevention
Pre or Post Disaster: Pre Disaster

Priority Level: High

Lead: RI Department of Education

Supporting: North Providence Town Council

Estimate Costs: \$15 Million

Financing Options: Rhode Island Department of Education and Town

Time Frame: Long-term

Action 19: Demolish and replace (or relocate students for) three 1930s schools- Marieville, James L. McGuire, and Stephen Olney.

Action Type: Structural Project

Pre or Post Disaster: Pre Disaster

Priority Level: High

Lead: RI Department of Education

Supporting: North Providence Town Council

Estimate Costs: \$60 Million

Financing Options: Rhode Island Department of Education and Town

Time Frame: Long-term

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Chapter 6: Implementation Element

6.1 Prioritization of Mitigation Actions

Having identified appropriate mitigation actions the North Providence Hazard Mitigation Committee set about prioritizing them for implementation. To accomplish this for the 2015 plan, the NPHMC ranked the actions as low, medium, or high priority. The prioritized results of this process are displayed in Table 14.

Table 14: Activity Prioritization

Priority Level	Mitigation Action
<p>High: Reduces the greatest risks, is important to accomplish first</p> <p>Medium: May need other actions to be completed first</p> <p>Low: Less of an impact on safety and property</p>	Ordinance to regulate dumping in streams and ditches
	Require soil percolation test for new development
	Widen culvert at Woonasquatucket Ave.
	Construct a detention basin to manage stormwater flow from RICC
	Adopt October 2015 flood maps
	Create dam EOPs
	Repairs at Wenscott dam
	Promote Special Needs Registry
	Incorporate hazard mitigation into publically funded building projects
	Create an urban forest management plan
	Improve building structure for Greystone, Centerdale, and Whelen schools
	Demolish and replace Marieville, James L. McGuire, and Stephen Olney schools
	Require and maintain FEMA elevation certificates
	Expand zoning regulations to promote low impact development
	<p>Medium Priority</p>
Public education piece on protecting your property in the winter	
<p>Low Priority</p>	Re-establish the North Providence Historic District Commission
	Hazard safety for school children
	Conduct one active shooter exercise per school annually

6.2 Evaluation and Revision

6.2.1. Monitoring, Evaluating and Updating the Plan

The plan is a living document that requires adjustments to maintain its relevance. The NPHMC will meet annually to review the status of the mitigation actions; and provide a yearly status report to the Mayor. It is recommended that this review be conducted prior to the Town's annual budget process so that any locally funded projects can be considered in the budget process. The plan will be reviewed and updated every 5 years using the same process as the initial plan adoption with public workshops and public hearings. The NPHMC will utilize the August 2003 FEMA How to Guide "Bringing the Plan to Life/Implementing the Hazard Mitigation Plan" as a resource document to update this plan. This guide contains worksheets which will help the Committee evaluate and monitor the results of the mitigation actions. The NPHMC will also identify potential mitigation projects that can be implemented in a post-disaster scenario taking the opportunity to improve North Providence's disaster reliance.

6.2.2. Continued Public Involvement

North Providence will continue public involvement in the plan maintenance process by:

- a. The approved/adopted plan will be posted on the town's web site;
- b. The annual meeting of the NPHMC to review the implementation of the Plan is a public meeting and will be posted per town guidelines.
- c. The NPHMC will include the public in the preparation of the five-year Plan Update using the same public participation process as in the development of this plan.

Chapter 7: Public Input and Adoption Processes

7.1 Summary

Prior to public release of the 2015 HMP, the NPHMC discussed hazard mitigation through a series of committee meetings. While these meetings did not rise to the level of public hearings and were not advertised, they were open to the public. Table 15 below provides a summary of the NPHMPC meeting dates and the activities that they conducted:

