

# 2025 Aquidneck Island Regional Hazard Mitigation and Flood Management Plan (DRAFT)

Town of Portsmouth, Rhode Island  
Town of Middletown, Rhode Island  
City of Newport, Rhode Island



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## Executive Summary

Aquidneck Island is an island region in Rhode Island, made up of the Towns of Portsmouth and Middletown, and the City of Newport. Serving as the lead entity, the Town of Portsmouth received a Federal Emergency Management Agency (FEMA) Building Resilient Infrastructure and Communities (BRIC) award to develop a regional, multi-jurisdictional Natural Hazard Mitigation Plan for all three island municipalities. A third-party consultant Vanasse Hangen Brustlin, Inc. (VHB) was hired by the Town of Portsmouth to lead this effort.

This Regional Hazard Mitigation and Flood Management Plan (RHMP) is a product of the Regional Hazard Mitigation Committee (RHMC or Committee). It has been approved by the governing bodies of each participating municipality, the Rhode Island Emergency Management Agency, and the Federal Emergency Management Agency in accordance with the Disaster Mitigation Act of 2000.

The consultant, Aquidneck Island Land Trust, residents and municipal officials from each community, contributed to this planning effort. VHB prepared this plan, building upon the prior Hazard Mitigation Plans from each municipality.

This Plan was constructed using input from municipal and private stakeholders and the public.

The purpose of this Plan is to:

1. Identify natural hazards and vulnerability which will affect Aquidneck Island and its nearly 60,000 residents;
2. Identify community assets which may be vulnerable to these hazards;
3. Highlight current capabilities to reduce risks from natural hazards; and
4. Propose a series of mitigation actions which reduce the loss of life and property, economic disruptions, and the cost of post-disaster recovery.

Public input and the RHMC's overview of past natural hazard occurrences verifies that the region is vulnerable to diverse events including hurricanes, Nor'easters, sea level rise, high winds, flooding, and severe winter weather.

The risk assessment confirms that the region has much to lose from these events. The identified vulnerabilities include flood prone areas, streets, or infrastructure, and drainage systems, bridges, wastewater systems, water supply system, other services/utilities, communication equipment, dams,

critical municipal hazard response facilities, populations, businesses, schools, public buildings, recreation facilities, natural and historic resources.

To address these risks the 2025 RHMP puts forth a clear mission, a distinct set of goals and 10 regional mitigation actions. The shared hazard mitigation mission is to protect public health and safety and create sustainable economic growth by limiting losses to lives, public and private property, and natural resources/systems. To implement the plan, important goals must be met. The Aquidneck Island mitigation strategy was created to help protect its citizens, visitors, businesses and property from the effects of various natural hazards.

This planning process establishes funding priorities for municipalities on Aquidneck Island. The formal adoption and implementation of this plan will allow Aquidneck Island municipalities to participate in several programs offered by the Federal Emergency Management Agency (FEMA) including: the Community Rating System Program (CRS); the Pre-Disaster Mitigation Assistance Program (PDM); the Building Resilient Infrastructure in Communities (BRIC) Program; the Flood Mitigation Assistance (FMA) Program; and the Hazard Mitigation Grant Program (HMGP). On average, natural hazard mitigation saves taxpayers \$6 for every \$1 spent on federally funded mitigation activities.



# 1

## Introduction

### Hazard Mitigation and its Benefits

Natural hazard mitigation planning consists of a series of actions taken to identify specific assets that are vulnerable to natural hazards within a region and seek 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 region wide. The process of natural hazard mitigation planning sets clear goals, identifies appropriate actions, and produces effective mitigation strategies that can be updated and revised to keep the plan current.

States and communities across the country are realizing that responding to natural disasters, without addressing ways to minimize their potential effect, is no longer an adequate role for local 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.

Federal legislation provides funding for disaster relief, recovery, and hazard mitigation planning. The legislation includes the following:

**The Disaster Mitigation Act of 2000 (DMA 2000)** became law on October 30, 2000, amending the Robert T. Stafford Emergency Assistance Act to create the authority on mitigation planning and the Pre-Disaster Mitigation (PDM) grant program. The DMA is a landmark law that recognizes that mitigation planning is the foundation for reducing risk.

A **Natural Hazard** is defined as an extreme natural event. **Natural Disasters** occur when these extreme natural events come into contact with people and property.

**Natural hazard mitigation** is any sustained action taken to permanently reduce or eliminate long-term risk to people and their property from the effects of natural hazards.

**Natural Hazard mitigation planning** is a process undertaken by a community to analyze the risk from natural disasters, coordinate available resources, and implement actions to minimize the damage to property, and injury or loss of life of its citizens before disaster occurs.

Mitigation plans help states, tribes, and locals understand their risk from natural hazards and reduce losses based on those risks. The DMA allows for states and tribes with an increased commitment to mitigation to achieve an “Enhanced” status, which provides additional funding.

**The Water Infrastructure Improvements for the Nation (WIIN)** Act of 2016 added a new dam safety grant program. The program requires applicants have a mitigation plan that includes all dam risks.

The **Disaster Recovery Reform Act (DRRA)** of 2018 acknowledges the need for collaborative disaster response and recovery across the whole community. The DRRA also created the Building Resilient Infrastructure and Communities (BRIC) grant program to replace and simplify the PDM program and added new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP) or other annual funding opportunities.

Section 322 of the Disaster Mitigation Act of 2000 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 a FEMA-approved natural hazard mitigation plan in place prior to receiving pre- and 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 pre- and post-disaster HMGP funding.

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

Support of a proactive planning approach focused on sustainability could help minimize the social and economic hardships that have resulted from the occurrence of previous natural disasters. These social and economic hardships include: the loss of life/injuries, destruction of property, interruption of jobs, damage to businesses, and the loss of historically significant structures and facilities.

## Mission Statement and Goals:

The Aquidneck Island communities of Portsmouth, Middletown, and Newport will work together to protect public health and safety and create sustainable economic growth by limiting losses to lives, public and private and private property, and natural resources/systems.

### Goals

This mitigation strategy is adopted by Aquidneck Island communities to present actions which help protect its citizens, visitors, businesses and property from the effects of various natural hazards. It is the intent of the Aquidneck Island communities to:

1. Protect public health, safety and welfare;
2. Reduce property damage caused by hazard impacts;
3. Minimize social dislocation and distress;

4. Reduce economic losses and minimize disruption to local businesses;
5. Protect the ongoing operations of critical infrastructure;
6. Reduce the dependence and need for disaster assistance funding after disasters;
7. Expedite disaster recovery mitigation efforts; and,
8. Provide an ongoing forum for the education and awareness of natural hazard mitigation issues, programs, policies, and projects.

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## Background

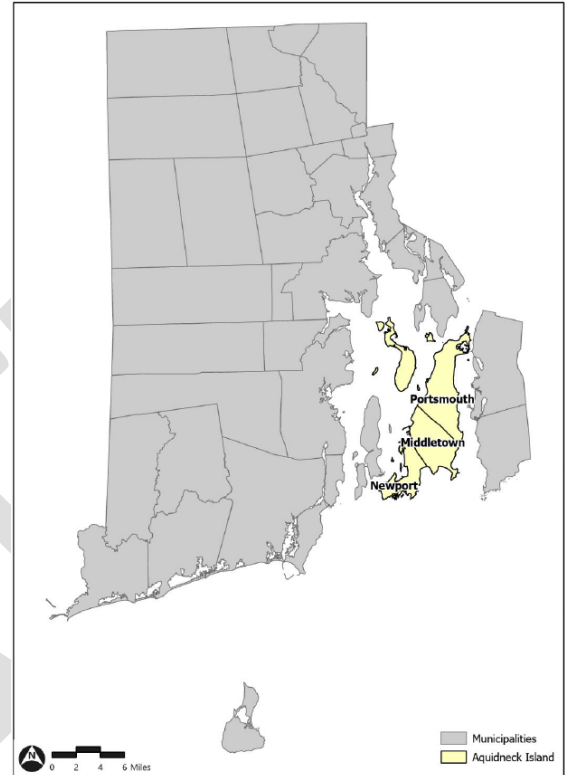
Aquidneck Island is located in the eastern section of Rhode Island, made up of the Towns of Portsmouth and Middletown, and the City of Newport, all of which are in Newport County. However, there is no County or regional government in Rhode Island. Aquidneck Island refers to the geographic area occupied by these adjoining municipalities and includes Prudence Island, Patience Island, Hope Island, and Hog Island. Aquidneck Island occupies 37.8 square miles of land surrounded on all sides by water. The island is served by a network of four bridges: The Claiborne Pell Newport Bridge (connects Jamestown to Newport); the Jamestown Verrazzano Bridge (connects Jamestown to mainland North Kingstown); Mount Hope Bridge (connects Portsmouth to mainland Bristol), and the Sakonnet River Bridge (connects Portsmouth to mainland Tiverton).

Aquidneck Island has an estimated year-round population of 59,689<sup>1</sup>. During the summer months, the population in Newport alone increases to 100,000. Newport is the state's principal tourist center and resort community. Millions of visitors come from all over to enjoy events, view the mansions, sail, see the sights, and dine.

Middletown, located between Portsmouth and Newport, is known for beaches, and other natural areas and recreational opportunities, including the Sachuest Point National Wildlife Refuge, the Norman Bird Sanctuary, and several Aquidneck Land Trust properties and trails. Middletown is also home to the Naval Undersea Warfare Center located at the United States Naval Station Newport, which spans all three island municipalities.

The Town of Portsmouth, known for historic attractions, residential neighborhoods, and a thriving business park, includes Prudence Island, the third largest island in Narraganset Bay, and three smaller islands: Patience Island, Hope Island, and Hog Island.

Figure 1 Locus Map



<sup>1</sup> United States Census Bureau, American Community Survey 5-Year Estimates, 2023.

## Select Demographics<sup>2</sup>

The municipalities on Aquidneck Island share many demographic commonalities. Newport has the largest population and largest percentage of historic homes on the island. Portsmouth and Middletown are generally more affluent and have similar population sizes. See **Tables 1 and 2** below.

**Table 1 Demographic Overview**

	Portsmouth	Middletown	Newport	Rhode Island
<b>Total Population</b>	17,740	16,920	25,029	1,097,962
<b>Aged 65+</b>	4,322 (24% of total)	3,804 (22% of total)	5,163 (21% of total)	212,376 (19% of total)
<b>Primary race (%)</b>	White (97.3%)	White (89.7%)	White (84.4%)	White (80%)
<b>Minority races</b>	Asian (2.3%) Black (2.1%) American Indian/Pacific Islander (2.3%) Other (6.2%)	Black (5.2%) Asian (4.7%) American Indian/Pacific Islander (0.8%) Other (8.3%)	Black (10.9%) Asian (4.0%) American Indian/Pacific Islander (2.2%) Other (8.8%)	Black (10.8%) Asian (4.8%) American Indian/Pacific Islander (2.8%) Other (17.1%)
<b>Average Household Income</b>	\$155,226	\$128,510	\$128,819	\$113,091
<b>Percent of population in poverty<sup>3</sup></b>	4.4%	10.0%	15.1%	10.8%
<b>Number of Housing Units</b>	8,375	8,225	13,527	483,474
<b>Housing Units Built before 1939</b>	1,353 (16% of total)	1,194 (14.5% of total)	5,810 (43% of total)	142,275 (26% of total)

**Table 2 Demographic Changes on Aquidneck Island**

	2010	2023	% Change
<b>Housing Units (total)</b>	28,985	30,193	+3.26%
<b>Population</b>	58,211	59,689	+3.08%
<b>% of homes owner-occupied</b>	56	60	+4.00%

Certain populations throughout Aquidneck Island are more vulnerable to the impacts of natural hazard events and climate change than others. Factors increasing this vulnerability include age, socioeconomic status, minority status, and health or disabilities. The Rhode Island Department of Environmental Management (RIDEM) Environmental Justice (EJ) Mapper is one resource which incorporates some of these factors and was used to identify those areas throughout the region that are considered EJ communities. According to the RIDEM EJ Mapper, two census tracts, one in

<sup>2</sup> For the purpose of this element, the most comprehensive data set is from 2023 United States Census, 2023 ACS 5-Year Estimates

<sup>3</sup> In 2021, the poverty threshold for a single individual under the age of 65 in Rhode Island is \$13,380 per year, while for a family of four with two children, it is set at \$27,300 per year.

Middletown and one in Newport, meet one or more of the following criteria to be considered an EJ community:

- › Annual median household income is not more than 65% of the statewide annual median household income;
- › Minority population is equal to or greater than 40% of the population;
- › 25% or more of the households lack English language proficiency; or
- › Minorities comprise 25% or more of the population and the annual median household income of the municipality in the proposed area does not exceed 150% of the statewide annual median household income.

The federal government’s Climate and Economic Justice Screening Tool<sup>4</sup> provides additional information as to the burdens afflicting the areas.



*Middletown Census tract 44005040100, population 1,259: burdened by the cost of housing and low income.*



*Newport Census tract 44005040500, population 4,658: burdened by water quality, low income, and asthma.*

The City of Newport and the Town of Middletown are also 2 of the 13 Rhode Island disadvantaged communities where some residents experience the inability to adequately meet household energy needs.<sup>5</sup>

## Economic Conditions

Aquidneck Island’s economic success is largely dependent on tourism, restaurants, museums, and retail. The region’s rich waterfront history is showcased in exhibits, and tours.

<sup>4</sup> Census tracts that are overburdened and underserved are highlighted as being disadvantaged on the map. [Explore the map - Climate & Economic Justice Screening Tool \(geoplatform.gov\)](https://energy.ri.gov/energy-justice)

<sup>5</sup> Rhode Island Office of Energy Resources, Energy Justice <https://energy.ri.gov/energy-justice>

Key industries in Aquidneck Island include professional and technical services, accommodation and food services, healthcare, and manufacturing.<sup>6</sup>

In June 2024, the unemployment rate (not seasonally adjusted) in Aquidneck Island was on average 3.4% which is slightly lower than the state average of 4.3% during the same period. Unemployment rates statewide have been improving since the average of 15.8% in the second quarter of 2020 (COVID pandemic).<sup>7</sup>

## Government

There is no island-wide government; any policy changes or updates to land use ordinances must be done at the local level. The three municipalities have similar governance structures. See **Table 3**. Each Council will adopt this Regional Hazard Mitigation and Flood Management Plan separately.

**Table 3 Local Government Structure**

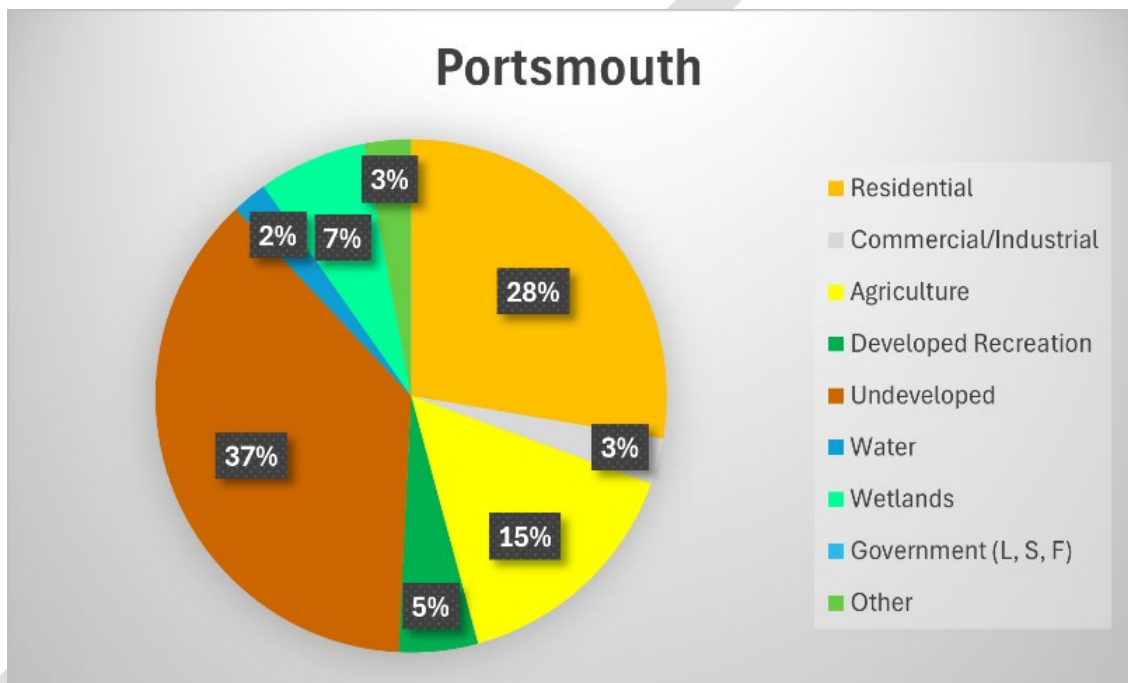
	Portsmouth	Middletown	Newport
<b>Council Type</b>	Town Council	Town Council	City Council
<b># of Members</b>	7	7	7
<b>Leadership</b>	Town Administrator, appointed	Town Administrator, appointed	City Manager, appointed Mayor, elected by Town Council

6 State of Rhode Island Department of Labor and Training, Employment & Wages by Industry, 2023. <https://dlt.ri.gov/labor-market-information/data-center/employment-wages-industry-qcew>

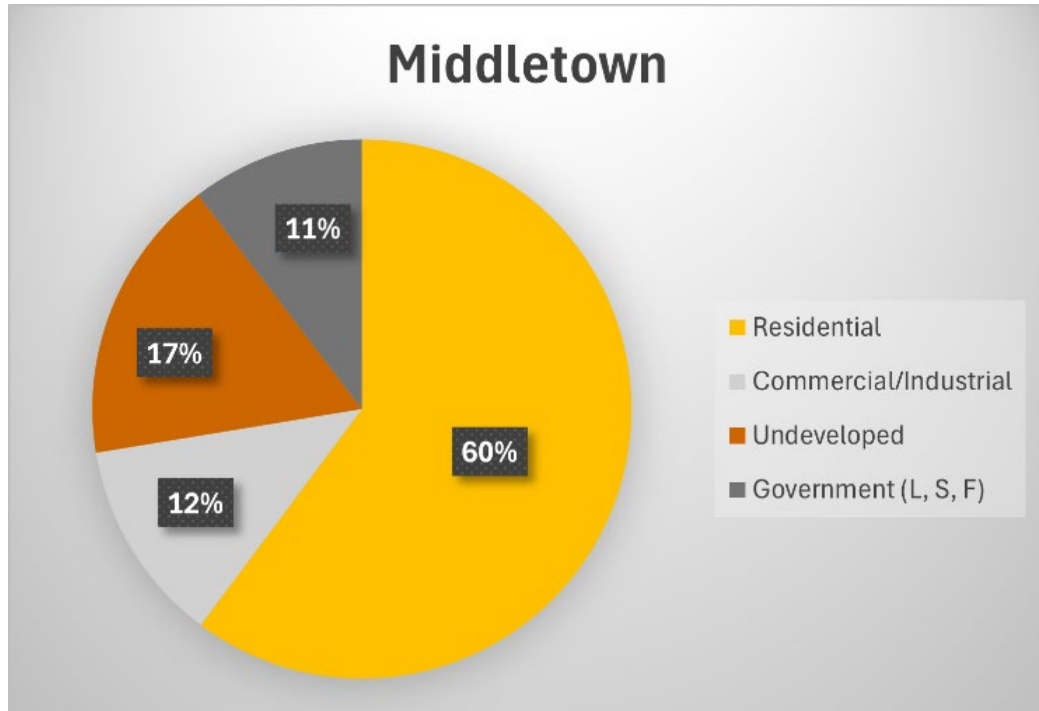
7 State of Rhode Island Department of Labor and Training, Unemployment Rate/Labor Force Statistics [Unemployment Rate/Labor Force Statistics \(LAUS\) | RI Department of Labor & Training](#), accessed February 2023.