Table 15 Summary of NPHMC Activities

Date	Meeting Summary
3/10/2015	Kick of meeting. NPHMC set strategy plan development. The NPHMC ranked the probably hazards and discussed the process for updating the plan.
3/21/15	The NPHMC reviewed the hazards of concern and created a list of critical infrastructure.
3/31/15 and 4/28/15	The NPHMC identified potential mitigation actions
8/10/15	The NPHMC reviews draft of 2015 HMP document for accuracy and revisions.
TBD	Edits made to draft plan by Town’s consultant under the guidance of the Emergency Management Director
TBD	Draft of 2015 HMP posted for public comment , public notice and article ran in local newspaper
TBD	Article in Providence Journal
TBD	2015 HMP was presented to Town Planning Board
TBD	2015 HMP was emailed to neighboring Emergency Management Directors for review.
TBD	Town’s consultant made document changes as per public comments and final edits.
TBD	Sent to RIEMA for review.
TBD	Edits made to draft plan by Town’s consultant under the guidance of the Emergency Management Director
TBD	Sent to FEMA for review
TBD	Edits made to draft plan by Town’s consultant under the guidance of the Emergency Management Director
TBD	Plan approved and adopted by Planning Board

This hazard mitigation plan benefits from two distinct types of public input strategies that were utilized by the NPHMC during the drafting process and prior to its adoption by the North Providence Planning Board.

This hazard mitigation plan benefits from two distinct types of public input strategies that were utilized by the NPHMC during the drafting process and prior to its adoption by the Town Planning Board and Council.

The 2015 NPHMC included town residents. The NPHMC’s roles focused on reviewing the content of the risk assessment matrix to ensure proper classification of problems and estimates of potential impacts; formulation of mitigation actions and sequencing of primary tasks; and identification of feasible implementation methods and schedules. Their comments were incorporated into the final 2015 HMP.

The second public input strategy used in the formulation of this plan was geared toward the general public as opposed to specific stakeholders. The general public was encouraged to become involved through a public participation process. A copy of the draft 2015 HMP was posted to the Emergency Management page on the Town of North Providence’s website. The public was informed of both the web page posting and the Planning Board workshop and were encouraged to comment on the HMP and attend the workshop. A public notice and newspaper articles in the Providence Journal and XXX (newspapers of general circulation within the Town) ran the first week of XXX. Notice of the Planning Board’s Workshop was also posted as an agenda item on the Town’s website and the Rhode Island Secretary of State’s website, and at the North Providence public libraries and Town Hall in accordance with state law. On XXX, the Town’s Planning Board conducted a public workshop on the HMP as part of their monthly meeting.

Prior to the public meeting, the draft plan was emailed to the neighboring Emergency Management Directors in Providence, Johnston, Smithfield, Lincoln, and Pawtucket for review.

Under the guidance of the Emergency Management Director, the Town’s consultant made the necessary edits to the HMP as per feedback from the NPHMC, Planning Board, and public comments. Review and comments from the Federal Emergency Management Agency and the Rhode Island Emergency Management Agency were incorporated prior to adoption.

APPENDICES

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Appendix A

A: Critical Municipal Facilities Inventory

Name	Location
Town Hall	2000 Smith Street
Old Town Hall	2026 Smith Street
Town Hall Annex	1995 Smith Street
Public Safety Complex	1951 Mineral Spring Avenue
Police/Fire Department	1967 Mineral Spring Avenue
Fire Department	Fruit Hill
Fire Department	1080 Mineral Spring Avenue
Public Works	2 Mafalda Street
North Providence High School- Shelter	1828 Mineral Spring Avenue
Backup 911 Center	1951 Smith Street
Communication Towers	Various locations
Mineral Spring Avenue	East/West transect

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Appendix B

B: School Inventory

Name	Location
Birchwood Middle School	10 Birchwood Avenue
Centerdale School	41 Angell Avenue
Dr. Edwards A. Ricci School	55 Intervale Avenue
Dr. Joseph A Whelan Elementary School	1440 Mineral Spring Avenue
Early Years Learning Center	33 Maple Avenue
George N. Hunt Campus School (St. Mary's)	440 Fruit Hill Avenue
Green Acres Country Day School	2 Thomas Street
Greystone School	100 Morgan Avenue
James L. McGuire School	55 Central Avenue
Marieville Elementary School	1135 Mineral Spring Avenue
North Providence High School (Shelter)	1828 Mineral Spring Avenue
Rhode Island College	600 Mt. Pleasant Avenue
Rhyme and Reason Nursery School	7 Rockwell Avenue
Stephen Olney School	1378 Douglas Avenue