## Land Use Patterns

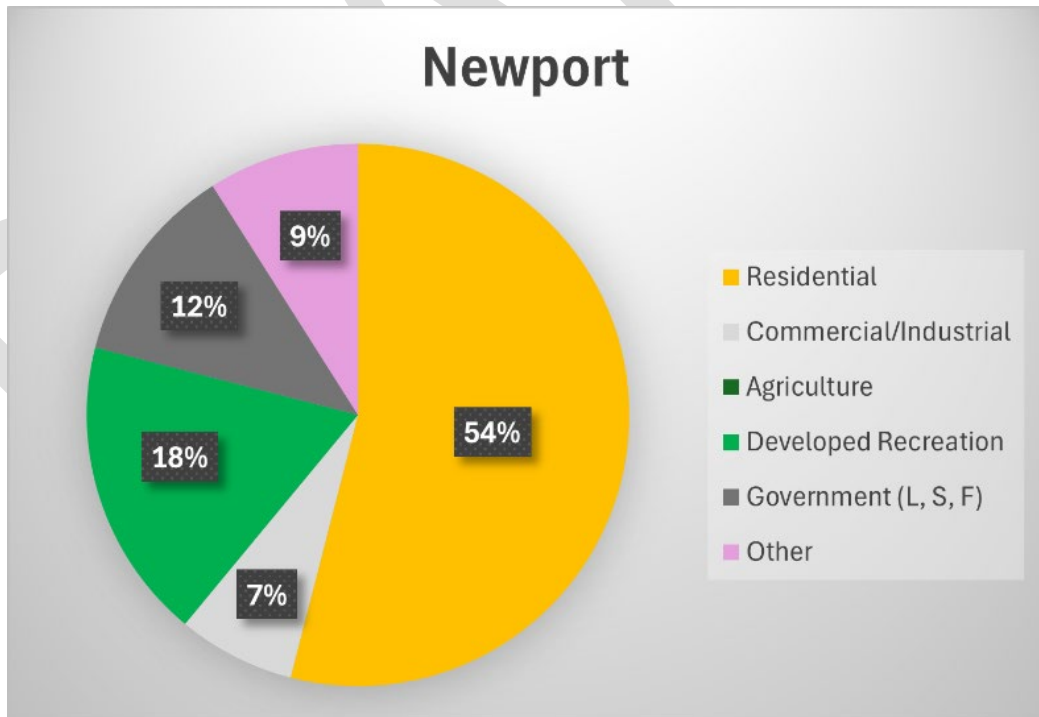
The land area of Aquidneck Island is 37.8 square miles and supports a mix of land uses connecting the communities. Residential and open space dominate the landscape with pockets of commercial districts, farmland, and a U.S. Navy base. Roughly 50% of the land on Aquidneck Island is devoted to residential uses and 30% is either agriculture, open space, developed recreation, or wetlands. Each municipality divides their land uses slightly differently, but the overall summary is visualized in the charts below based on local Comprehensive Plans. Figure 2 is based on GIS dataset Land Use and Land Cover (2011) published by the Rhode Island Department of Environmental Management.



Source: Portsmouth Comprehensive Plan 2022

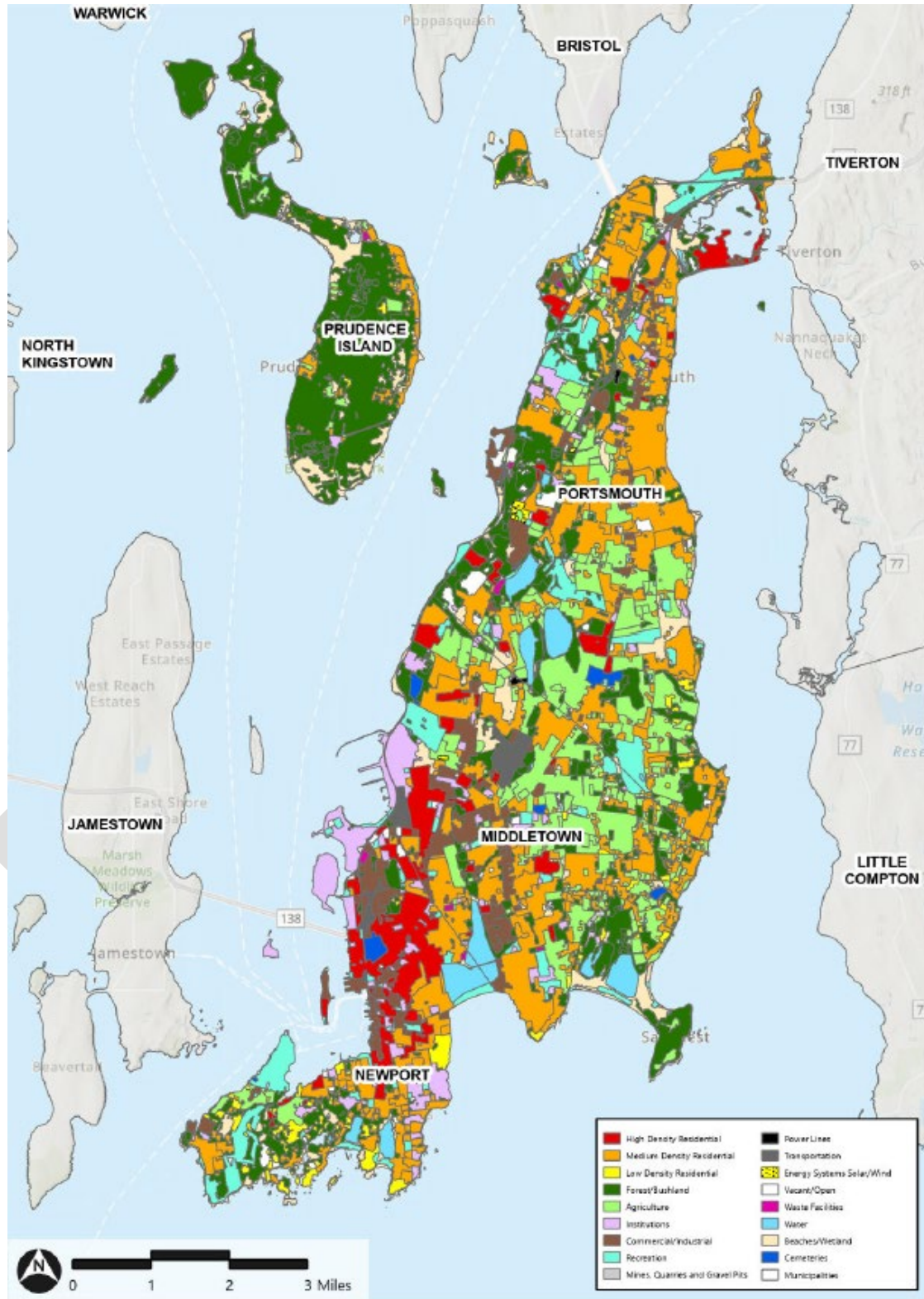


Source: Middletown Comprehensive Plan 2015



Source: Newport Comprehensive Land Use Plan 2017

Figure 2 Land Use Map



Source: RIDEM

## Roads and Bridges

Aquidneck Island’s location strongly defines the area’s circulation traffic pattern. The two main roads, State Route 138 and State Route 114, handle most of the north-south traffic on the island. Various locally owned roads and bridges connect the major routes and bring people to the coast and business centers.

The island is served by a network of various municipal-owned small bridges and four major bridges, all owned and operated by the Rhode Island Bridge and Turnpike Authority.:

- › Claiborne Pell Newport Bridge, connects Jamestown to Newport,
- › Jamestown Verrazzano Bridge, connects Jamestown to mainland North Kingstown
- › Mount Hope Bridge, connects Portsmouth to mainland Bristol, and
- › Sakonnet River Bridge, connects Portsmouth to mainland Tiverton

## Dams

In 2022 the Rhode Island Department of Environmental Management (DEM) identified 7 high hazard dams, 1 significant hazard dam, and 7 low hazard dams on Aquidneck Island. See **Table 4**. Should a significant hazard dam become a high hazard dam, the municipalities will consider mitigation actions to reduce long-term vulnerabilities.

The City of Newport owns and operates most of the dams on the island which impound water for regional water supply purposes. However, Portsmouth and Middletown are responsible for the emergency response plans required by RIDEM for the dams located within their municipalities, regardless of Newport’s ownership.

**High Hazard Dam** – where failure or misoperation will result in probable loss of human life.

**Significant Hazard Dam** – where failure or misoperation will result in no probable loss of human life but can cause major economic loss, disruption of lifeline facilities or impact other concerns detrimental to the public’s health, safety or welfare.

**Low Hazard Dam** – where failure or misoperation will result in no probable loss of human life and low economic losses.

Owners of high and significant hazard dams are required to file a dam Emergency Action Plan (EAP) with the State. As of 2024, the state has been re-energizing that effort with all municipalities.

**Table 4 Dams on Aquidneck Island**

Dam Name	Classification	Location	Owner	EAP On File?
Melville #1	Significant	Portsmouth	Town of Portsmouth	No
Lawton Valley Reservoir	High	Portsmouth	City of Newport	No
Sisson Pond	High	Portsmouth	City of Newport	No
St. Mary’s Pond	High	Portsmouth	City of Newport?	No
Gardiner Pond	High	Middletown	City of Newport	No
Nelson Pond	High	Middletown	City of Newport	2024 Draft

Dam Name	Classification	Location	Owner	EAP On File?
Easton Pond North	High	Middletown	City of Newport	2024 Draft
Easton Pond South	High	Middletown and Newport	City of Newport	No
Various	Low	Portsmouth (4) Middletown (3) Newport (0)	Various/Unknown	NA

## Utilities

### Sewerage

The Newport Water Pollution Control Division is responsible for providing wastewater treatment to the residents of Newport, Middletown, and the Naval Station Newport. The Town of Portsmouth relies exclusively on individual on-site wastewater treatment systems (OSWTS) for wastewater disposal. There is no municipal wastewater utility. Larger facilities or subdivisions do have multi-user private wastewater treatment systems. There are no plans to install a publicly owned wastewater treatment system in Portsmouth.

The Newport Wastewater Treatment Facility (WWTF), located about 1,000 feet from the shoreline, is vulnerable to partial inundation from a 1% annual chance storm (not including sea level rise).

### Stormwater

Most stormwater and drainage infrastructure on the island drains into catchments, wetlands, or receiving waters. In Newport there are some stormwater connections to the existing sewer-stormwater overflow (CSO) system. Each municipality is responsible for the maintenance of their own infrastructure.

Newport owns and two CSO facilities at Washington Street and Wellington Avenue, and a pump station at Long Warf, and a Water Pollution Control Plant in the North End. By the nature of their function, they are located in coastal areas susceptible to flooding. As heavy rainfall can stress the system, the city is working on disconnecting or removing private and public inflow sources to achieve a reduction in rainfall-derived flow.<sup>8</sup>

Much of the island is low-lying and vulnerable to sea level rise and storm surge. The nature of the topography puts stormwater infrastructure at risk of under-performing or failing during high tide or heavy rain events. Portsmouth has some of the highest elevations on the Island that slope from its North/South center line towards Narragansett Bay and the Sakonnet River

8 Collection System Capacity Assessment and System Master Plan, Prepared for City of Newport, November 2012. <https://www.cityofnewport.com/CityOfNewport/media/City-Hall/Departments/Utilities/W%20P%20C/CSO-REPORTS/SystemMasterPlan-November2012.pdf>

## Fresh Water

The Newport Water Division operates and manages the source water reservoirs, treatment plants, storage tanks and drinking water distribution system throughout Newport, the Town of Middletown and a small portion of the Town of Portsmouth. The Newport Water Division also sells water to the Portsmouth Water and Fire District and Naval Station Newport, each of which operate the distribution system within their jurisdictions.

Most of the drinking water on Aquidneck Island is sourced at various surface water reservoirs throughout Rhode Island. Seven are located on Aquidneck Island, two are located in Tiverton and Little Compton. During heavy rain events, or when one of the OSTWS fails, the likelihood of drinking water contamination increases.

## Energy

Rhode Island Energy is responsible for delivering natural gas and electricity throughout the island. While regional gas, electric, and sewer utilities are regularly maintained by the entities that own them, the municipal-owned public utility infrastructure is maintained as needed.

## Communications

Municipal communication equipment and private cellular towers are located throughout the island.

## Water Resources

Water resources including freshwater bodies, coastal waters and wetlands are important for the region. Wetlands provide a value to prevent flooding, purify the groundwater, and provide wildlife habitat.

The most significant/ natural water features in Aquidneck Island are:

**Table 5 Natural Water Resources**

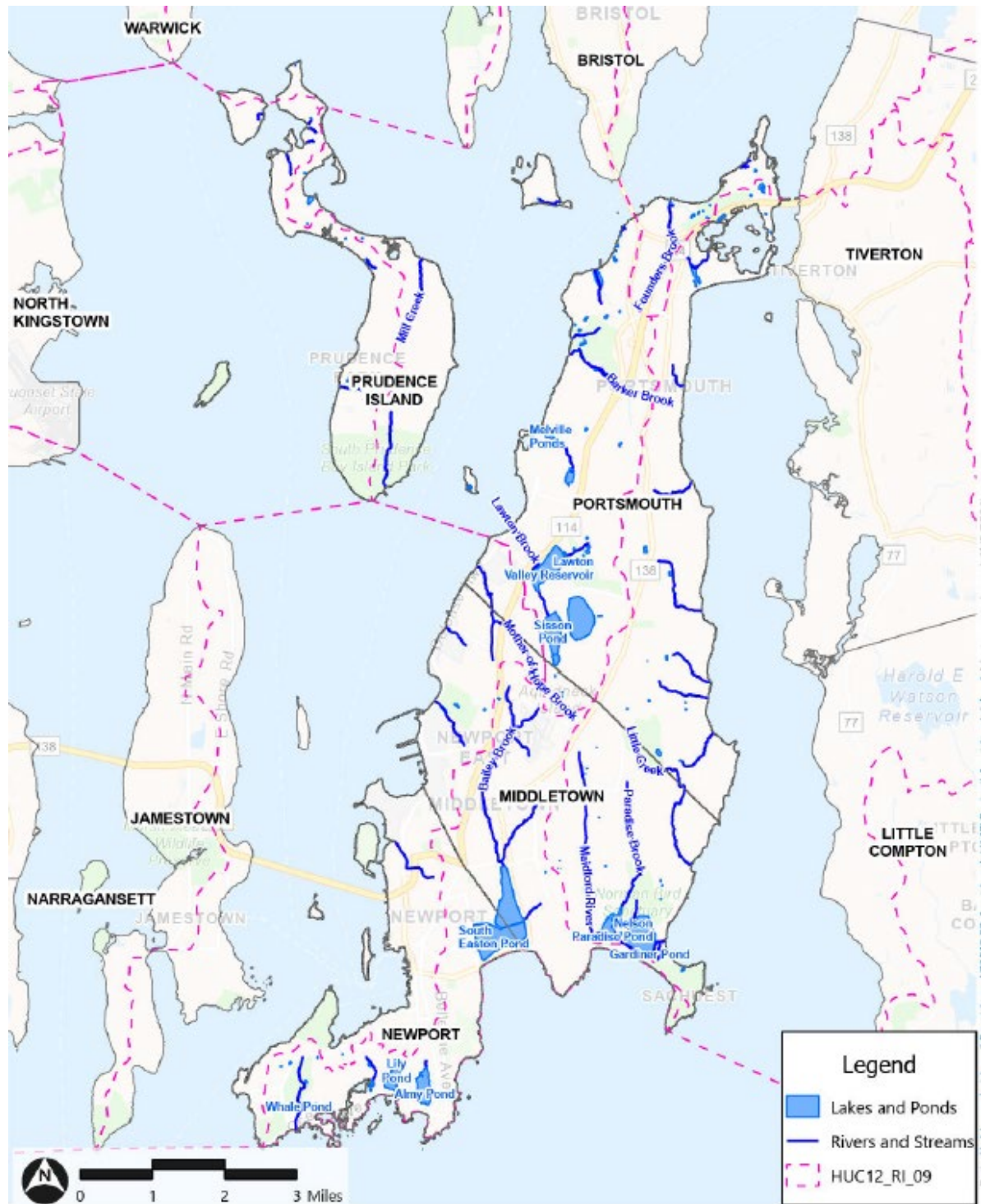
Name	Type	Features	Location
Island Park Cove	Saltwater	Body of water between Point Road and Route 24 in Portsmouth.	Portsmouth
Barker Brook	Stream	Runs from the middle of Portsmouth, under Route 24 to Narragansett Bay	Portsmouth
Bloody Brook	Stream	Connected to the eastern end of Barker Brook. Rumored to have run red during the Battle of Rhode Island in 1778.	Portsmouth
Bailey Brook	Stream	Primary water source for North Easton/Green End Pond (public drinking water reservoir)	Middletown

Name	Type	Features	Location
Maidford River	River	Primary water source for the drinking water reservoirs Nelson Pond and Gardiner Pond	Middletown
Paradise Brook	River	Supplies water to Nelson Pond	Middletown
Lawton Valley Reservoir	Freshwater Pond	Drinking water reservoir.	Portsmouth
Saint Mary's Pond	Freshwater Pond	Drinking water reservoir.	Portsmouth
Sisson Pond	Freshwater Pond	Drinking water reservoir.	Portsmouth
Gardiner Pond	Freshwater Pond	Drinking water reservoir. Coastal.	Middletown
Nelson Pond	Freshwater Pond	Drinking water reservoir. Coastal.	Middletown
North Easton Pond/Green End Pond	Freshwater Pond	Drinking water reservoir. Coastal.	Middletown and Newport
Easton Pond	Coastal Pond	Drinking water reservoir. Coastal.	Middletown and Newport
Almy Pond	Coastal Pond	Shallow pond in Newport's south end, one of the most impaired water bodies on Aquidneck Island.	Newport
Lily Pond	Coastal Pond	Small pond in the residential area of Newport's south end.	Newport



*Almy Pond: one of the most impaired bodies of water on Aquidneck Island.  
Photo credit: City of Newport*

Figure 3 Water Resources



Source: RIDEM, RIGIS

## Forest and Open Space

Private, municipal, and state commitments have played a large role in the preservation of open space on Aquidneck Island. Aquidneck Island’s open space and recreation areas enhance the Town’s character and provide for the passive and active recreational needs of residents.

There are not a lot of brushland, grassland, and open forest habitat type areas on Aquidneck Island. Key open space areas are:

**Table 6 Open Space**

Name	Type	Location
Various coastal lands	High value/high vulnerability habitat	Island-wide
Un- and lightly- inhabited islands of Hog Island, Prudence Island, Patience Island, and Hope Island.	Conservation, major parks and open space, forested.	Portsmouth
Town Pond	Conservation	Portsmouth
Melville Ponds Campground	Forested Recreation	Portsmouth
Various farmland	Agricultural land preservation	Island-wide
Fort Adams State Park	Developed	Newport
Brenton Point State Park	Developed	Newport
Sachuest Point	Brushland Habitat protection	Middletown
Norman Bird Sanctuary	Brushland Habitat protection	Middletown
Various Country Clubs	Recreation	Island-wide

## Cultural and Historic Resources

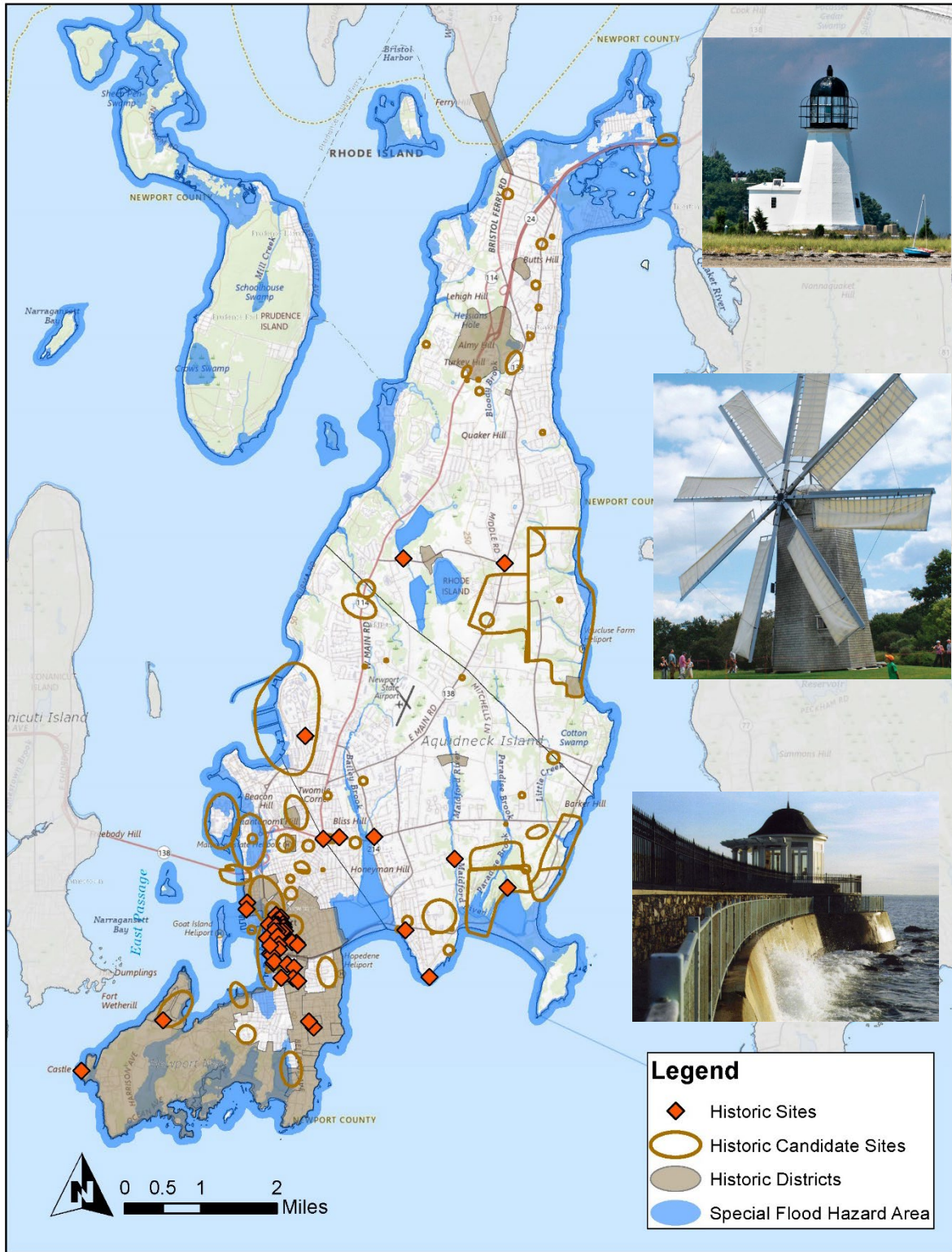
Significant cultural and historic resources on Aquidneck Island include early farms, lighthouses, a large collection of colonial era wooden homes, summer residences of wealthy industrialists (the famous mansions), and historic districts. The island has abundant federally recognized historic places which help shape the local culture and drive the economy. See **Table 7**.

**Table 7 Historic Resources**

	Portsmouth	Middletown	Newport
National Register Historic Districts	0	2	5
National Register Historic Landmarks	1	0	23 (5 of which are landmark districts)
National Register of Historic Places <sup>9</sup>	12	13	56

<sup>9</sup> National Register of Historic Places: The National Register is the official Federal list of districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering, and culture.

Figure 4 Cultural Resources



National Historic Landmark District: National Historic Landmarks are buildings, sites, districts, structures, and objects that have been determined by the Secretary of the Interior to be nationally significant in American history and culture. National Historic Landmarks are a separate designation, but upon designation, NHLs are listed in the National Register of Historic Places if not already listed.

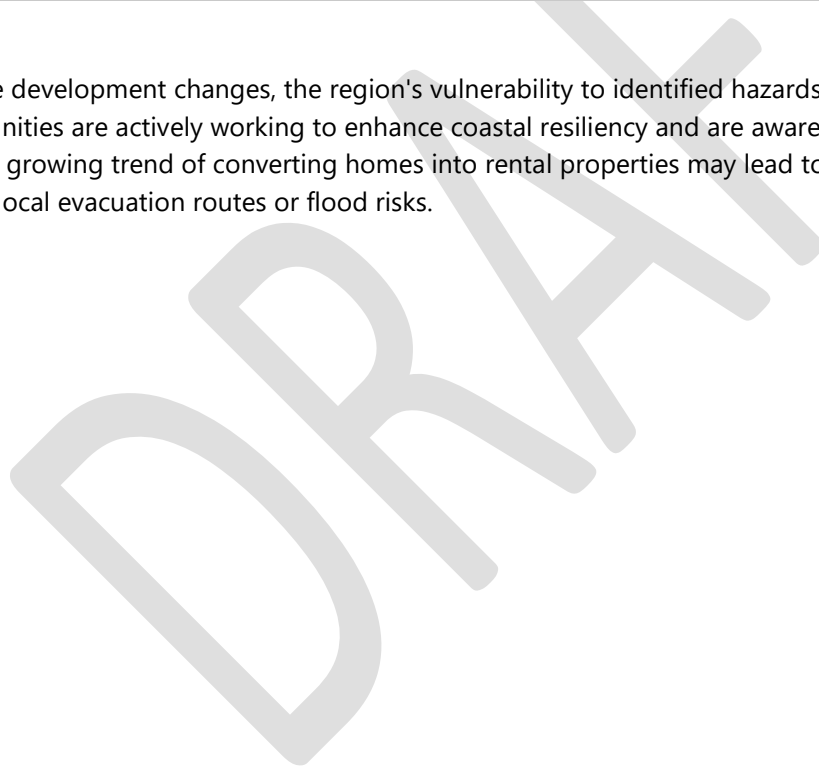
## Development Trends in the Last 5 Years

Table 8 Recent Development Trends

	Portsmouth	Middletown	Newport
<b>Residential Development Trends</b>	<ul style="list-style-type: none"> <li>› Over 93 acres of residential development since 2018.</li> <li>› 152 units are under development off Bristol Ferry Road (Narragansett Bay Club)</li> </ul>	<ul style="list-style-type: none"> <li>› Decrease in subdivision activity.</li> <li>› More interest in multi-family development, including affordable housing.</li> <li>› Conversion of homes to be seasonal or short-term rentals.</li> </ul>	<ul style="list-style-type: none"> <li>› Conversion of homes to be seasonal or short-term rentals.</li> <li>› Conversion of existing multifamily dwellings to single family dwellings</li> <li>› Demolition of vernacular housing to provide for larger homes.</li> <li>› Increasing use of the adaptive reuse legislation.</li> <li>› Limited new home construction.</li> <li>› Continued effort in maintaining and upgrading affordable housing units</li> </ul>
<b>Commercial and Industrial Development Trends</b>	<ul style="list-style-type: none"> <li>› Very little change in commercial development.</li> <li>› Ongoing requests for boat storage</li> <li>› Increase interest in ground mounted solar projects. 3 have been approved.</li> </ul>	<ul style="list-style-type: none"> <li>› Some interest in mixed use development that will include retail space.</li> <li>› Continued interest in hotel development.</li> <li>› Low office space vacancy, no interest in building more. In fact, some existing office/light industrial space is being converted into other uses such as storage.</li> </ul>	<ul style="list-style-type: none"> <li>› Continued focus on commercial redevelopment of the City’s North End.</li> <li>› Ongoing efforts to address business community concerns regarding parking and traffic congestion.</li> <li>› Supporting workforce housing initiatives.</li> <li>› Low office space vacancy.</li> <li>› Continued hotel and tourism related development</li> </ul>

	Portsmouth	Middletown	Newport
<b>Natural, Historic and Cultural Development Trends</b>	<ul style="list-style-type: none"> <li>› Aquidneck Land Trust has assisted with the conservation of over 120 acres since 2018.</li> <li>› Ragged Island Brewery has secured 37 acres of farmland for agricultural property.</li> </ul>	<ul style="list-style-type: none"> <li>› Town recently purchased the former Hoogendoorn property (75+ acres) for future recreations and open space development.</li> </ul>	<ul style="list-style-type: none"> <li>› Working on lead abatement issues within the historic building stock.</li> <li>› Continued focus on flooding and stormwater issues in historic neighborhoods.</li> <li>› Ongoing Cliff Walk repairs</li> <li>› Focus on resiliency and sustainability city wide, evidenced by newly created Resiliency and Sustainability Director position</li> </ul>

Despite these development changes, the region's vulnerability to identified hazards has not significantly changed. Nonetheless, all three communities are actively working to enhance coastal resiliency and are aware of the risks posed by unregulated development. However, the growing trend of converting homes into rental properties may lead to a rise in less-informed visitors who might not be familiar with local evacuation routes or flood risks.





# 2

## Planning Process

### Overview

The three island communities have come together to address regional natural hazards and strategies for resilience in the face of natural disasters and climate change. In 2022, the Town of Portsmouth was awarded a FEMA Building Resilient Infrastructure and Communities (BRIC) Award (EMB-2022-BR-007-004) to develop a regional, multijurisdictional Hazard Mitigation Plan. The Town of Portsmouth initiated the RHMP planning effort in 2024 at the recommendation of the Town Planner. The Town of Portsmouth is the grant manager for this project on behalf of the three island municipalities. This Hazard Mitigation and Flood Management Plan Update is the result of a dedicated group of individuals working for nine months identifying natural hazards and proposing ways to improve Aquidneck Island's resiliency. The draft plan was made available for public comment before it was submitted to the State and FEMA for review.

### Regional Hazard Mitigation Committee

This Regional Hazard Mitigation and Flood Management Plan (HMFMP) is a product of the Aquidneck Island Regional Hazard Mitigation Committee (RHMC). The RHMC was comprised of municipal employees, state employees, federal Naval employees, and local residents. Committee members participated in three committee meetings, three public workshops, and were given an opportunity to comment on the draft plan before it was posted for public comment. A sign-in sheet was completed at each meeting, helping to document participation. See **Chapter 7** for recommendations on enhancing the breadth of RHMC. The 2024/2025 Regional Hazard Mitigation Committee members include:

- › Patricia Reynolds, Director of Planning & Economic Development – City of Newport
- › Tuuli Martin, City Planner – City of Newport (left July 2024)
- › Hayden McDermott\*, Assistant Planner – City of Newport
- › Harp Donnelly, Fire Chief – City of Newport
- › Ryan Duffy, Police Chief – City of Newport

- › Michael Griffith, Emergency management Specialist – Naval Station Newport
- › Cornelia Mueller, Community Planning Liaison Officer – Naval Station Newport
- › Rae-Anne Culp, Mitigation Planning Supervisor & State Hazard Mitigation Officer – RIEMA
- › Paige Myatt\*, Director of Climate Resilience, Aquidneck Land Trust (previously Aquidneck Island Regional Resilience Coordinator at Rhode Island Infrastructure Bank)
- › Ronald Wolanski, Town Planner – Town of Middletown
- › Anita Guo\*, Principal Planner/GIS Manager – Town of Middletown
- › Jim Peplau, Fire Chief – Town of Middletown (left October 2024)
- › Tim Beck, Detective Lieutenant, Deputy Director Middletown Emergency Management – Town of Middletown
- › Lea Hitchen\*, Town Planner – Town of Portsmouth
- › Aaron Lindo, Assistant Town Planner – Town of Portsmouth
- › Ray Perry, Director of Emergency Management – Town of Portsmouth
- › Paul Ford, Fire Chief – Town of Portsmouth
- › Carissa Mills, Hazard Mitigation/Resiliency Planner – VHB
- › Tom Charboneau\*, CFP Prep Committee Member – Portsmouth Resident
- › Melissa Welch\*, Middletown conservative committee member – Middletown Resident
- › Tom Gibson\*, Friends of the Waterfront, Newport Bridge Realignment Property Advisory Committee, Elizabeth Brook Working Group Member – Newport Resident

\* denotes Aquidneck Island resident

Additional input was received from:

- › Conexión Latina Newport, an organization established to support the Hispanic/Latino community in Newport.
- › Three Portsmouth neighborhood preparedness committees: Common Fence Point – Prudence Island – Island Park and the Hummocks.

## The Planning Process

This 2025 HMFMP update is the result of a 7-step process that was initiated in April 2024 with the establishment of the RHMC. Membership of the RHMC consisted of municipal staff and local stakeholders. The Town hired a consultant to assist with this planning effort.

The prior Hazard Mitigation Plans were used as a starting point to create this RHMP. Demographic information and hazard history was updated as needed.

The RHMC first met virtually on April 8, 2024 to discuss the mitigation goals and hazards of concern for Aquidneck Island. This list of hazards was crafted from prior mitigation plans and the state's Municipal Resilience Program (MRP) Community Resilience Building (CRB)

workshop Summary of Findings. The list of hazards largely remained the same, with some discussion about which are of highest concern for the island. The RHMC was able to quickly come to an agreement on the eight goals of this mitigation plan effort, including identifying Environmental Justice Areas. At the end of this meeting, the RHMC discussed the questions to be included in an online public survey that was promoted along with the public workshops.

The Town of Portsmouth hosted the project's website which provided a link to the survey, background materials, RHMC members, a calendar of events, and contact information. During this early phase, the RHMC worked on a comprehensive list of stakeholders/interest groups, businesses, non-profits, community organizations, and education centers to invite to participate in the data gathering and plan review process. See **Appendix A**.

The next step in the planning process was to educate the public about the hazard mitigation plan, identify additional areas of concern, and brainstorm what mitigation actions might help the island be more resilient. On May 30<sup>th</sup>, the RHMC hosted an afternoon Hazards and Vulnerability Workshop in Portsmouth open to the public and invited stakeholders. An identical workshop was hosted in Newport on June 6, and in Middletown on June 20<sup>th</sup>. The three workshops were promoted on the municipal websites, the project home page, social media, and print media. Those on the list of interest groups were sent a direct email inviting them to participate in the workshops. Nearly 100 people attended the three events and 138 people participated in the online survey.

Over the summer, the consultant compiled the results from the survey and organized the data from the public workshops. During this time, each municipality reported on the status of their prior mitigation actions. Newport has the newest plan (dated 2022), so it was expected that many of their actions would move into this plan. Actions which remained incomplete were brought over into this 2025 plan.

Each community also worked with the consultant on updating municipal current capabilities. Many different departments, committees, and programs already engage in activities that help Aquidneck Island communities become more resilient to a variety of hazards. It is important to highlight these capabilities and show how they support the hazard mitigation efforts.

On August 6, 2024, the RHMC met again to discuss the feedback from the public workshops, review the list of incomplete prior municipal mitigation actions, and create a list of regional hazard mitigation actions. This discussion was where the team was able to focus on regional efforts for Aquidneck Island. Many of the actions came from public input or were part of prior planning efforts. Following this meeting, the consultant created a worksheet for each regional action. At the follow up meeting on September 6, 2024, the team met virtually to discuss the action details such as timing, funding, identifying a champion, obstacles, etc. See **Table 9**. The RHMC was later asked to participate in an anonymous survey ranking the mitigation actions as high, medium, and low priority of the region.

Each community met with the consultant in September and October to focus on their local mitigation actions. At the first meeting the team reviewed the list of vulnerable community assets, hazards, and created a list of mitigation actions. See **Table 39**. At the follow up

meetings, the team provided action details such as timing, obstacles, and identifying a champion. A similar anonymous survey was conducted for each local team to rank the priority of the mitigation actions.

Step seven furthered the public input and review process with the local Councils, and the general public for review and comment. See *Public Input* below.

**Table 9** below provides a summary of the Committee’s meeting dates and planning activities:

**Table 9 Planning Process**

Date	Meeting Summary/Action
04/08/2024	› Virtual kick off meeting with new contractor, VHB. RHMC discussed the hazards of concern, established goals, reviewed public survey questions, and reviewed the planning process.
04/25/0224	› Project webpage, hosted on the Town of Portsmouth’s website, goes live.
04/25/0224	› Hazards survey posted on project webpage and promoted via listserv and social media. Hard copies were also available at Portsmouth Town Hall. During the two-month period, 138 people responded.
May 2024	› VHB reviewed prior Hazard Mitigation Plans, Comprehensive Plans, and Community Resilience Building (CRB) Summaries of Findings.
05/30/2024	› Public Workshop in Portsmouth. Discussed vulnerable areas on the island and potential mitigation actions.
06/06/2024	› Public Workshop in Newport. Discussed vulnerable areas on the island and potential mitigation actions.
06/20/2024	› Public Workshop in Middletown. Discussed vulnerable areas on the island and potential mitigation actions.
July 2024	› Individual efforts by each municipality to update the status of prior mitigation actions and which ones to move forward into this new update.
08/06/2024	› Second meeting of the RHMC. › Mitigation action discussion › Finalized mitigation actions and discussed prioritization › Plan review by the RHMC › Distributed to Planning Board and Town Council › Posted for public comment and sent neighboring towns › Received comments from public and Town Council › Sent to RIEMA for review › Sent to FEMA for approval › Plan adopted by the Town Council

## Documents Reviewed

During this mitigation planning effort, the consultant reviewed and incorporated pertinent information from available resources. Table 4 below summarizes the available plans, studies, reports, and technical research reviewed. These resources were referenced as needed throughout the RHMP.