Appendix C

C: Historic Properties

Name	Location
Allendale Mill	494 Woonasquatucket Ave.
Captain Stephen Olney House	138 Smithfield Road
Smith-Cushing House	109 Smithfield Road
Old Town Hall	2226 Mineral Spring Avenue
Fruit Hill Avenue School	354 Fruit Hill Avenue
William W. Angell House	157 Fruit Hill Avenue
Blacksmith Shop/Belvedere Club	1596 Smith Street
Joseph Smith House	109 Smithfield Road
Greystone Historic District	

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Appendix D

D: Care Facilities

Name	Location
Salvatore Mancini Resource and Activity Center	2 Atlantic Blvd
George N. Hunt Campus School	440 Fruit Hill Avenue
Our Lady of Fatima Hospital	200 High Service Ave.
Hopkins Health Center	610 Smithfield Road
Golden Crest Nursing Home	100 Smithfield Road.
John E. Fogarty Center	220 Woonasquatucket Ave.

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Appendix E

E: Dam Inventory

Name	Hazard Classification
Wenscott Reservoir	High
Louisquisset Flood Control	High
Geneva Sportsmen's Club Pond	Low
Shippee Pond	Low
Allendale Pond	Low
Lymansville	Low
Centredale	Low
Greystone	Low
Douglas Terrace Pond	Low

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Appendix F

F: Technical and Financial Assistance for Mitigation State Resources

Coastal Resources Center

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

Coastal Resources Management Council

Stedman Government Center
4808 Tower Hill Road
Wakefield, RI 02879
(401) 222-2476

Department of Administration/Division of Planning

One Capitol Hill
Providence, RI 02908
(401) 222-6478

Department of Environmental Management

235 Promenade Street
Providence, RI 02908
(401) 222-6800

Rhode Island Banking Commission/Associate Director

233 Richmond Street
Providence, RI 02903
(401) 222-2405

Rhode Island Builders Association

Terry Lane
Gloucester, 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 Marshal's Office

272 West Exchange Street
Providence, RI 02903
(401) 222-2335

State of Rhode Island Building Committee Office

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

**Technical and Financial Assistance for Mitigation
Federal Resources**

Economic Development Administration

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

Federal Emergency Management Agency

Mitigation Division

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

Small Business Administration

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

U.S. Department of Agriculture

Natural Resources 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

**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

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. Environmental Protection Agency

Region I Offices
5 Post Office Square - Suite 100
Boston, MA 02109-3912
(617) 565 3400

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

Technical and Financial Assistance for Mitigation

Other Resources Technical and Financial Assistance for Mitigation

The Association of State Flood Plain Managers (ASFPM)

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.

Flood Plain Management Resources Center

Free library and referral service of the ASFPM for flood plain 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)

An insurance industry – sponsored, nonprofit organization dedicated to reducing losses – 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

Organizations, such as the American Red Cross, the Salvation Army, Habitat for Humanity, Interfaith, and the Mennonite Disaster Service, are often available to help after disasters. Service organizations, 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 floodproofing 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)

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 WWW home page that is accessible at <http://www.serve.com/NESEC>.

The New England Flood Plain and Stormwater Managers Association (NEFSMA)

Professional organization for New England flood plain and stormwater managers. Provides workshops, conferences, and a newsletter to membership and interested individuals and companies. Contact: Nicholas Winter, chairman, at (617) 727-0488 or the NEFSMA home page on the Web at <http://www.seacoast.com/~nepsma>.

Appendix G

G: Existing Protection Systems Federal and State

Earthquakes and Hurricanes

A certain amount of funding is allotted to each state per year based on a risk formula for earthquakes. Coastal states such as Rhode Island are allocated funds based on a risk formula for hurricanes. Each state receiving such funds has the ability to grant project funds to a community. There is not a match requirement on the part of the community, but the funds are limited, and are generally only available once a year. The projects or products proposed for such funding must demonstrate that earthquake or hurricane risk will be reduced or eliminated, and that the proposed project or product is a cost-effective measure (a stringent cost/benefit analysis need not be performed). Information about the amount of funding available per year and the state requirements for eligibility and performance may be obtained from RIEMA at (401) 946-9996.