**Table 10 Documents Reviewed**

Name	Contents Summary (How this information improved the planning effort)	How Applied (How this information was incorporated into the RHMP)
2018 Hazard Mitigation Plan Update, Town of Portsmouth, Rhode Island	Review demographic information, hazards of concern, hazard mitigation committee members, and mitigation actions.	Used as a starting point for hazards of concern, impacts, and mitigation actions. Status of prior mitigation actions were documented.
Strategy for Reducing Risks from Hazards in Middletown, Rhode Island: A Multi-Hazard Mitigation Strategy, 2019 Update		
2022 Newport Hazard Mitigation Plan Update, City of Newport, Rhode Island		
Portsmouth Municipal Resilience Program Community Resilience Building Workshop Summary of Findings, September 2019	Community-driven assessment of hazard and climate change impacts and to surface projects, plans, and policies for improved resilience.	Top hazards, capabilities, and concerns were brought into the discussion for this plan. Identified support for proposed mitigation actions.
Middletown Municipal Resilience Program Community Resilience Building Workshop Summary of Findings, September 2020		
Newport Municipal Resilience Program Community Resilience Building Workshop Summary of Findings, September 2020		
Portsmouth, RI Climate Resiliency Planning & Financing Strategy, 2021	Actions to advance the municipal climate resilience goals. Reviewed highest priority capital needs and recommendations for sustainable funding.	Top hazards, assets, and high priority actions were brought into the discussion for this plan.
Middletown, RI Climate Resiliency Planning & Financing Strategy, 2023		
Newport, RI Climate Resilience and Financing Prioritization Report, 2022		

Name	Contents Summary (How this information improved the planning effort)	How Applied (How this information was incorporated into the RHMP)
Aquidneck Island Strategic Plan, 2016	Outline of Aquidneck Island Planning Commission’s vision and strategic goals.	Reviewed for challenges faced by the region.
Rhode Island Coastline Coastal Storm Risk Management, Final Integrated Feasibility Study and Environmental Assessment, 2023	Review of flood risk along the shoreline and coastal tributaries of Rhode Island.	Problems and opportunities in the focused study areas in Portsmouth, Middletown, and Newport.
Military Installation Resilience Review (MIRR), 2022	Summarizes findings to build resilience and enhance hazard readiness and response for Navy assets on Aquidneck Island.	Identified support for proposed mitigation actions.
North End Urban Plan, 2021	Amendment to the City’s Comprehensive Plan. Informs near- and long-term real estate development in the North End in ways that help address historic inequities and current disadvantages, while creating a built environment that balances Newport’s history with its aspirations for the future.	Development trends and potential hazards of concern in this low-lying coastal area.
Prudence Community Wildfire Protection Plan, 2018	Review for wildfire mitigation plans and obstacles on Prudence Island.	Risk information brought into the section on Brushfires.
Maidford River Restoration Pilot Project, 2023	Review of the proposed solutions to water quality and flooding problems in the Maidford River.	Mitigation action to reduce flooding of the Maidford River was brought forth in this plan.
Memo: Aquidneck Island Climate Resilience Leadership Exchange: Summary of Findings, 2023	Summary of climate resilient infrastructure projects within each municipality and regionally across the island.	Recommendations about educating the public and improve regional coordination were brought forward as mitigation actions in this plan.
Town of Portsmouth, RI FY 2020-2030 Capital Requests	List of projects that are needed to protect public health and safety or maintain current facilities and infrastructure.,	Mitigation or resiliency actions that are in the Capital Improvement Plan were brought forward into this plan. Identified support for proposed mitigation actions.
Town of Middletown, RI, Approved Consolidated Municipal Budget Capital Improvement Program FY 2022-FY 2026		
City of Newport, RI Capital Improvement Program FY 2024-2028		
Portsmouth Comprehensive Community Plan, 2022	Review of each municipality’s vision and goals for long-term planning and development.	Cited information throughout on local history, planning areas, and support of mitigation actions.
Comprehensive Community Plan, Middletown, RI, 2022		

Name	Contents Summary (How this information improved the planning effort)	How Applied (How this information was incorporated into the RHMP)
City of Newport Comprehensive Land Use Plan, 2017		
Town of Portsmouth Code of Ordinances, 2022	Review of zoning regulations as it relates to floodplain management and stormwater management.	Cited local ordinances as it relates to floodplains.
Town of Portsmouth Code of Ordinances, 2024		
City of Newport Code of Ordinances, 2024		
FEMA Flood Insurance Study (FIS), Newport County, Rhode Island, 2021	Flood hazard data for all three communities.	Used information on sources of flooding.
State of Rhode Island Hazard Mitigation Plan, 2024	Statewide hazards of concern and history.	Cited information throughout on hazard descriptions and history.
RIDEM 2023 Annual Report to the Governor on the Activities of the Dam Safety Program	Overview of dam classification and safety status.	Information on the dams was reported in the Background information on dams as well as the Hazards of Concern, Dam Failure.

## Public Input

This hazard mitigation plan benefits from various distinct types of public input strategies that were utilized by the RHMC during the drafting process and prior to its adoption by the municipal Councils. Public input for the Aquidneck Island Regional Hazard Mitigation and Flood Management Plan was primarily collected through a public survey, public workshops, a project website, and an invitation to comment.

### Survey

Early in the planning process, the RHMC promoted and distributed a “Hazard Perceptions” survey on the project’s website. A paper copy was also available at Portsmouth Town Hall. The purpose of the anonymous survey was to hear the most concerning hazards and neighborhoods from residents. The RHMC emailed invitations to specific interest groups to encourage them to take the survey. See **Appendix A** for the list. Overall, 138 individuals participated in the survey. Most were concerned about Nor-easters, sea level rise, high winds, flooding, and severe winter weather. The survey also provided the RHMC with a list of problematic areas that are susceptible to flooding and ideas for the island to become more resilient. The RHMC used the input from the survey to focus their mitigation planning efforts. See **Appendix B** for the survey results.

**Figure 4 Example Question in the Hazards Perceptions Survey**



### Public Workshops

The three municipalities on Aquidneck Island are very community-oriented, and the RHMC felt it would be advantageous to provide local residents and stakeholders a workshop environment to share ideas. Three identical workshops were held in Portsmouth, Newport, and Middletown. Nearly 100 individuals participated by identifying areas of concern, adding community capabilities, and suggesting mitigation actions.



Aquidneck Island municipal representatives identify areas at risk. Committee members collaborate on potential impacts.



Common Fence Point Neighborhood Preparedness

## Invitation to Comment

After the RHMC reviewed the plan drafted by VHB, the RHMC extended an invitation to the general public and emailed stakeholders asking for their comments and suggestions. A digital copy of the draft was available on the project website, and a hard copy was available at Portsmouth Town Hall, Middletown Town Hall, and Newport City Hall.

A press release announcement invited people to review and comment on the Plan during the two-week review period. Reviewers were encouraged to read the document and send any questions or suggested edits to the Portsmouth Town Planner.

The local planners in neighboring communities of Bristol, Tiverton, and Jamestown were emailed a copy of the plan for review.

[enter comments]

The public comment period concluded on XXX during the Town Council meeting which included a chance for the public to comment on the hazard mitigation plan in -person. This opportunity was advertised in the Town Council's meeting agenda. During this two-week public review period, no comments were received from the general public. The Town Council suggested a few editorial changes but there were no substantial changes recommended.

Review and comments from the Rhode Island Emergency Management Agency (RIEMA) and the Federal Emergency Management Agency (FEMA) were also incorporated prior to adoption by the local Councils.



# 3

## Natural Hazards

### Hazards of Concern

The 2024 State of Rhode Island State Hazard Mitigation Plan Update, prior local Hazard Mitigation Plans, and Municipal Resilience Program Community Resilience Building Workshop Summaries of Findings were used as a starting point for identifying hazards that pose the largest threat to Aquidneck Island. The following table summarizes the hazards identified by the State and the Regional Hazard Mitigation Committee. Aquidneck Island is only 37.8 square miles, surrounded by water on all sides. All three municipalities have similar geography, topography, and land use. Impacts to a particular location are noted as such.

**Table 11 Hazards Identified by the Regional Hazard Mitigation Committee**

Natural Hazards Identified by the State	Identified by the Regional HMC	Notes
<b>Severe Winter Weather</b>		
<i>Ice Storm</i>	✓	Discussed as Winter Storms
<i>Snow</i>	✓	
<b>Flood</b>		
<i>Riverine</i>	✓	Combined all flooding as a hazard. Being a coastal area, flooding from inland waterways and the Bay can have compounding effects.
<i>Coastal</i>	✓	
<i>Flash</i>	✓	
<i>Urban/Street</i>	✓	
<b>High Wind</b>	✓	
<b>Extreme Heat</b>	✓	
<b>Hurricane and Tropical Storms</b>		
<i>Nor'easter</i>	✓	
<i>Storm Surge</i>	✓	Included with flooding.
<b>Extreme Cold</b>	✓	
<b>Thunderstorm</b>	✓	
<i>Hail</i>	✓	

Natural Hazards Identified by the State	Identified by the Regional HMC	Notes
<i>Lightning</i>	✓	
<b>Dam Failure</b>	✓	
<b>Fire</b>		
<i>Urban</i>	–	Not covered by this natural hazard plan. While still a threat to Aquidneck Island, these are typically man-made disasters.
<i>Wildfire/Brushfire</i>	✓	
<b>Sea Level Rise</b>	✓	
<b>Infectious Disease</b>	–	Not covered by this natural hazard plan. While still a threat to Aquidneck Island populations, disease is generally considered a biological event, not meteorological, environmental, or geological.
<b>Drought</b>	✓	
<b>Earthquake</b>	✓	
<b>Tornado</b>	✓	
<b>Human-Caused Hazards</b>		
<i>Cyber Security</i>	–	Not covered by this natural hazard plan.
<i>Chemical Incident</i>	–	Not covered by this natural hazard plan.
<i>Terrorism</i>	–	Not covered by this natural hazard plan.
<i>Biological Incident</i>	–	Not covered by this natural hazard plan.
<i>Radiological Incident</i>	–	Not covered by this natural hazard plan.
<i>Civil Unrest</i>	–	Not covered by this natural hazard plan.
<b>Technological Hazards</b>		
<i>Infrastructure Failure</i>	–	Not covered by this natural hazard plan

Other natural hazards such as landslides and volcanoes, are not likely in Aquidneck Island due to the flat topography and lack of appropriate landforms. Although the Covid-19 Pandemic was a declared biological disaster affecting the State and Newport County from 2020 through 2023, it is not covered in this natural hazard plan. Lessons learned from the pandemic are being carried over to respond to and mitigate future disasters of all types via the local Medical Points of Dispensing (MEDSPOD) Plans developed and maintained under the auspices of the Rhode Department of Health.

In addition to the hazards of concern identified by the State, the RHMC has decided to include tsunamis and space weather in this plan.

## History of Past Disaster Declarations in Newport County

To date (May 1953 to October 2024) there have been 17 declared natural disasters in Newport County, Rhode Island. Table 12 summarizes both the State Executive Order (EO),

and Federal (DR) natural disasters declared in Rhode Island which have impacted Aquidneck Island.<sup>10</sup>

**Table 12 Natural Disasters Which Have Impacted Aquidneck Island**

Incident Date (Start)	ID	Incident Type
08/31/1954	DR-23-RI	Hurricane (Carol)
02/07/1978	EM-3058-RI	Snowstorm
02/16/1978	DR-548-RI	Snowstorm
10/15/1985	DR-748-RI	Hurricane (Gloria)
08/26/1991	DR-913-RI	Hurricane (Bob)
03/16/1993	EM-3102-RI	Snowstorm
01/24/1996	DR-1091-RI	Snowstorm
02/17/2005	EM-3182-RI	Snowstorm
01/22/2005	EM-3203-RI	Snowstorm
03/12/2010	EM-3311-RI	Severe Storms and Flooding
03/12/2010	DR-1894-RI	Severe Storms and Flooding
08/26/2011	EM-3334-RI	Hurricane (Irene)
08/27/2011	DR-4027-RI	Hurricane (TS Irene)
10/29/2012 Emergency Declaration	EM-3355-RI	Hurricane (Sandy)
11/03/2012 Disaster Declaration	DR-4089-RI	Hurricane (Sandy)
02/08/2013	DR-4107-RI	Severe Storm
01/26/2015	DR-4212-RI EO-15-02	Severe Winter Storm and Snowstorm
08/21/2021	3563-EM-RI EO 21-88	Hurricane (Henri)
01/28/2022	DR-4653-RI EO 22-10	Snowstorm
12/20/2023	EO-23-10	High winds and extreme rainfall
01/10/2024	DR-4766-RI EO 24-01	High winds and extreme rainfall
02/12/2024	EO 24-03	Winter Storm

## Methodology

In the past 5 years, members of the RHMC have participated in hazard mitigation plan updates and Community Resilience Building workshops where the hazards of concern were identified and ranked. As a consistency check, these results were reviewed by the RHMC at the kickoff meeting. There were slight variations in risk perception from town to town but

<sup>10</sup> Rhode Island Governor's Archive of Executive Orders (archived 2015 to present only) <https://governor.ri.gov/executive-order-archive>; and Federal Emergency Management (FEMA) declared disasters in Rhode Island <https://www.fema.gov/disaster/declarations>.

overall, the major hazards of concern were the same. For example, Portsmouth may be more concerned about brushfires on Prudence Island, than the more developed city of Newport.

The RHMC used the following scale to identify risk levels.

Probability of Future Occurrence	
Highly likely:	Near 100 percent probability within the next year and considering current climate trends.
Likely:	Between 10 percent and 100 percent probability within the next year or at least one chance in next 10 year and considering current climate trends.
Possible:	Between 1 percent and 10 percent probability within the next year or at least one chance in next 100 years and considering current climate trends;
Unlikely:	Less than 1 percent probability in next 100 years and considering current climate trends
Damage Extent	
Minor:	Some local property damage not town wide; no damage to public infrastructure, essential services not interrupted; no injuries or fatalities.
Serious:	Scattered major property damage; some minor infrastructure damage; wider geographic area (several towns); essential services are briefly interrupted; some injuries and/or fatalities.
Extensive:	Consistent major property damage; major damage to public infrastructure (taking up to several days for repair); essential services are interrupted from several hours to several days; many injuries and fatalities.
Catastrophic:	Property and public infrastructure destroyed; essential services stopped; hundreds of injuries and fatalities
Level of Concern/Risk Rank	
Developed by the RHMC 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 municipalities have resources to reduce risks.
High:	Expected to occur within the next 5 years and is a major concern for the municipalities. Island-wide impacts.

Based on a combination of probability of future occurrence, damage extent and impacts, the RHMC assigned each hazard a Level of Concern. The table below summarizes the hazards of concern for the RHMC, ranked from a high concern to low concern.

**Table 13 Hazards Ranked**

Hazard	Probability of Future Occurrence	Damage Extent	Level of Concern/Risk Rank
Hurricane/Nor'easter	Highly likely	Extensive	High
Flooding (heavy rain, runoff, flash, inland, high tide, storm surge)	Highly likely	Serious	High
Severe Winter Weather	Highly likely	Serious	High
High Wind	Highly likely	Minor	Medium
Drought	Likely	Serious	Medium
Heat Wave	Highly likely	Minor	Medium

Hazard	Probability of Future Occurrence	Damage Extent	Level of Concern/Risk Rank
Extreme Cold	Likely	Minor	Medium
Sea Level Rise <sup>11</sup>	Highly likely	Serious	Medium
Lightning/Thunderstorms/Hail	Highly likely	Minor	Low
Brushfires	Highly likely	Minor	Low
Dam Failures	Possible	Serious	Low
Tornadoes	Possible	Serious	Low
Earthquakes	Possible	Serious	Low
Tsunami	Possible	Serious	Low
Space Weather (Solar Flares, Solar Storms, and Electromagnetic Pulses)	Unlikely	Serious	Low

In this RHMP, climate change is treated as an ongoing amplifier to the identified natural hazards, not profiled as an independent hazard. "Extreme weather events have become more frequent during the past half-century, and this trend is projected to continue.<sup>12</sup> For instance, more frequent intense precipitation events may translate into more frequent flooding episodes. The National Climate Assessment and Development Committee has documented that the average temperature across the United States has increased 1.5°F since 1895, with the majority of the increase since 1980. Weather events have and will continue to become more intense and frequent and will result in health and livelihood related impacts such as water supply, agriculture, transportation, and energy. The impact of dynamic storm events includes, but is not limited to, more frequent and intense heat waves, increases in ocean and freshwater temperatures, frost-free-days, heavy downpours, floods, sea level rising, droughts, and wildfires."<sup>13</sup>

The following subsections are organized by the level of risk as identified in **Table 13 Hazards Ranked**. Climate change impacts will be mentioned for each hazard. Local historic records are not available for all hazards. Where indicated, Newport County data was used in the absence of more local data.

11 Sea level rise is a slow phenomenon. Impacts of which may not be measurable within the span of this 5-year plan.

12 IPCC, 2012 – Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (Eds.) Available from Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 8RU ENGLAND, 582 pp.

13 National Climate Assessment and Development Advisory Committee (NCADAC) January 2013 Draft Climate Assessment Report. <http://ncadac.globalchange.gov/>

## Hurricanes

### Description

Tropical and extratropical storms are two distinct types of weather systems characterized by their formation, structure, and associated meteorological conditions.

Tropical storms originate over warm ocean waters, typically in tropical and subtropical regions. They form when warm, moist

air rises, creating an area of low pressure at the surface. Warm ocean waters provide the heat and moisture necessary for their development. Tropical storms have a well-defined center called the "eye" surrounded by bands of thunderstorms. They have warm core temperatures, meaning that the strongest winds and heaviest rainfall are concentrated near the center. Their primary energy source is the heat released when moist air rises and condenses into clouds. Tropical storms are often driven by easterly trade winds and move generally west and north. However, their paths can be influenced by various atmospheric factors.<sup>14</sup>

There are three categories of tropical storms:

- › **Tropical Depression:** maximum sustained surface wind speed is less than 39 mph
- › **Tropical Storm:** maximum sustained surface wind speed from 39-73 mph
- › **Hurricane:** maximum sustained surface wind speed exceeds 73 mph

Hurricanes are categorized according to the Saffir/Simpson scale (**Table 14**) with ratings determined by wind speed and central barometric pressure. Hurricane categories range from one (1) through five (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 sooner.

The Saffir-Simpson scale (**Table 14**) 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.



*Bowen's Wharf after Hurricane Sandy 2012. Photo credit: Newport Daily News*



*Flooding at JT Connell Highway on Sept 2, 2021 after the remnants of Hurricane Ida.*



*Road (above) and underground catch basin (left) collapsed after heavy rainfall from the remnants of Hurricane Ida in 2021.*

*Photo credit: Portsmouth Police Department.*

**Table 14 Saffir/Simpson Hurricane Wind Scale<sup>15</sup>**

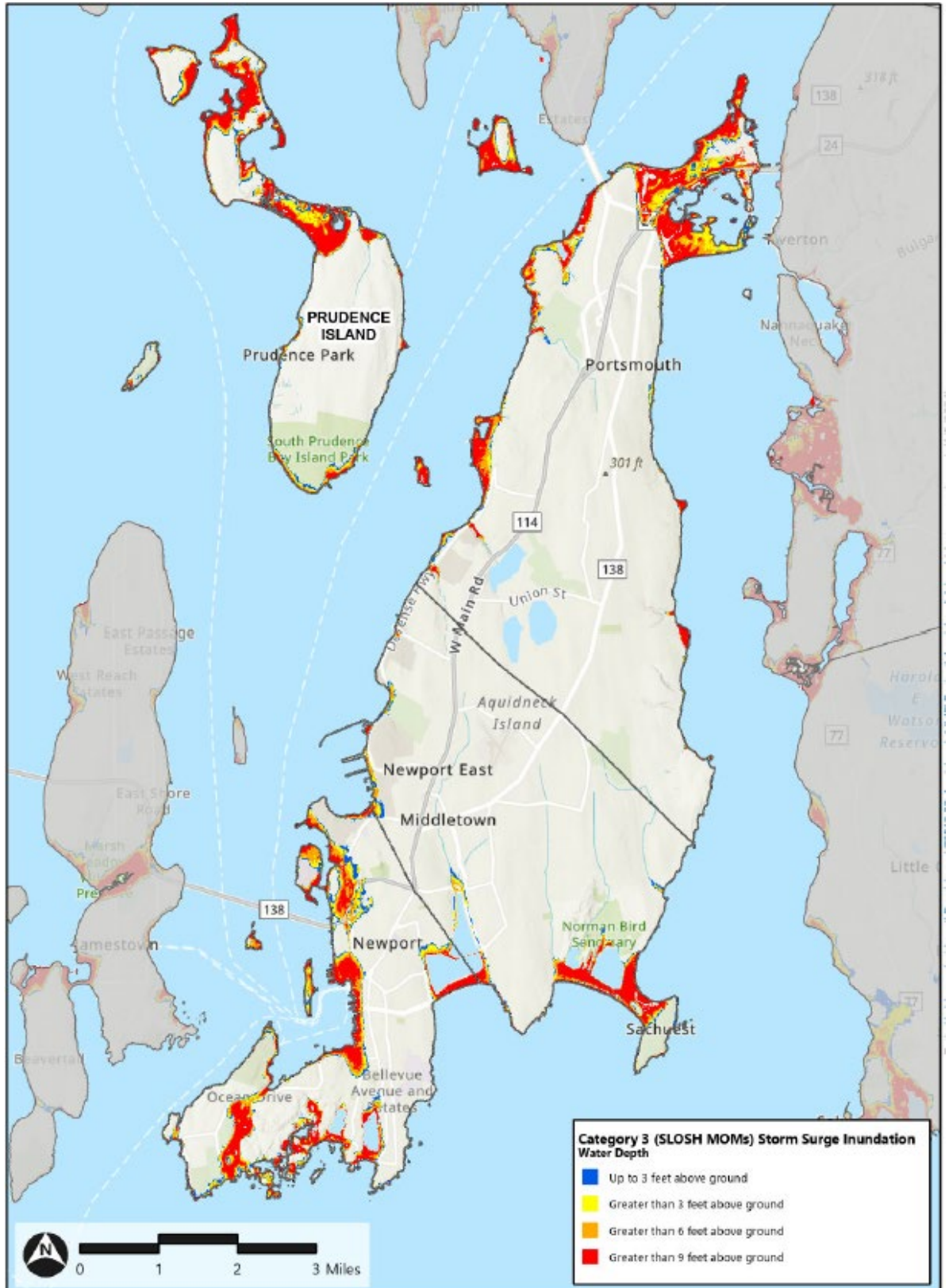
<b>WIND SPEED</b>	<b>TYPICAL EFFECTS</b>
<b>Category 1 – Weak</b> 74-95 mph (64-82kt)	<i>Minimal Damage:</i> Damage is primarily to shrubbery, trees, foliage, and unanchored mobile homes. No real damage occurs in building structures. Some damage is done to poorly constructed signs.
<b>Category 2 – Moderate</b> 96-110 mph (83-95kt)	<i>Moderate Damage:</i> Considerable damage is done to shrubbery and tree foliage; some trees are blown down. Major structural damage occurs to exposed mobile homes. Extensive damage occurs to poorly constructed signs. Some damage is done to roofing materials, windows, and doors; no major damage occurs to the building integrity of structures.
<b>Category 3– Strong</b> 111-130 mph (96-113kt)	<i>Extensive Damage:</i> Foliage torn from trees and shrubbery; large trees blown down. Practically all poorly constructed signs are blown down. Some damage to roofing materials of buildings occurs, with some window and door damage. Some structural damage occurs to small buildings, residences and utility buildings. Mobile homes are destroyed. There is a minor amount of failure of curtain walls (in framed buildings).
<b>Category 4 – Very Strong</b> 131-156 mph (114-135kt)	<i>Extreme Damage:</i> Shrubs and trees are blown down; all signs are down. Extensive roofing material and window and door damage occurs. Complete failure of roofs on many small residences occurs, and there is complete destruction of mobile homes. Some curtain walls experience failure.
<b>Category 5 – Devastating</b> Greater than 155 mph (135kt)	<i>Catastrophic Damage:</i> Shrubs and trees are blown down; all signs are down. Considerable damage to roofs of buildings. Very severe and extensive window and door damage occurs. Complete failure of roof structures occurs on many residences and industrial buildings, and extensive shattering of glass in windows and doors occurs. Some complete buildings fail. Small buildings are overturned or blown away. Complete destruction of mobile homes occurs.

### Location

Aquidneck Island’s close proximity to the Atlantic Ocean renders it particularly susceptible to hurricanes and the resulting loss of human life and property.

<sup>15</sup> National Weather Service, National Hurricane Center

Figure 5 Probable Storm Surge for a Category 3 Hurricane



Source: Coastal Resource Management Council

## Extent (Event Magnitude)

Hurricanes that reach Rhode Island are usually weak (Category 1) or downgraded tropical systems. The wind speeds may be less, but the storms can still bring a lot of rain and storm surge which can cause extensive damage to the coastal areas of the island.

## Impact and Damage Extent

Hurricane strength storms can cause coastal and inland flooding. Extensive rain and flooding could damage homes, roads, and cripple the island. The high winds could down power lines and trees, and damage older structures. During extremely dangerous conditions, municipalities may elect to open emergency shelters. Damage extent is dependent upon the size and timing of the storm. A slow-moving storm may bring more rain to the area than a fast-moving storm.

Impacts from Hurricane Irene in 2011 included heavy rain, inland flooding, and wind damage. In 2012, Hurricane Sandy caused extensive coastal erosion and town-wide power outages throughout the island. See Section 4 Risk Assessment for the wind impacts from a probable Category 2 hurricane.

## History

Since 1851 Newport County has experienced 68 hurricanes of varying magnitude. The largest hurricane to cross over Aquidneck Island was **Hurricane Bob** in 1991.<sup>16</sup>

In 1985, **Hurricane Gloria** left the area without power for three days. Along with the interruption of school and business activity, the roof of the Defiance Fire Station was destroyed.

In 2011, **Hurricane Irene** hit Aquidneck Island as a tropical storm. Despite the relatively low wind speeds, sustained winds over a 6 to 12-hour long duration resulted in widespread tree damage and resulted in power outages to roughly half a million customers throughout the state. Aquidneck Island experienced two days of complete power outage. Numerous trees, poles, and wires were downed throughout the area. The island experienced storm surge, debris, and road flooding. Collective effects throughout Massachusetts and Rhode Island resulted in 1 fatality, no injuries, and \$127.3 million in property damage.<sup>17</sup>

In October 2012, **Hurricane Sandy** severely impacted coastal Rhode Island as it came ashore with tropical storm strength winds. Aquidneck Island was mainly impacted by waves and high winds. Tree damage was widespread. Newport's downtown area experienced extensive coastal flooding. Easton's Beach and associated structures, and the Cliff Walk were damaged by Sandy's 12-foot waves. In Middletown, there was extensive damage to Sachuest Point Road and a mechanical failure of the Wave Avenue pumping station's elevated generator.

**Tropical Storm Isaias** (downgraded from a hurricane) knocked out power to tens of thousands of Rhode Island residents on the evening of August 4, 2020. Although there were

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16 NOAA Historical Hurricane Tracks (accessed July 2024) <https://bit.ly/3ywNxOx>

17 NOAA Storm Event Database (accessed July 2024).

no reported damages in Newport County, it is likely that heavy rain and strong winds led to tree damage and downed wires.

**Tropical Storm Henri** (downgraded from a hurricane) brought heavy rain and strong winds (up to 70 mph) to the area on August 22, 2021. Approximately 60 homes in Newport County were damaged by the storm. Multiple trees and wires were down around the island.

### Probability of Future Occurrence

Likely.

### Climate Change Impacts

Warming global air and water temperatures may increase the intensity of hurricanes that travel along the Atlantic Coast.

## Nor'easters

### Description

A strong low-pressure system along the Mid-Atlantic and New England can form over land or over coastal waters. The storm radius is often as large as 1,000 miles, and the horizontal storm speed is about 25 miles per hour, traveling up the eastern United States coast. Sustained wind speeds of 10-40 mph are common during a nor'easter, with short term wind speeds gusting up to 70 mph. Typically occurring during the fall, winter, and early spring, Nor'easters are known to produce heavy snow, rain and heavy waves along the coast. Unlike hurricanes and tropical storms, Nor'easters can sit offshore, wreaking damage for days.

Also called East Coast Winter Storms, Nor'easters are characterized by:

- › A closed circulation.
- › Located within the quadrilateral bounded at 45N by 65W and 70W, and at 30N by 85W and 75W.
- › Show a general movement from the south-southwest to the north-northeast.
- › Contain winds greater than 23 mph.
- › The above conditions must persist for at least a 12-hour period<sup>18</sup>.

The magnitude or severity of a severe winter storm or Nor'easter depends on several factors including a region's climatological susceptibility to snowstorms, snowfall amounts, snowfall rates, wind speeds, temperatures, visibility, storm duration, topography, and time of occurrence during the day (e.g., weekday versus weekend), and season.

The extent of a severe winter storm (including Nor'easters that produce snow) can be classified by meteorological measurements and by evaluating its combined impacts. For measuring wind effects, the Beaufort Wind Scale is a system that relates wind speed to

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<sup>18</sup> Hersher, et al. An East Coast Winter Storm Climatology. Northeast Regional Climate Center, Cornell University, Ithaca, NY, 2001.

observed conditions at sea or on land (See Table 11). The snow impact of a Nor'easter can be measured using NOAA's Regional Snowfall Index (See the section *Severe Winter Weather*).

### Location

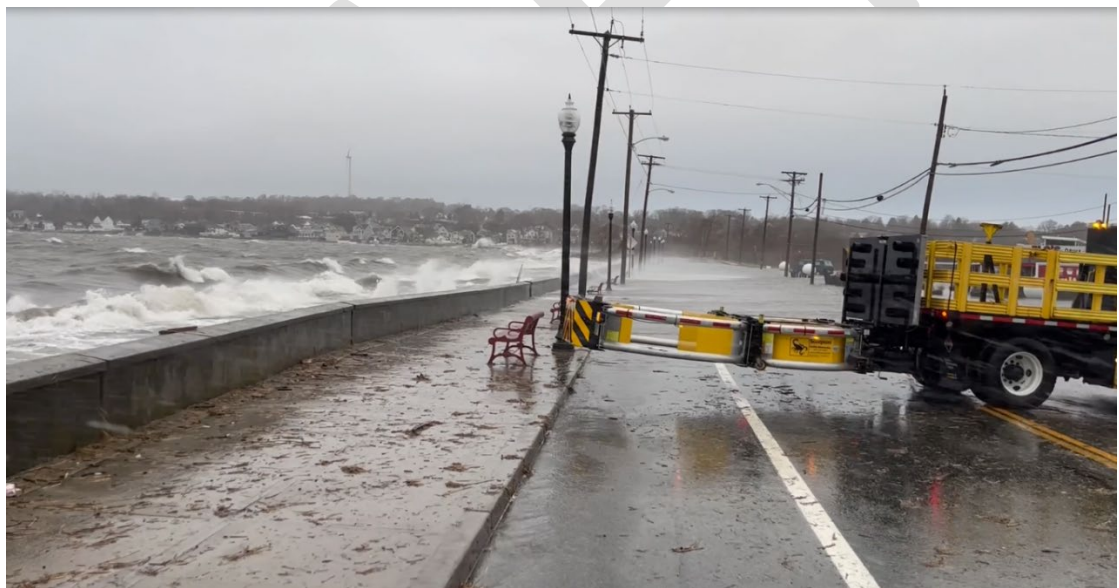
Aquidneck Island's close proximity to the Atlantic Ocean renders it particularly susceptible to Nor'easters and the resulting damages and loss of human life and property.

### Extent (Event Magnitude)

On average, Aquidneck Island experiences or is threatened by a Nor'easter every year or two.

### Impact and Damage Extent

Most damage on Aquidneck Island would be to utilities, roads, stormwater infrastructure, personal property, trees, and snow loads on roofs. Debris in streams and streets would impair drainage and result in more flooding. Expected damages are similar to those from a hurricane but with maybe less storm surge. The Blizzard of 1978 was the largest Nor'easter on record. Many people in Rhode Island were without heat and electricity for over a week.



*Park Avenue, Portsmouth, January 2024 Photo credit: Portsmouth EMA*

## History

**Table 15 Nor'easter History<sup>19</sup>**

Date	Comments
02/11/1994	Major Nor'easter in the region. School closed by noon, business and highway travel disrupted.
02/18/1998	Heavy rainfall, isolated flash floods, and thunderstorms to mainly central and southern Rhode Island. 2.16 inches of rain at T.F. Green Airport in nearby Warwick during a 12-hour period. In neighboring Middletown, the Maidford River rose out of its banks flooding a part of a neighborhood. Reports of minor street flooding in Newport.
02/23/1998	Second Nor'easter to affect region in less than one week brought heavy rainfall and strong winds. Winds of 47 mph reported in Newport.
03/21/1998	Spring nor'easter brought a mixture of snow, sleet, and rain to Rhode Island. Strong northeast winds gusting from 35 to 50 mph occurred over the central and southern portion of the state.
05/25/2005	Late season Nor'easter brought strong winds and heavy rains which mainly effected the western part of the state.
10/25/2005	A strong coastal storm (i.e. a Nor'easter) entrained with energy and moisture from the remnants of Wilma brought rainfall amounts between 2 and 2.5 inches and damaging winds to portions of Rhode Island. The high winds brought down limbs, trees, and wires, resulting in scattered power outages.
02/12/2006	A strong Nor'easter produced heavy snow and windy conditions across Rhode Island. Snowfall ranged from 9 to 14 inches.
10/30/2011	A rare and historic October Nor'easter brought very heavy snow and high winds. The Automated Surface Observing System at Newport State Airport recorded sustained winds of 36 mph and gusts to 53 mph.
02/07/2013	Winter Storm Nemo, a major snowstorm with powerful winds, resulted in severe power outages across the region for days.
02/08/2015	Long duration Nor'easter dumped 2 to 4 inches of snow in Newport County
03/2018	Three (3) Nor'easters in the month of March brought high winds, rain, and eventually snow throughout the area.
01/29/2022	Nor'easter brought high winds, poor visibility, and snow totals in excess of 20 inches in Newport.

## Probability of Future Occurrence

Highly Likely.

## Climate Change Impacts

Similar to hurricanes, changes in air and water temperatures may lead to stronger Nor'easters along the Atlantic Ocean. Aquidneck Island should expect stronger and more frequent severe storms.

<sup>19</sup> NOAA Storm Event Database, Bristol County. <https://www.ncdc.noaa.gov/stormevents/>

## Flooding (Heavy Rain, Runoff, Flash, Riverine Flooding, High Tide and Storm Surge)

### Description

Aquidneck Island experiences many types of flooding, none of which are independent from one another. The Regional HMC has decided to include all types of flooding as a singular hazard. See descriptions below.

According to the 2024 State of Rhode Island Hazard Mitigation Plan Update, "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."

Flooding due to **runoff** (sometimes called urban flooding) occurs when water runs over the land's surface impervious surfaces (paved areas, building subdivisions, and highways) during a heavy rain event. Two major environmental modifications are primarily responsible for drastically altering the rain fall-runoff relationship.

1. Making the land surface impervious by covering it with pavement and construction work.
2. Installing storm sewer systems that collect urban runoff rapidly discharging large volumes of water into stream networks and/or freshwater wetland system.

**Riverine flooding** occurs when heavy rainfall or snow melt causes the water in rivers and streams to flow over their banks. The severity of the flood depends on the saturation of the surrounding ground, the amount of precipitation, and duration of the event. Riverine



*Flooding in Portsmouth.*

*Photo credit: Portsmouth Police Department.*

flooding is most likely to occur in the late summer and early spring due to snow melt and spring rainfalls.

**Coastal flooding** occurs when seawater inundates the land. This can occur from a storm making landfall or just an unusually high tide (also called a King Tide, Spring Tide, or Moon Tide).<sup>20</sup> Because of development pressures and population increases on the coast, a greater number of structures are at risk to flooding.

FEMA maintains regulatory flood maps called Flood Insurance Rate Maps (FIRM). Insurance companies refer to these when providing coverage to homeowners. These maps are available for viewing at Town Hall, City Hall, and online at the FEMA Map Service Center <https://msc.fema.gov>. Please note that there is a process for the public to request a change in the flood zone designation for their property. Homeowners may submit an application to FEMA (Letter of Map Change) for a formal designation of the property relative to the flood zone. For more information see <https://www.fema.gov/flood-maps/change-your-flood-zone>.

**Table 16 Flood Zone Descriptions**

Flood Zone	Description
VE	Coastal areas subject to inundation by the 1% annual-chance flood event with additional hazards due to storm-induced velocity wave action.
A	
AE	1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Base Flood Elevation is provided.
AO	1% or greater chance of shallow riverine flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage
X (shaded)	Areas subject to inundation by the 0.2% annual-chance flood event.

**High tide flooding**, also called sunny-day flooding or king tide flooding is the temporary inundation of low-lying coastal areas during exceptionally high tide events. Roads, parking lots, and storm drains are most often impacted. These vulnerable areas are not represented on FEMA flood maps.

**Storm surge** can be the most threatening part of hurricane. According to the National Hurricane Center, storm surge is an abnormal rise of coastal water generated by a storm, over and above the predicted astronomical tides. The rise in water level occurs primarily due to winds pushing water toward the shore. The rise in water level due to storm surge can cause extreme flooding in coastal areas particularly when storm surge coincides with normal high tide, resulting in storm tides reaching up to 20 feet or more in some cases. Besides the inundation of normally dry areas, battering waves associated with storm surge pose additional risk to structures. Strong currents associated with storm surge can severely erode beaches and coastal roads and undermine the foundations of structures.<sup>21</sup> These vulnerable areas are not represented on FEMA flood maps.

20 For more information on King Tides, visit <https://www.savebay.org/king-tides-ri/> and [The RI King Tides Initiative - MyCoast](#)

21 National Oceanic and Atmospheric Administration, "Storm Surge Overview," <https://www.nhc.noaa.gov/surge/> accessed July 2024.

## Location

Low-lying areas around the coast, streams, and rivers are the most vulnerable to flooding. Developed floodplains on Aquidneck Island include:

**Table 17 Developed Floodplains**

Portsmouth	Middletown	Newport
<b>Common Fence Point Neighborhood</b>	Atlantic Beach District	Newport Harbor waterfront
<b>Park Avenue</b>	Paradise Brook northwest of the intersection of Wapping Road and Berkley Ave.	Washington and Thames Streets
<b>Island Park Neighborhood</b>	Some residential properties along Bailey Brook and Maidford River	Area north of Easton Pond along Ellery Road
<b>Glen Road</b>		Area north of Almy Pond
<b>Melville Park</b>		Goat Island
		Wellington Ave./King Park area

Several coastal areas are protected by seawalls.

According to the 2021 Flood Insurance Study (FIS), the principal flood sources on Aquidneck Island are the Atlantic Ocean, Narragansett Bay, Sakonnet River, Bailey Brook, Maidford River, and Paradise Brook.<sup>22</sup>

## Extent (Event Magnitude)

Localized flooding can be expected regularly on Aquidneck Island. The island has been experiencing more and more high tide flooding.

## Impact and Damage Extent

Hurricanes and Nor'easters usually bring coastal and riverine flooding however there are examples of flooding that happens outside of these extreme energy systems. Along the Aquidneck Island coast, hurricanes and other storms accompanied by heavy winds and rain make the area vulnerable to personal, property and environmental damage occasioned by flooding. Storm surge coupled with large fast-moving waves can scour beaches and building foundations. Coastal storms that occur during the summer have the likelihood of catching visitors and seasonal residents off guard without a plan to evacuate.