Economic/Community Development

There are programs existing to help floodproof homes using Community Development Block Grant funds. There may be housing assistance programs in the community that can be used following a major flood, achieving both objectives of reducing flood damage and improving the communities housing stock (see Appendix F, Federal Resources, for more information).

Evacuation Plans and Systems

The community's emergency operations center has evacuation plans in place. RIEMA may have additional evacuation plan information located on their website at www.riema.ri.gov.

Land Use Restrictions

There are several federal and state regulations that serve to restrict land use in certain areas that may help reduce flood hazard vulnerability. If your community has open land owned by the state or federal government, examine what restrictions are placed on its development. In addition, the state Wetlands Protection Act regulates the development of all lands identified as significant to the protection of resources identified in the act.

Septic Systems

In areas in the community not served by a public sewer system, state septic system regulations influence development and may be a consideration for mitigation alternatives that include rebuilding and elevation of structures. Specific design requirements must be met for any construction in river floodways. Generally, an inspection of a septic system is required if there is a change in use of the structure, an increase in flow, or a failed system. Limited inspections are required if the footprint of the structure is being changed. Upgrades are required by the state if an inspection reveals a failed system.

Warning Systems and Emergency Operations Plans

There are no statewide flood warning systems but RIEMA has offices throughout the state that maintain area-wide plans for flood events. Stream gauges are monitored by the communities as well as the National Weather Service office in Taunton, MA.

The State of Rhode Island has adopted a CodeRED Emergency Notification System which can send out warning messages to registered users. To register, visit the RIEMA website www.riema.ri.gov.

Appendix H

H: Financing Options

Federal Emergency Management Agency

National Flood Insurance Program (NFIP)

All of Rhode Island's 39 municipalities participate in the NFIP. This program is a direct agreement between the federal government and the local community that flood insurance will be made available to residents in exchange for community compliance with minimum flood plain management regulations. Communities participating in the NFIP must:

- Adopt the flood insurance rate maps as an overlay regulatory district.
- Require that all new construction or substantial improvement to existing structures in the flood hazard area be elevated or (if nonresidential) floodproofed to the identified flood level on the maps.
- Require design techniques to minimize flood damage for structures being built in high hazard areas, such as floodways or velocity zones.

In return for community adoption of these standards, any structure in that community is eligible for protection by flood insurance, which covers property owners from losses due to inundation from surface water of any source. Coverage for land subsidence, sewer backup, and water seepage is also available subject to the conditions outlined in the NFIP standard policy (see Appendix F, Federal Resources, for contacts regarding insurance coverage and purchase). Since homeowners insurance does not cover flooding, a community's participation in the NFIP is vital to protecting property in the flood plain as well as being essential to ensure that federally backed mortgages and loans can be used to finance floodprone property.

Hazard Mitigation Grant Program (HMGP)

Also known as the 404 Program or HMGP, this program is available only after a federally declared disaster occurs. It represents an additional 15 percent of all the infrastructure and individual assistance funds that are provided to states to repair damages and recover from losses, and is administered by the state in partnership with FEMA. Having a plan or completed mitigation action matrix prior to a disaster event is extremely helpful in meeting the state's deadlines for applications and ensuring the project is eligible and technically feasible. It provides 75/25 matching grants on a competitive basis to state, local, and tribal governments, as well as to certain nonprofit organizations that can be matched by either cash or in-kind services. The grants are specifically directed toward reducing future hazard losses, and can be used for projects protecting property and resources against the damaging effects of floods, earthquakes, wind, and other hazards. Specific activities encouraged under the HMGP include acquiring damaged structures to turn the land over to the community for open space or recreational use, relocating damaged or damage-prone structures out of the hazard area, and retrofitting properties to resist the damaging effects of disasters. Retrofitting can include wet- or dry-floodproofing, elevation of the structure above flood level, elevation of utilities, or proper anchoring of the structure.

For further information contact the state of Rhode Island hazard mitigation officer at (401) 946-9996 or FEMA Region I at (617) 223-9540.

Flood Mitigation Assistance Program (FMA)

Two programs that have been authorized under the National Flood Insurance Reform Act of 1994 include the Flood Mitigation Assistance (FMA) program and a provision for increased cost of compliance (ICC) coverage. FMA makes grants available on a pre-disaster basis for flood mitigation planning and activities, including acquisition, relocation, and retrofitting of structures. FMA grants for mitigation projects will be available only to those communities with approved hazard mitigation plans.