Vulnerable structures include stormwater infrastructure, dams, residential homes, marinas, water supply lines, and roads.

Riverine flooding and runoff may not have the velocity associated with coastal flooding but the water can still cause damage, close roads, and collect debris. Bridges along the flooded streams can be compromised as waters rise and scour away at the foundations.

22 Federal Emergency Management Agency (FEMA), Flood Insurance Study, Newport County, Rhode Island, July 6, 2021. <https://map1.msc.fema.gov/data/44/S/PDF/44005CV000C.pdf?LOC=ffac1a1058e4e1f8bf7f33f59c3ecc50>

Saltwater intrusion into freshwater systems is another concern. Large storms will push the seawater up into the rivers and estuaries causing flooding. This can also impact the freshwater drinking resources. The timing of these storms around high tide could impact the extent of the damages.

## History

The most significant riverine flood in Aquidneck Island was in March 2010 when major rivers throughout the state crested their banks. It was a was a 250 year +/- event with about 5 ½ inches of rain in a short period of time.

Most of the damage in Newport County was.

**Table 18 History of Flooding in Newport County Since 2010<sup>23</sup>**

Date	Damage (reported)	Comments
03/30/2010	\$3.2 million	Significant statewide flood event. Five to eight inches of rain fell across Newport County. Many basements were flooded in Jamestown, and Portsmouth.
07/28/2012	\$5,000	Heavy rainfall and flash flooding in urban areas. A car was stuck in flood waters on East Main Road in Middletown. East Main Road was closed near Valley Road and the Shaw's Plaza due to flooding. Several streets in Newport were closed due to flooding. Also, Daley's Brook was overrunning onto Forest Road with 6 to 10 inches of water over the road.
08/15/2012	\$0	Heavy rainfall and flash flooding. Water overwhelmed storm drains.
06/07/2013	\$15,000	Significant urban flooding from the remnants of Tropical Storm Andrea. Three to five inches of rain fell across Newport County. The underpass to the Newport Bridge was flooded and impassable. A small car was stuck in floodwaters.
07/16/2014	\$5,000	Heavy rainfall and flash flooding.
07/14/2020	\$0	Thunderstorms produced localized flooding. Up to 1 foot of flood waters on several roads. The Newport Public Library was closed due to flooding.
09/02/2021	Unknown	Remnants of Hurricane Ida caused localized street flooding.

23 NOAA National Centers for Environmental Information, Storm Event Database. <https://www.ncdc.noaa.gov/stormevents/>



*Coastal Flooding in Portsmouth (2024). Photo credit: Portsmouth EMA*



*Stream flooding at the Newport Rotary. Photo credit: Newport Fire Department.*

During the remnants of Hurricane Ida in 2021 and the resulting heavy rainfall, an underground catch basin in Portsmouth collapsed (see picture on page 36). Also, homes in other areas situated on hillsides above the coastal flood zones experienced basement flooding as water rushed down the hills and slammed into the sides of the houses. Water infiltrated into the basements, mostly through basement windows, at levels not seen in the past. Eleven of the homes needed emergency pump out services from the Fire Department.

### **Probability of Future Occurrence**

Flooding is highly likely, expected multiple times a year.

## Climate Change Impacts

Changing climate conditions are likely to bring more rainfall events to Aquidneck Island and fewer snowstorms. More intense storms will stress the rivers and natural floodplains designed to carry floodwaters. Rising sea levels, see “*Sea Level Rise*”, will exacerbate the extent of flooding and push the impacts to areas that currently seem otherwise protected.

## Severe Winter Weather

### Description

The majority of Rhode Island lies outside the heavy snow and ice regions of the northeast. Due to its maritime climate, Rhode Island generally experiences cooler summers and warmer winters than inland areas. However, snow and ice do occur and can be more than an inconvenience and cause extensive damage. The two major threats from these hazards are loss of power due to ice on electrical lines and snow loading on rooftops. Additionally, loss of power could mean loss of heat for many residents.

Winter storms vary in size and strength and can be accompanied by strong winds that create blizzard conditions and dangerous wind chill. There are three categories of winter storms.

A blizzard is the most dangerous of the winter storms. It consists of low temperatures, heavy snowfall, and winds of at least 35 miles per hour.

- › A heavy snowstorm is one which drops four or more inches of snow in a twelve-hour period.
- › An ice storm occurs when moisture falls and freezes immediately upon impact.

### Location

A severe winter storm could have a serious impact on private and public structures, as well as the general population throughout Aquidneck Island.

### Extent (Event Magnitude)

On average, Aquidneck Island receives 37 inches of snow during the winter months. The average winter temperature (December-February) in Aquidneck Island is 40 degrees Fahrenheit.<sup>24</sup>

The Sperry–Piltz Ice Accumulation (SPIA) Index is a scale for rating ice storm intensity, based on the expected storm size, ice accumulation, and damages on structures, especially exposed



*Snow in Portsmouth.*

*Photo credit: Portsmouth Police Department.*

24 U.S. Climate Data <https://www.usclimatedata.com/>

overhead utility systems. See Figure 6. The SPIA Index uses forecast information to rate an upcoming ice storm's impact from 0 (little impact) to 5 (catastrophic damage to exposed utility systems). Aquidneck Island expects at least a level 1- isolated or localized utility interruptions every year due to ice.

Figure 6 SPIA Index

**The Sperry-Piltz Ice Accumulation Index, or “SPIA Index” – Copyright, February, 2009**

ICE DAMAGE INDEX	* AVERAGE NWS ICE AMOUNT (in inches) *Revised-October, 2011	WIND (mph)	DAMAGE AND IMPACT DESCRIPTIONS
<b>0</b>	< 0.25	< 15	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
<b>1</b>	0.10 – 0.25	15 - 25	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
	0.25 – 0.50	> 15	
<b>2</b>	0.10 – 0.25	25 - 35	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
	0.25 – 0.50	15 - 25	
	0.50 – 0.75	< 15	
<b>3</b>	0.10 – 0.25	> = 35	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
	0.25 – 0.50	25 - 35	
	0.50 – 0.75	15 - 25	
	0.75 – 1.00	< 15	
<b>4</b>	0.25 – 0.50	> = 35	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
	0.50 – 0.75	25 - 35	
	0.75 – 1.00	15 - 25	
	1.00 – 1.50	< 15	
<b>5</b>	0.50 – 0.75	> = 35	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.
	0.75 – 1.00	> = 25	
	1.00 – 1.50	> = 15	
	> 1.50	Any	

(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

### Impact and Damage Extent

The combination of wind, ice, and snow can have a crippling effect on the area. Heavy and/or excessive snowfall amounts can hamper emergency response services, stress roofs and slow plowing efforts, as well as cause power outages. The local economy slows when businesses are closed due to winter weather. Heavy snow and ice can take down trees, knock out power, block roads, and cause structure damage. Falling trees have taken out power lines, damaged buildings, and essentially shut down the town. Fallen trees, particularly when ice is present, can cause streams and drainage areas to dam up and increase flooding. Flash freezes and icy roads from rain or high tides can also cause dangerous driving conditions.

## History<sup>25</sup>

Aquidneck Island has been subjected to annual snowstorms and Nor'easters. A few of the more significant ones crippled not only Newport but the entire state. The blizzard of 1978 is still regarded as the storm of the century and is the storm to which all subsequent storms are compared. Newport County received 28 inches of snow while areas in the rest of the state got upwards of 40 inches. Businesses across the state were closed for several days. More than 9,000 people in Rhode Island sought refuge in makeshift shelters, hotels, and movie theaters.

In February 2013, Winter Storm Nemo temporarily crippled the region. Power lines were downed, and heavy snow hampered driving conditions. The governor declared a state of emergency and enacted a state travel ban that lasted nearly 24 hours. Strong winds and wet snow lead to extensive power outages. Thirteen inches of snow fell across Newport County during this event.

Blizzard conditions were present in Newport County during a late January 2015 winter storm. Again, the Rhode Island governor issued a travel ban to keep people off the roads. Sixteen to nineteen inches of snow fell across Newport County.

In March 2018 nine to fourteen inches of snow fell throughout Newport County. Blizzard conditions were observed locally. A wind sensor on the Newport Bridge measured a wind gust of 64 mph.

In December 2020, up to seven inches of snow fell during a heavy snowstorm in southern New England. Strong damaging winds up to 43 mph caused coastal flooding and downed trees.

In February 2021 and 2023, two more snowstorms brought heavy snow to Newport County. Aquidneck Island received up to 7 inches.

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25 2022 Newport Hazard Mitigation Update and NOAA Storm Events Database for Newport County (2024).



*Bannister's Wharf, December 2020. Photo credit: Savana Dunning/ Newport Daily News*

### Probability of Future Occurrence

Highly Likely.

### Climate Change Impacts

Aquidneck Island may likely see less snowfall over the winter season but may see more intense blizzards when they do occur. If there is enough moisture in the atmosphere, it may fall as freezing rain, coating everything in ice. Aquidneck Island should expect more ice events.

## High Winds

### 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. National climatic events such as high gale winds, tropical storms, thunderstorms, nor'easters, hurricanes, and low-pressure systems produce wind events in Rhode Island. 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.

The Beaufort Wind Scale<sup>26</sup> is a 13-level scale used to describe wind speed and observed wind conditions at sea and on land. See **Table 19**. A wind classification of 0 has wind speeds of less than 1 mile per hour (1 kilometer/hour) are considered calm. A higher classification of 10 with wind speeds reaching 63 miles an hour (101 kilometers/hour) will blow down trees and cause considerable damage.

**Table 19 Beaufort Scale**

Beaufort Number	Description	Wind Speed (km/h)	Observations
0	Calm	<1	Smoke rises vertically
1	Light Air	1-5	Smoke drifts slowly
2	Light Breeze	6-11	Leaves rustle, wind vanes move
3	Gentle Breeze	12-19	Leaves and twigs on trees move
4	Moderate Breeze	20-29	Dust picked up from ground
5	Fresh Breeze	30-38	Small trees sway in wind
6	Strong Breeze	39-51	Large branches move
7	Near Gale	51-61	Trees move, hard to walk
8	Gale	62-74	Twigs break off trees
9	Strong Gale	75-86	Branches break off trees
10	Whole Gale	87-101	Trees uprooted
11	Storm	102-120	Buildings damaged
12	Hurricane	>120	Severe building and tree damage

### Location

Wind events are expected throughout Aquidneck Island.

### Extent (Event Magnitude)

The windier part of the year lasts for 6.3 months, from October 13 to April 23, with average wind speeds of more than 8.3 miles per hour (13.3 km/h).<sup>27</sup>

### Impact and Damage Extent

Strong wind gusts of 40 miles an hour (Beaufort Scale of 8) can blow twigs and small branches from trees. Occasional gusts and sustained winds at this speed (and above) are of concern to the region. Damages from wind events range from power outages, property damage to vehicles and buildings and fallen trees/limbs. Previous wind events on Aquidneck Island have resulted primarily in power outages and downed tree limbs with minimal

<sup>26</sup> Source: NOAA Storm Prediction Center. Developed in 1805 by Sir Francis Beaufort.

<sup>27</sup> WeatherSpark <https://weatherspark.com/y/26159/Average-Weather-in-Newport-Rhode-Island-United-States-Year-Round> accessed 06/20/2021

property damage. It is important that municipalities on Aquidneck Island maintain their public tree trimming programs that will reduce the likelihood of fallen trees/limbs from disrupting transportation routes, taking down power lines, and/or creating damage to the tree canopy.

## History<sup>28</sup>

**Table 20 Recent History of High Winds in Newport County**

Date	Magnitude (mph)	Comments
02/16/2016	51	Winds gusted as high as 59 mph at the Halfway Rock station (located about 4 miles up the bay, north of the Newport Bridge). No significant damage was reported.
04/15/2016	35	Halfway Rock recorded sustained wind speeds of 40 mph. No damage was reported.
10/29/2017	50	Strong to damaging winds from Tropical Storm Phillipe
03/02/2018	58	Newport State Airport in Middletown measured a wind gust to 67 mph. At 2:24 PM EST an amateur radio operator in Newport reported a wind gust to 62 mph. At 3:20 PM EST, a tree fell on the front yard of a property near the intersection of Lawrence Avenue and Ruggles Avenue in Newport; the tree struck and killed the property owner.
02/25/2019	52	At 4:25 PM EST a weather station at Newport reported a sustained wind of 41 mph and a wind gust to 61 mph.
06/29/2019	51	At 4:17 PM EST, a weather station near Newport reported a wind gust to 59 mph.
08/08/2019	50	Tree damage in Newport.
10/16/2019	35	Rose Island weather station reported sustained winds of 43 mph
02/07/2020	63	A weather station in Newport recorded a gust to 62 mph. The ASOS (Automated Surface Observing Systems) at Newport Airport recorded a gust to 53 mph. In Newport multiple trees were reported down across town.
04/13/2020	50	Wind gusts of 58 mph reported.
07/14/2020	50	On Washington Street near Newport Harbor, a large tree was down. A small sailboat was blown over in the harbor. Large branches were down, with power outages, on both Bellevue Avenue and Easton's Beach.
08/25/2020	65	High winds caused damage to two boats in the harbor.
03/02/2021	53	Weather station at Rose Island recorded a gust to 58 mph. At the Newport State Airport, the ASOS had a strong wind gust of 53 mph.

28 NOAA Storm Event Database (2023)



*Downed tree blocking a Newport road in 2018.*

### **Probability of Future Occurrence**

Highly Likely.

### **Climate Change Impacts**

Changes in atmospheric circulation are predicted to occur. See “Hurricanes” and “Nor’easters” above.

## Drought

### Description

Drought is characterized as a continuous period of time in which rainfall is significantly below the norm for a particular area over a multi-year period. The American Meteorology Society defines drought as a period of abnormally dry weather sufficiently long enough to cause a serious hydrological imbalance. Drought differs from other natural hazards in that they do not occur suddenly. Rather, a drought evolves over months or even years and, while causing very little structural damage, can have profound economic, environmental, and social impacts.

There are four different ways that a drought can be defined:

1. **Meteorological** – A measure of departure of precipitation from normal. Due to climatic differences, what is considered a drought in one location may not be a drought in another location.
2. **Agricultural** – refers to a situation when the amount of moisture in the soil no longer meets the needs of a particular crop.
3. **Hydrological** – occurs when surface and subsurface water supplies are below normal.
4. **Socioeconomic** – refers to the situation that occurs when physical water shortage begins to effect people.

Characteristics and impacts of drought differ in many ways, so it is difficult to quantify drought. An existing index called the Palmer Drought Severity Index (PDSI) that used temperature and precipitation levels to determine dryness, measuring a departure from the normal rainfall in a given area. The advantage of the PDSI is that it is standardized to local climate, so it can be applied to any part of the country to demonstrate relative drought or rainfall conditions. A monthly PDSI value below -2.0 indicates moderate drought, and a value below -3.0 indicates severe drought.

The U.S. Drought Monitor tracks drought conditions in Rhode Island and in the rest of the nation. They create maps based on climate data, hydrologic and soil conditions, as well as reported impacts and observations from over 350 contributors nationwide.

**Table 21 Drought Severity** <sup>29</sup>

Severity	Category	PDSI Index Value	Drought Level	Possible Impacts
Exceptional Drought	D4	-5 or less	Emergency	Widespread crop/pasture losses, shortages of water creating water emergencies.
Extreme Drought	D3	-4 to -4.9	Warning	Major crop/pasture losses, widespread water shortages or restrictions.
Severe Drought	D2	-3 to -3.9	Watch	Crop or pasture losses likely, water shortages common, water restrictions imposed.

29 Drought Monitor <http://droughtmonitor.unl.edu/AboutUs/ClassificationScheme.aspx>

Severity	Category	PDSI Index Value	Drought Level	Possible Impacts
Moderate Drought	D1	-2 to -2.9	Advisory	Some damage to crops/pastures, developing water shortages, voluntary water-use restrictions requested.
Mild Drought/Abnormally Dry	D0	-1 to -1.9	Normal	Short term dryness slowing planting or crop growth.
Incipient Dry Spell		-0.9 or less	–	–

Rhode Island, as with most states within the United States, uses both the Palmer Drought Severity Index (PDSI) and the Crop Moisture Index (CMI) as indices for a drought occurrence. The CMI (a derivative of the PDSI) provides information on the short-term or current status of purely agricultural drought or moisture surplus. The PDSI is most effective for determining long-term drought conditions, while the CMI is effective at helping determine short-term drought.

The Rhode Island Drought Steering Committee assigns drought levels for the seven designated drought regions in the state, based on hydrological indices such as precipitation, groundwater, stream flow, and the PDSI, as well as on local supply indices such as static groundwater levels and reservoir levels. The Normal, Advisory, and Watch levels are issued statewide. The Warning and Emergency levels are issued on a regional basis and consider local conditions, source of water supply, and water storage capacity issues.

### Location

The potential for a drought exists throughout Aquidneck Island. Although temporary drought conditions may occasionally exist in Rhode Island, affecting Aquidneck Island, devastating long term drought conditions are not indicative of this temperate region.

### Extent (Event Magnitude)

According to The National Weather Service Rhode Island receives on average 39" to 54" of rain annually. Notwithstanding the same, the State experiences extended periods of dry weather. Drought has affected Rhode Island on a reoccurring basis but most of which are been Abnormally Dry (D0), or Moderate Drought (D1).

### Impact and Damage Extent

The main impacts of meteorological drought are periods of very high fire danger and low drinking water supplies. Aquidneck Island's drinking water is supplied by various surface water reservoirs throughout the state. Changes in water levels can impact not only the quantity of available water but also the quality.

Drought can also reduce water quality through a decreased ability for the rivers and streams to dilute pollutants and increase water contamination.

Prolonged dry conditions can accelerate brushfires, especially in areas where there are a lot of dried vegetation. These brushfires in undeveloped areas become especially problematic when they reach the urban boundaries.

Drought conditions have been known to trigger the rapid increase of the gypsy moth populations in the region. The extended period of dry weather (specifically in May and June) slows the fungus that usually keeps the gypsy moth caterpillars at bay. Denuded trees can have cascading effects on the local ecosystem. The increase in fuel availability associated with forest pest damage (e.g. standing dead trees and downed woody debris in forested areas) contributes to more hazardous and extreme wildfire behavior.

## History

Historically, Rhode Island has ranged from near-normal moisture conditions to moderate and severe droughts throughout the past century. Since 2000, the longest duration of drought (D1–D4) in Rhode Island lasted 36 weeks beginning on May 19, 2015, and ending on January 19, 2016. The most intense period of drought occurred the week of September 29, 2020, where D3 affected 99.21% of Rhode Island land.<sup>30</sup>

During the drafting of this plan in November 2024, Aquidneck Island is experiencing abnormally dry conditions (Category D0).

**Table 22 History of Droughts in Rhode Island<sup>31</sup>**

Date	Area Affected	Category	Remarks
1930-31	Statewide	D1/D2	Stream flow of 70% normal.
1941-45	Statewide	D1	Stream flow of 70% normal in Blackstone and Pawtuxet Rivers.
1949-50	Statewide	D1/D2	Stream flow of 70% normal.
1963-67	Statewide	D1-D3	Water restrictions/well replacements common.
1980-81	Statewide	D1	Groundwater deficient in eastern part of state. Considerable crop damage.
1987-88	Southern part of the state	D0/D1	\$25 million crop damage.
1998-99	Statewide	D1-D3	Spring through summer the State experienced 75% of normal flow.
2012	Statewide	D2	January –April 2012. Meteorological drought due to precipitation levels one half of normal.
2016	Statewide	D2	August to November. Severe Drought due to below normal precipitation.
2020	Statewide	D3	September to November. Extreme Drought
2021	Statewide	D0	March to May
2022	Statewide	D0-D3	May to October
2023	Statewide	D0	Abnormally Dry

30 NOAA National Integrated Drought Information System <https://www.drought.gov/states/Rhode-Island>. Accessed July 2024.

31 USGS; RI Water Resources Board [http://www.wrb.ri.gov/work\\_programs\\_drought/Drought\\_Facts\\_110607.html](http://www.wrb.ri.gov/work_programs_drought/Drought_Facts_110607.html); and NOAA National Centers for Environmental Information <https://droughtmonitor.unl.edu/AboutUSDM/AbouttheData/DroughtClassification.aspx>

## Probability of Future Occurrence

Highly Likely.

## Climate Change Impacts

Even though rain events may intensify due to climate change, the periods between them may be longer. Rhode Island expects longer periods of drought. According to the 2016 Rhode Island Hazard Identification and Risk Assessment, “Recent climate change studies<sup>32</sup> have indicated that although precipitation is projected to increase throughout this century, it will be in the form of short duration, intense, and less frequent events. In addition, it is projected by the Northeast Climate Impacts Assessment Group (NECIA) and the New York City Panel on Climate Change (NPCC) that most of this increased precipitation may occur during colder times of the year, such as winter, in the form of snow or ice. Furthermore, it is projected that the frequency and intensity of both long-term and short-term droughts throughout the Northeast will increase throughout the century with the impacts beginning to occur with a greater degree of frequency beginning in the mid-century (2050s).”

## Extreme Temperatures

### Description

**Extreme cold** may accompany winter storms, be left in their wake, or can occur without storm activity. Extreme cold can lead to hypothermia and frostbite, which are both serious medical conditions. The definition of an excessively cold temperature varies according to the normal climate of a region. In areas unaccustomed to winter weather, near freezing temperatures are considered “extreme cold.” In Rhode Island, extreme cold usually involves temperatures below zero degrees Fahrenheit.<sup>33</sup>

The wind chill index attempts to quantify the cooling effect of wind with the actual outside air temperature to determine a wind chill temperature that represents how cold people and animals feel, based on the rate of heat loss from exposed skin. A wind chill index of -5 indicates that the effects of wind and temperature on exposed flesh are the same as if the air temperature alone were five degrees below zero, even though the actual temperature could be much higher. The NWS issues a wind chill advisory when wind chill temperatures are potentially hazardous and a wind chill warning when the situation can be life-threatening<sup>34</sup>.

The National Weather Service issues **extreme (or excessive) heat** warnings when the maximum expected heat index is expected to be 105° F or higher for at least 2 consecutive days and nighttime air temperatures are not expected to fall below 75°. In the northeast, these criteria are generally modified to a heat index of 92° for higher for 2 consecutive days.

The heat index is what the temperature of what the human body feels when the relative humidity is combined with air temperature.

32 Information derived from two recent studies: *Confronting Climate Change in the Northeast*, by the Northeast Climate Impacts Assessment Group, July 2007, and *Climate Risk Information*, by the New York City Panel on Climate Change, 2/17/09.

33 Rhode Island State Hazard Mitigation Plan 2019

34 Rhode Island State Hazard Mitigation Plan 2019

## Location

An extreme heat or cold event would be a regional issue affecting Aquidneck Island and significant portions of Southern New England. Coastal regions are generally buffered from extreme temperatures and may be spared the worst.

## Extent (Event Magnitude)

The extent of extreme cold is measured by the Wind Chill Temperature Index, and extreme heat is generally measured through the Heat Index. Both indices provide a measure of how temperatures feel.

## Impact and Damage Extent

Extreme temperatures could have a serious impact on private and public structures, as well as the general population throughout Aquidneck Island. During a heat wave, water supplies for drinking and firefighting may be stressed. There is added stress to the power grid and the natural environments.

Personal exposure to dangerous heat conditions may lead to heat cramps, heat exhaustion, and heat stroke. These are especially important to monitor in children, elderly, and vulnerable populations that are not able to move to cooler conditions.

Extreme cold conditions may occur during, after, or without any connection to a winter storm. During extended periods of extreme cold temperatures, there is a greater likelihood for frozen water pipes and services, higher fuel usage, and icy roads. Exposure to extreme cold can lead to hypothermia and frostbite. On Aquidneck Island, the supply of natural gas used to heat homes was once a major concern but has been improved with infrastructure upgrades. The concern now is fuel redundancy, which means the ability of a fuel system to maintain or restore function if a single component fails.

## History<sup>35</sup>

NOAA's Storm Events Database has documented the following extreme temperature events.

- › In July 2011, Newport State Airport reported heat indexes of 106 to 110 over a 5-hour period.
- › In February 2015, the Newport State Airport recorded wind chills as low as 26 degrees below zero.
- › In February 2016, wind chills of 34 degrees below zero were reported at Newport State Airport.

## Probability of Future Occurrence

Likely.

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35 NOAA Storm Events Database (2024)

## Climate Change Impacts

Temperatures in Rhode Island have risen almost 4°F since the beginning of the 20th century.<sup>36</sup> Over the coming century, extremely hot days (over 90 degrees F) is projected to increase in New England.<sup>37</sup>

“Extreme cold in Rhode Island is projected to continue as extreme weather events experience an upswing due to climate change. The specific likelihood of extreme cold is unpredictable, as days of frigid, arctic air and below freezing temperatures may be followed by days of mild temperatures in the 40s or 50s.”<sup>38</sup>

## Sea Level Rise

### Description

“Sea level rise is an increase in the ocean’s surface height relative to the land in a specific location. The primary causes of sea level rise are the melting of polar ice caps and thermal expansion of ocean water. Thermal expansion occurs when water gets warmer, causing the volume to increase.

“Melting water from ice sheets and glaciers, caused by rising air temperatures, is the main contributor to sea level rise. This melting process is accelerated by warmer ocean water eroding ice shelves from below. Additionally, ocean measurements indicate that the temperature of the ocean’s surface has risen approximately 1.5°F since the late 1800s. This rise in temperatures is a result of increased absorption of excess heat trapping greenhouse gases from the atmosphere. Another factor in rising sea levels is coastal land subsistence, often caused by natural geologic processes. It is estimated that Rhode Island has been sinking at a rate of four inches per 100 years.”<sup>39</sup>

In Rhode Island planning activities generally consider 1, 3, 5, or 7 feet of sea level rise. See Figure This does not include the periodic storm surge event. Rising sea levels will impact parts of the region differently.

### Location

All of the Aquidneck Island coastline is susceptible to sea level rise and associated impacts such as coastal erosion and flooding. Newport and Portsmouth are surround on three sides by the ocean. The south facing sandy beaches on Aquidneck Island have seen the greatest amount of erosion.

In Newport, sea level rise will cause more frequent flooding or permanent destruction of the low-lying waterfront which is the center of social tourism, and economic activities.

Middletown is less vulnerable to near-term sea level rise but in the long term, five feet of sea level rise by 2100 will impact parcels along Wave Avenue in the Atlantic Beach District. The

36 NOAA Centers for Environmental Information, State Climate Summaries 2022. <https://statesummaries.ncics.org/chapter/ri/>

37 Confronting Climate Change in the Northeast, by the Northeast Climate Impacts Assessment Group, July 2007

38 2024 State of Rhode Island Hazard Mitigation Plan

39 2024 State of Rhode Island Hazard Mitigation Plan

Common Fence Point and Island Park Neighborhoods in Portsmouth will be cut off from the rest of the island with five feet of sea level rise.



*Erosion of the Cliff Walk in March 2022.*



*Flooding on Anthony Road, Portsmouth 2023.*

In 2016 the Rhode Island Division of Statewide Planning developed a Technical Paper summarizing the threat of sea level rise and storm surge to transportation assets. The State has identified assets vulnerable to 1, 3, 5, and 7 feet of sea level rise. During the design life of most roads and bridges, Rhode Island will see three feet of sea level rise. See **Appendix C** for the full municipal reports.

### Comparison of Asset Design Life With SLR Timeline



RI Statewide Planning figures 1-3 feet of sea level rise will occur during the design life of a standard roadway.

**Table 23 Roads Most Vulnerable to SLR<sup>40</sup>**

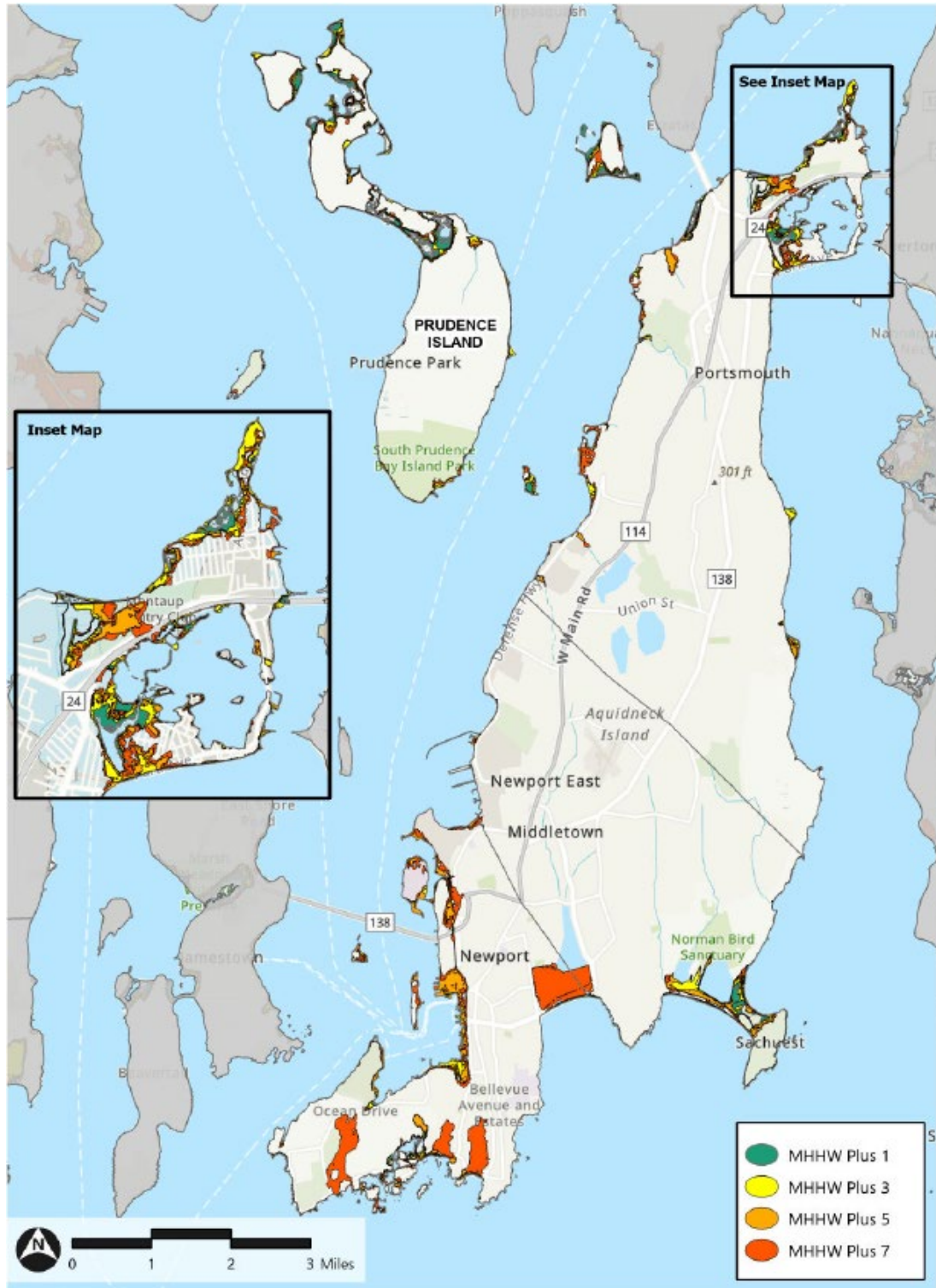
<b>Portsmouth</b>	<b>Middletown</b>	<b>Newport</b>
Boyds Lane	Third Beach Road	Memorial Boulevard
Narragansett Avenue*	Purgatory Road	Americas Cup Avenue
Neck Farm Road*	Hanging Rock Road	West Marlborough Street
Common Fence Point Blvd	Sachuest Point Rd	Ocean Avenue
Park Avenue	Aquidneck Avenue	State Highway 138 W
State Highway 24 N & S		Wellington Avenue
Anthony Road	Defense Highway	On-Ramp RI-138 W
Mount Hope Bridge	Wave Avenue	Off-Ramp RI-238
Lagoon Road		State Highway 138 E
South Prudence Bay Is. Pk.		Clinton Street

\*Prudence Island

DRAFT

<sup>40</sup> [https://planning.ri.gov/sites/g/files/xkgbur826/files/documents/sea\\_level/statewide/Newport.pdf](https://planning.ri.gov/sites/g/files/xkgbur826/files/documents/sea_level/statewide/Newport.pdf) , [Portsmouth.pdf](https://planning.ri.gov/sites/g/files/xkgbur826/files/documents/sea_level/statewide/Portsmouth.pdf), [https://planning.ri.gov/sites/g/files/xkgbur826/files/documents/sea\\_level/statewide/Middletown.pdf](https://planning.ri.gov/sites/g/files/xkgbur826/files/documents/sea_level/statewide/Middletown.pdf)

Figure 7 Sea Level Rise Scenario

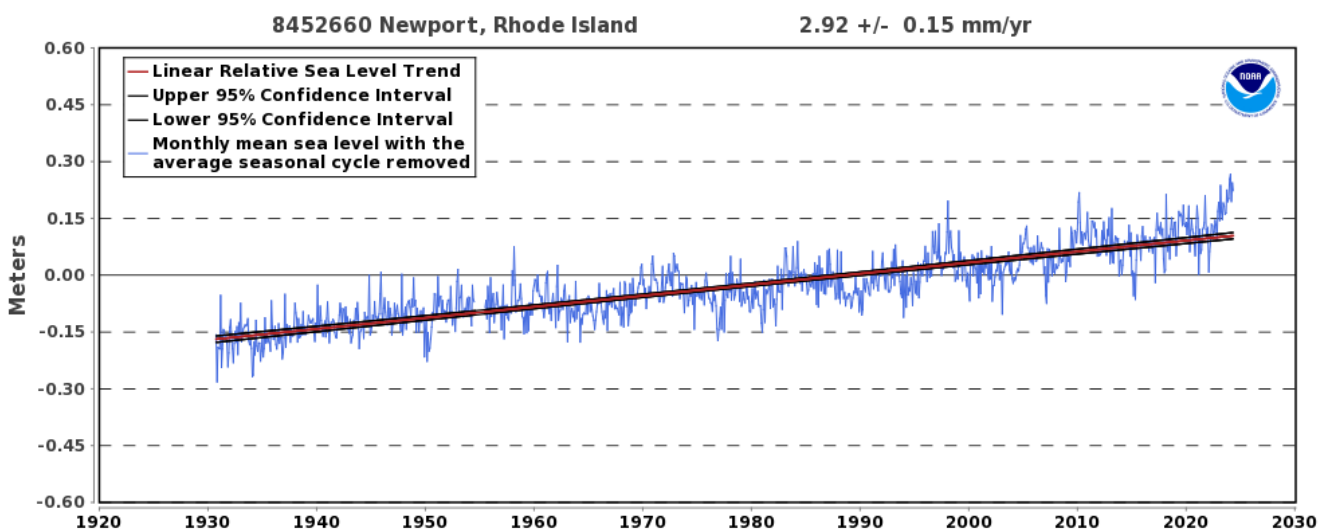


## Extent (Event Magnitude)<sup>41</sup>

Although the impacts from sea level rise vary across different land use types on the island, the data on the rate at which sea level rise is occurring is consistent throughout the State.

- › Data from the Newport tide gauge has shown a steady increase in sea level rise over the past 90 years.
- › Rhode Island could see a potential for one foot of sea level rise by 2050.
- › Sea level is projected to increase by three to five feet above 1990 levels in Rhode Island by 2100.

**Figure 8 Sea Level Rise Trends in Newport**



## Impact and Damage Extent

Sea level rise can have widespread flooding impacts across Aquidneck Island.

- › Gradual loss of coastal properties and infrastructure, including homes, businesses, and critical facilities. This can result in substantial economic losses for individuals and communities.
- › During extremely high tide events, the island is already seeing cases where seawater is entering drainage infrastructure outfalls and flooding parking lots.
- › Saltwater intrusion into freshwater sources can contaminate drinking water supplies.
- › Coastal habitat loss of salt marshes which serve as breeding and feeding grounds for various species.
- › Coastal roads, bridges, and public transportation systems can be impacted by the flooding associated with sea level rise.

41 RI Coastal Resources Management Council Shoreline Change Special Area Management Plan (SAMP), June 2018.

## History<sup>42</sup>

- › Sea levels have risen more than 10 inches in Rhode Island since 1930 as measured at the Newport tide gauge.
- › Since 1930 the sea level in Rhode Island has increased by an average of one inch per decade over the past half century, slightly higher than the global average.
- › The water temperature in Narragansett Bay has increased 3° F in the last 100 years, increasing thermal expansion.

## Probability of Future Occurrence

Highly likely.

## Climate Change Impacts

According to the US Army Corps of Engineers, by 2100, sea levels along Rhode Island’s Newport coastline are projected to rise up to an additional 5 feet.<sup>43</sup> As coastal storms become stronger in response to warmer ocean temperatures, higher sea levels will result in more intensive erosion along barrier beaches and shorelines.

## Lightning/Thunderstorms/Hail

### Description

Thunderstorms are formed when the right atmospheric conditions combine to provide moisture, lift, and warm unstable air that can rise rapidly. Thunderstorms occur any time of the day and in all months of the year but are most common during summer afternoons and evenings and in conjunction with frontal boundaries. The National Weather Service (NWS) classifies a thunderstorm as severe if it produces hail at least one inch in diameter, winds of 58 MPH or greater, or a tornado. About 10 percent of the estimated 100,000 annual thunderstorms that occur nationwide are considered severe. Thunderstorms affect a smaller area compared with winter storms or hurricanes, but they can be dangerous and destructive for a number of reasons. Storms can form in less than 30 minutes, giving very little warning; they have the potential to produce lightning, hail, tornadoes, powerful straight-line winds, and heavy rains that produce localized flooding.

All thunderstorms contain lightning. Thunderstorms can occur singly, in clusters, or in lines. Therefore, it is possible for several thunderstorms to affect one location over the course of a few hours. Thunderstorms usually bring heavy rains (which can cause localized 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. Lightning is one of the most underrated severe weather hazards yet ranks as the second-leading weather killer in the United States. Hundreds of people are injured by lightning every year.<sup>44</sup> Lightning often strikes as far as 10 miles away from any rainfall.