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Financing Options

ICC coverage has recently been implemented for all new NFIP policies and renewals and is intended to be “mitigation insurance” to allow homeowners whose structures have been repeatedly or substantially damaged to cover the cost of elevation and design requirements for rebuilding with their flood insurance claim up to a maximum of \$15,000.00. A certain amount of funding is allotted to each state per year based on a risk formula for floods. Each state has the discretion to award funds to communities or to state government agencies. States may use whatever criteria or method they choose to award the funds as long as the applicant and the proposal are eligible. The program may fund up to 75 percent of the cost of the proposed project, with a minimum of 25 percent of the cost coming from the community. A minimum of half the community share must be cash or “hard match.”

Funds can also be granted to communities to help them prepare local flood mitigation plans. The same match requirements apply. Once a community receives a planning grant, however, it is not eligible to receive additional planning grants for another five years. For further information on the FMA program or ICC coverage contact RIEMA at (401) 946-9996.

Natural Resources Conservation Service (NRCS)

Small Watershed Program and Flood Prevention Program

The Watershed and Flood Prevention Act, P.L. 83-566, August 4, 1954, (16 USC 1001 – 1008) authorized this program. Prior to fiscal year 1996, small watershed planning activities and the cooperative river basin surveys and investigations authorized by Section 6 of the Act were operated as separate programs. The 1996 appropriations act combined the activities into a single program entitled Watershed Surveys and Planning Program.

The purpose of the Watershed Program, including River Basin operations, is to assist Federal, State, local agencies, local government sponsors, tribal governments, and program participants to protect and restore watersheds from damage caused by erosion, floodwater, and sediment, to conserve and develop water and land resources, and solve natural resource and related economic problems on a watershed basis. The program provides technical and financial assistance to local people or project sponsors, builds partnerships, and requires local and state funding contribution.

Resource concerns addressed by the program include watershed protection, flood prevention, erosion and sediment control, water supply, water quality, opportunities for water conservation, wetland and water storage capacity, agricultural drought problems, rural development, municipal and industrial water needs, upstream flood damages, water needs for fish, wildlife, and forest-based industries, fish and wildlife habitat enhancement, wetland creation and restoration, and public recreation in watersheds of 250,000 or fewer acres. Both technical and financial assistance are available.

Wildlife Habitat Incentives Program

The Wildlife Habitat Incentives Program (WHIP) is a voluntary program for people who want to develop and improve habitat primarily on private land. Through WHIP USDA’s Natural Resources Conservation Service (NRCS) provides both technical assistance and up to 75 percent cost-share assistance to establish and improve fish and wildlife habitat. WHIP agreements between NRCS and the participant generally last from 5 to 10 years from the date the agreement is signed.

National Weather Service (NWS)

The Taunton, Massachusetts NWS office has developed a partnership with RIEMA. NWS donates staff time and tide gauges to help gain more lead time for evacuation.

For further information contact NWS at (508) 823-2262. <http://www.nws.noaa.gov/>.

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Financing Options

American Red Cross (ARC)

The ARC chapter of Rhode Island has supplied public education materials and volunteered to conduct training programs and hold seminars for the Rhode Island Hazard Mitigation Project.

For further information contact the Rhode Island Chapter of the American Red Cross at (401) 831-7700. <http://www.redcross.org>.

U.S. Army Corps of Engineers

Beneficial Uses of Dredged Material – Section 204, Water Resources Development Act of 1992, as amended, authorizes projects for the protection, restoration, and creation of aquatic and ecologically related habitats, including wetlands, in connection with dredging an authorized federal navigation project. Non-federal sponsors are responsible for 25 percent of the project cost and 100 percent of the cost of operation, maintenance, replacement and rehabilitation. There is an annual appropriations limit of \$15 million. For projects with an estimated federal cost of less than \$5 million, divisions have approval authority.

1948 Flood Control Act, as amended - Section 205 (Small Flood Damage Reduction Projects) aids in the development and construction of small flood damage reduction projects for eligible non-federal sponsors. The 1960 Flood Control Act, as amended, provides 100 percent funding for technical and planning guidance to state and local governments and federally recognized Native American tribes to help develop and interpret flood and flood plain data, such as flood hazard mapping, and for assessment for structural and non-structural flood damage reduction measures.

Under Flood Control Act of 1946 – Section 14, as amended, projects are eligible for construction only after an analysis demonstrates the engineering and environmental feasibility and economic justification of the improvement. The local sponsor must be a municipality or public agency. Funding may also be available for flood damage reduction measures if the community writes a request letter to the U.S. Army Corps of Engineers. The non-federal cost share is 35 percent of the analysis and implementation, and the initial \$40,000 of the analysis is 100 percent federally funded.

The 1974 Water Resources Development Act, as amended – Section 22 (Planning Assistance to States Program) provides technical assistance for such flood projects as erosion and control. This program uses cost-shared studies with a non-federal sponsor. The non-federal share of the cost is 50 percent and in-kind services are not authorized. The federal limit for each state is \$500,000 annually.

For more information, contact the U.S. Army Corps of Engineers at (978) 318-8087 or (978) 318-8647. <http://www.usace.army.mil>.

State of Rhode Island

The capital budget is approved on a 5-year basis and is proposed by the governor. If there is any surplus available in the emergency fund, this could be a possible source of financing for mitigation projects.

Rhode Island Department of Environmental Management (DEM)

In the 1980's, four major open space bond issues were approved that resulted in an investment of more than \$100 million for recreational and open space land acquisition. Each application is reviewed by a committee to assure consistency with local plans and habitat values. The state participates in funding either through a matching grant or of a revolving loan. Funds may be available through the DEM Parks and Recreation Division for tree trimming, dune restoration and bulkhead repair. In

Appendix H (Continued)

Financing Options

addition, the state has several funding programs for the acquisition of land or purchase of development rights to protect open spaces. For instance, two Rhode Island municipalities use a real estate transfer tax for land preservation. Rhode Island has incorporated land trusts that work to preserve land and natural resources. Land owners can participate in the Farm, Forest and Open Space Program. Under this program, land may qualify for a reduced property tax assessment if it meets specific criteria as farmland, forest land or open space.

For current funding availability contact the Open Space and Recreational Bond Fund Land Acquisition Program or DEM at (401) 222-2776.

Rhode Island Department of Transportation (DOT)

The State Planning Council designates which Transportation Improvements Plan enhancement projects the state will pursue. Applications for the Federal Wooden Bridge Replacement Program can be made through DOT. In addition, DOT has a debris management program that goes into effect during a storm event. The new federal transportation bill, TEA-21, is a successor to the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA). There are a few categories within this bill that may have available funding for natural hazard mitigation projects. These include transportation enhancement (categories include storm water remediation, storm water runoff protection, and environmental mitigation) and bridge replacement. The municipality must apply for project funds through DOT. The annual funding averages for Rhode Island are \$156,781.00. There is an average of \$26,749 available under the Bridge Rehabilitation and Replacement category.

For further information contact DOT at (401) 277-2481.

North East States Emergency Consortium (NESEC)

Since 1998, RIEMA has been given funds for preventative measures and maintenance. Providence and Woonsocket both received \$5,000 grants from NESEC for mitigation activities that were addressed in their local hazard mitigation strategies.

For further information contact at (781) 224-9874.

Municipal

Several utility companies have prevention and clean-up programs that require cooperation from municipalities. For instance, companies are usually willing to co-sponsor planting low-growing trees as part of a tree replacement program. Utility companies will provide the bucket truck area lift if the town/city helps dispose of tree trunks.

The Clean Water Finance Agency has financing programs for local government units and water suppliers. The clean water state revolving fund uses monies from the Federal Clean Water Act to support sewer work such as sewer extensions and septic system repair, and to give homeowners of all incomes low-interest loans for septic system repairs. The community wide onsite wastewater management plan is a Clean Water Finance Agency program for failing or sub-standard septic systems, and it identifies areas in municipalities where system failures could cause degradation to water quality. Municipal loans for large infrastructure projects are also available through this program at discounted interest rates.

Appendix K

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Appendix L

J: Public Notice and Article

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