42 2024 State of Rhode Island Hazard Mitigation Plan

43 USACE Sea-Level Change Curve Calculator

44 NOAA Lightning Safety <https://www.noaa.gov/jetstream/lightning/lightning-safety>.

“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. Hail larger than three-quarters (0.75)-inch in diameter can do great damage to both property and crops, and some storms produce hail over two (2) inches in diameter. See Table 24 below. Hail causes about \$1 billion in damage annually in the U.S.”<sup>45</sup>

**Table 24 Hail Size**

Hail Diameter	Size Description
<b>1/4"</b>	Pea Size
<b>1/2"</b>	Mothball Size
<b>3/4"</b>	Penny Size
<b>7/8"</b>	Nickel Size
<b>1" (Severe Criteria)</b>	Quarter Size
<b>1 1/4"</b>	Half Dollar Size
<b>1 1/2"</b>	Walnut or Ping Pong Ball Size
<b>1 3/4"</b>	Golf Ball Size
<b>2"</b>	Hen Egg Size
<b>2 1/2"</b>	Tennis Ball Size
<b>2 3/4"</b>	Baseball Size
<b>3"</b>	Teacup Size
<b>4"</b>	Grapefruit Size
<b>4 1/2"</b>	Softball Size

### Location

All of Aquidneck Island is susceptible to lightning/thunderstorms and hail.

### Extent (Event Magnitude)

The NWS classifies a thunderstorm as severe if it produces hail at least one (1) inch in diameter, winds of 58 mph or greater, or a tornado. Similar to modern tornado characterizations, lightning events are often measured by the damage they produce. Building construction, location, and nearby trees or other tall structures will have a large impact on how vulnerable an individual facility is to a lightning strike. A rough estimate of a structure’s likelihood of being struck by lightning can be calculated using the structure’s ground surface area, height, and striking distance between the downward-moving tip of the stepped leader (negatively charged channel jumping from cloud to earth) and the object. In general, buildings are more likely to be struck by lightning if they are located on high ground or if they have tall protrusions such as steeples or poles which the stepped leader can jump to.

## Impact and Damage Extent

Lightning can strike buildings and accessory structures, often causing structure fires. Electrical and communications utilities are also vulnerable to direct lightning strikes. Damage to these lines has the potential to cause power and communication outages for businesses, residencies, and critical facilities.

Electrical and communications utilities are also vulnerable to direct lightning strikes. Damage to these lines has the potential to cause power and communication outages for businesses, residencies, and critical facilities.

Strong thunderstorms with high winds can also scatter debris and break tree limbs causing damage and injury, or disruption to traffic and the electrical grid.

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. Swimming, boating, and fishing are particularly dangerous during periods of frequent lightning strikes, which can also cause power outages, topple trees, and spark fires. 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.

Structural vulnerability to hail varies. 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. Glass windows and exposed vehicles are also susceptible to hail damage. Vegetation and crops are extremely susceptible to hailstorm damage.

## History

There has been no reported loss of human life on Aquidneck Island in the past 50 years due to lightning or hail.

**Table 25** Lightning and Hail Events in on Aquidneck Island<sup>46</sup>

Date	Comments
05/24/2000	Nickle-sized hail from a severe thunderstorm fell in Portsmouth.
09/02/2000	Lightning struck two utility poles in Portsmouth, causing high-tension wires to fall to the ground and temporarily close roads. Lightning also struck a house in Portsmouth, starting a fire.
09/09/2000	Lightning struck a house in Newport causing a small fire.
06/24/2008	Quarter sized hail accompanied a severe thunderstorm in Newport.
07/01/2009	Penny sized hail reported in Portsmouth.
06/05/2010	Portsmouth fire department communications were knocked out by a lightning strike.
08/07/2014	Quarter sized hail reported at the Newport Naval Base.
06/21/2016	Penny sized hail fell in Newport.

<sup>46</sup> NOAA Storm Event Database (2024)

Date	Comments
06/27/2023	A house was hit by lightning on Slocum Road in Portsmouth.
05/08/2024	Quarter sized hail was reported in Portsmouth.

## Probability of Future Occurrence

Highly Likely.

## Climate Change Impacts

Changing weather patterns may lead to more severe thunder and lightning storms which produce hail.

## Brushfire

### Description

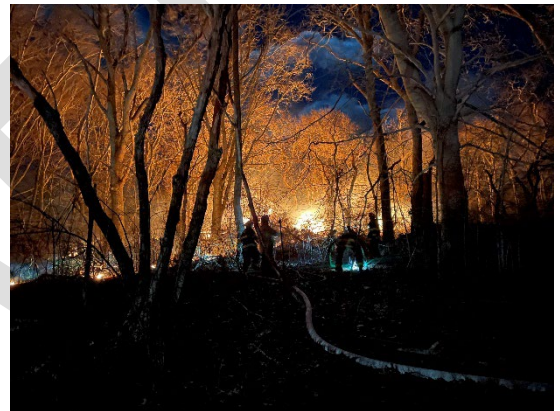
Brushfires are fueled by natural cover, including native and non-native species of trees, brush and grasses, and crops along with weather conditions and topography. While available fuel, topography, and weather provide the conditions that allow wildfires to spread, most wildfires are caused by people through criminal or accidental misuse of fire.

Brushfires pose serious threats to human safety and property in rural and suburban areas. They can destroy crops, timber resources, recreation areas, and habitat for wildlife. Wildfires are commonly perceived as hazards in the western part of the country; however, smaller brushfires are a growing problem in the wildland/urban interface of the eastern United States, including Rhode Island.

Brushfires are dependent upon the quantity and quality of available fuels. Fuel quantity is the mass per unit area. Fuel quality is determined by a number of factors, including fuel density, chemistry, and arrangement. Arrangement influences the availability of oxygen. Another important aspect of fuel quality is the total surface exposed to heat and air. Fuels with large area-to-volume ratios, such as grasses, leaves, bark and twigs, are easily ignited when dry.

Climatic and meteorological conditions that influence wildfires include solar insolation, atmospheric humidity, and precipitation, all of which determine the moisture content of wood and leaf litter. Dry spells, heat, low humidity, and wind increase the susceptibility of vegetation to fire. In Rhode Island, common factors leading to large fires include short-term drought, humidity below 20%, and fuel type.

Various natural and human agents can be responsible for igniting brushfires. Natural agents include lightning, sparks generated by rocks rolling down a slope, friction produced by branches rubbing together in the wind, and spontaneous combustion.



*Brushfire in Portsmouth.*

*Photo credit: Portsmouth Police Department.*

Human-caused brushfires are typically worse than those caused by natural agents. Arson and accidental fires usually start along roads, trails, streams, or at dwellings that are generally on lower slopes or bottoms of hills and valleys. Nurtured by updrafts, these fires can spread quickly uphill. Arson fires are often set deliberately at times when factors such as wind, temperature, and dryness contribute to the fires' spread.

The temperate climate on Aquidneck Island is not set up to endure long periods of drought that lead to widespread vegetation loss. Destructive lightning fires in remote locations are rare but there is always a risk of fires from arson or careless fire use.

### Location

The open fields, forested areas, and grassy areas throughout the island are most at risk. The Wildland Urban Interface (WUI)- the area where the built environment meets with the undeveloped wildlands is also vulnerable to fast spreading brushfires. On Aquidneck Island, these areas include open fields, forested areas, and grassy areas. The U.S. Forest Service Wildland Urban Interface 2020 map<sup>47</sup>, indicates the following WUI areas:

- › Open space along Lagoon Road in Portsmouth
- › Common Fence Point in Portsmouth
- › Island Park in Portsmouth
- › Narragansett Avenue and two isolated neighborhoods on Prudence Island, Portsmouth

Being largely undeveloped, Prudence Island is most at risk for brushfires. Approximately 85% (3,030 acres) of the island is protected from development. Most of the island is a mix of forests, shrublands, and open fields. Structures are built primarily along the shoreline, concentrated on the eastern side of the island.<sup>48</sup> The combination of island remoteness, impeded access into undeveloped areas, limited wildland firefighting equipment, the number of available responders, and water supply infrastructure, raises the risk potential for a brushfire to get out of control.

### Extent (Event Magnitude)

Brushfires average about one per year with a burn area of generally less than an acre. The extent has decreased over the years due to better response equipment, faster response time, and the widespread use of cell phones used to report fires. However, the wildland-urban interface is growing, potentially putting more infrastructure and lives at risk.

### Impact and Damage Extent

Individual buildings may be more or less vulnerable to damage from brushfires based on factors such as the clear distance around the structure and the structure's construction materials. Brushfires primarily impacts timber and forest ecosystems, although the threat to nearby buildings is always present.

47 U.S. Forest Service- Geospatial Data Discovery website: <https://data-usfs.hub.arcgis.com/documents/usfs::wildland-urban-interface-2020-map-service/about>

48 Prudence Island Community Wildfire Protection Plan, 2018

The likelihood of brushfires occurring and having widespread impacts on Aquidneck Island has decreased over the years as fields and wooded areas are taken over by development although extensive tracts of undeveloped lands along Lagoon Road in Portsmouth remain a concern. During abnormally dry or drought conditions, brushfires can accelerate.

Another factor that could contribute to the spreading of fires impacting residential areas is the increase in the use of residential propane tanks, especially when homes are in close proximity to each other such as the case in Common Fence Point and Hummocks and Island Park neighborhoods of Portsmouth, where property lots are small and homes closely located.

On Prudence Island there are a few isolated homes in densely forested areas where there is only a single road for egress.

Prudence Island developed a Community Wildfire Protection in 2018 that served to model fire behavior, evaluate fire suppression capability and identify mitigation actions that improve wildland fire response and reduce wildland fire risk, many of which have been implemented. Recent improvements in wildland suppression capability may not, however, be sufficient to offset the shift in forest composition and structure witnessed during the past decade, which serves to increase fire potential. Prudence Island remains at moderate to high risk for an extensive wildfire with widespread impacts.

## History

There have been no significant brushfires in the past 25 years on Portsmouth, Middletown, Newport, or Prudence and Hog Islands. Regular prescribed burns are conducted on Prudence Island for both habitat maintenance and training.

During the draft writing of this plan in November 2024, the State has been under a Red Flag Warning- an alert for when the combination of dry fuels and weather conditions support extreme fire danger.

## Probability of Future Occurrence

Likely.

## Climate Change Impacts

Fire behavior is expected to become more extreme with the anticipated change in temperature and precipitation patterns associated with a changing climate. These changes in environmental conditions will result in more abundant fuel availability across all habitat types but is particularly true in forested areas through the secondary impact of increased pest species that are attracted to stressed trees. Extreme fire behavior in forested areas is generally driven by an increase in woody debris and a change in both understory and overstory composition, both of which are occurring at an extraordinary rate. Although the extent of brushfires may have diminished over the years due to advances in detecting and firefighting technologies, longer dry periods and droughts are expected to increase the probability of brushfires in future years.

## Dam Failure

### Description

The Rhode Island Department of Environmental Management (RIDEM) classifies dams as high hazard, significant hazard or low hazard. The classification is not based on whether a dam is deemed safe or unsafe. As of 2023, there are 95 high hazard dams, 81 significant hazard dams and 494 low hazard dams in the state.<sup>49</sup> Each dam’s hazard classification determines the frequency of inspection. The higher the classification, the more frequently the inspection is conducted.

- › A High Hazard dam is one whose failure or misoperation will result in a probable loss of human life.
- › A Significant Hazard dam is one whose failure or misoperation results in no probable loss of human life but may cause major economic loss, disruption of lifeline facilities or impact other concerns detrimental to the public’s health, safety or welfare.
- › A *Low Hazard* dam is one whose failure or misoperation results in no probable loss of human life and low economic losses.

As part of each Rhode Island Department of Environment Management (RIDEM) inspection, the major components of the dam are subjectively rated as good, fair or poor. The major components are the embankment, the spillway and the low-level outlet. Good means the dam meets the minimum Army Corps of Engineers (ACOE) guidelines. Fair means the dam has one or more components that require maintenance. Poor means a component of a dam has deteriorated beyond maintenance and is in need of repair.

### Location

As noted in Table 4, there are various dams on Aquidneck Island. See Appendix E Community Assets Maps. According to the RIDEM 2023 Annual Report to the Governor on the Activities of the Dam Safety Program, two dams in Middletown have been identified as having unsafe conditions.

- › Gardiner Dam: Vegetation prohibited inspection, deteriorated spillway, unknown operability of low-level outlet. However, a 2023 Inspection Report by Pare Corporation<sup>50</sup> rated the Gardiner Pond dam structure in fair condition meaning that it needs to be maintained but still functions as originally intended.
- › Easton North: Vegetation prohibited inspection; vegetation affected spillway flow. However, a 2023 inspection done by Pare Corporation<sup>51</sup> determined the dam to be in fair condition meaning that it needs to be maintained but still functions as originally intended

<sup>49</sup> 2023 Annual Report to the Governor on the Activities of the Dam Safety Program.  
<https://dem.ri.gov/sites/g/files/xkgbur861/files/2024-05/damrpt23.pdf>

<sup>50</sup> Gardiner Pond North Dam, Visual Inspection/Evaluation Report. October 11, 2023.  
<https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/maps/mapfile/damfiles/583.pdf>

<sup>51</sup> Eason Pond North Dam, Visual Inspection/Evaluation Report. October 26, 2023.  
<https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/maps/mapfile/damfiles/584.pdf>

A 2023 Inspection Report by Pare Corporation<sup>52</sup> rated the Easton South dam structure in fair condition meaning that it needs to be maintained but still functions as originally intended.

### Extent (Event Magnitude)

All three dam hazard classifications are represented on Aquidneck Island. The extent of a failure would vary. The RHMC has identified failure as a break in the dam, sending water downstream.



*Easton Pond Dam South (left) and Easton's Beach (right) during a storm in December 2023.  
Photo credit: City of Newport.*

### Impact and Damage Extent

The RHMC recognizes that a dam failure is not a natural hazard in itself but several of the hazards listed in the hazard list could bring dam failure upon Aquidneck Island. Severe winter storms, flooding, and a hurricane could all bring enough rain and or snowfall to cause a dam failure. The age of these nearby dams also poses a risk to their structural integrity. A failure of the Easton Pond South Dam would cause significant damage to Memorial Boulevard and several hundred feet of Easton's Beach. Detailed inundation areas can be found in Dam Emergency Action Plans field with RIEMA and RIDEM.

<sup>52</sup> Eason Pond South Dam, Visual Inspection/Evaluation Report. October 26, 2023.  
<https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/maps/mapfile/damfiles/585.pdf>

## History

There have been two minor dam incidents with the Newport-owned reservoirs in recent history. A dam incident was detected in the Lawton Valley Reservoir Dam (located in Portsmouth) in February 2000; the vegetation on the earth concrete dam was deemed to be excessive and recommendations were made to remove it. Additionally, missing riprap and erosion issues were in need of repair (National Performance Dams Program).

Another dam incident was recorded in March 2000 with the Harold E. Watson Reservoir Dam (located in Little Compton). During the inspection the dam was found to have an eroded embankment, and recommendations were made to remove excessive vegetation and to regrade the crest and plant it with grass for erosion protection (National Performance Dams Program).

## Probability of Future Occurrence

Possible.

## Climate Change Impacts

Related to flooding, more intense rain events may stress the structural integrity of dams which could lead to failure.

## 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. 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.



*Tornado in Portsmouth, October 2019. Photo Credit: Portsmouth Police Department.*

Tornadoes are categorized according to the damage they produce using the Fujita Scale (F-scale). Below is the Enhanced Fujita (EF) Scale and the Old Fujita (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 27** highlights more tornado events that have affected Rhode Island.

**Table 26 Fujita Scale**

Fujita Scale			Enhanced Fujita Scale		Damage Scale
F Number	Fastest ¼ mile (MPH)	3 Second Gust (MPH)	EF Number	3 Second Gust (MPH)	
0	40-72	45-78	0	65-85	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
1	73-112	79-117	1	86-110	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
2	113-157	118-161	2	111-135	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.

Fujita Scale			Enhanced Fujita Scale		Damage Scale
F Number	Fastest ¼ mile (MPH)	3 Second Gust (MPH)	EF Number	3 Second Gust (MPH)	
3	158-207	162-209	3	136-165	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
4	208-260	210-261	4	166-200	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars were thrown and large missiles generated.
5	261-318	262-317	5	Over 200	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds); trees debarked; incredible phenomena will occur.

### Location

The Regional Hazard Mitigation Committee recognizes that the risk of tornadoes is low for the State of Rhode Island but with the recent changing weather patterns and touchdowns of tornadoes, it would be unwise not to consider them a possible hazard.

### Extent (Event Magnitude)

Historically, Newport County isn't known to be a hotbed of tornado activity. In 2019 an EF-0 tornado touched down in nearby Portsmouth and lasted for only about a minute. It is expected that future tornadoes will be 0 or 1 on the F-Scale of magnitude.

### Impact and Damage Extent

Tornadoes can cause significant damage to buildings, trees and above ground utility lines. Flying debris can cause injuries to residents.

### History

**Table 27 Recent Tornado Events in Rhode Island<sup>53</sup>**

Date	EF-Scale	Injuries	Damage	Location
8/16/2000	0	0	\$0	Providence County
8/7/2004	0	0	\$0	Kent County
7/23/2008	1	0	\$47,987	Bristol County
8/10/2012	0	0	\$50,000	Washington County
10/24/2018	1	0	unknown	North Providence and Lincoln
10/02/2019	0	0	\$5,000	Portsmouth
11/13/2021	1	9	\$50,000	Westerly and CT
08/18/2023	1/2	1	\$250,000	Scituate, Johnston, North Providence

53 NOAA Storm Event Database (2023)

## Probability of Future Occurrence

Unlikely.

## Climate Change Impacts

It is uncertain how climate change will affect tornado outbreaks on Aquidneck Island.

## Earthquake

### Description

An earthquake (also known as a quake, tremor or temblor) is the result of a sudden release of energy in the Earth's crust that creates seismic waves. The seismicity or seismic activity of an area refers to the frequency, type and size of earthquakes experienced over a period of time. Earthquakes are measured with a seismometer. The size or magnitude is recorded on a device known as a seismograph. Earthquakes with a magnitude 3 or lower are mostly imperceptible (too low to recognize) and magnitude 7 earthquakes can cause serious damage over large areas.

Although earthquakes are not considered to be a major problem in the Northeast United States, they are more prevalent than one might expect. Table 29 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.

The 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 28 Magnitude Scale Comparisons**

Modified Mercalli Intensity	Richter Scale Magnitude	Description of Intensity Level
I	1 to 2	Not felt except by a very few under especially favorable circumstances.
II	2 to 3	Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
III	3 to 4	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration similar to the passing of a truck. Duration estimated.
IV	4	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	4 to 5	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.

Modified Mercalli Intensity	Richter Scale Magnitude	Description of Intensity Level
VI	5 to 6	Felt by all; many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	6	Damage negligible in building of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motorcars.
VIII	6 to 7	Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	7	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	7 to 8	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
XI	8	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
XII	8 or greater	Damage total. Lines of sight and level distorted. Objects thrown into the air.

Despite the low probability of a high impact earthquake, physical characteristics in Rhode Island may increase earthquake vulnerability:

- › **Hard Rock:** Due to the geological makeup of New England’s base rock, seismic energy is conducted on a greater scale (four (4)-10 times that of an equivalent Richter magnitude earthquake in California).
- › **Soft Soil:** Many coastal regions of New England are made up of soft soils. These soils can magnify an earthquake as much as two times.
- › **Structures:** The New England region, being one (1) of the first settled areas of the United States, has an abundance of older, unreinforced masonry structures that are inherently brittle and very vulnerable to seismic forces.
- › **Low Public Awareness of Vulnerability:** Little public recognition of earthquake threat, and no established system of educating or informing the public of the threat or how to prepare for or respond during an earthquake. Therefore, higher losses will occur here than in other regions of the country.

## Location

Rhode Island is located in the North Atlantic tectonic plate and is in a region of historically low seismicity. Only three or four earthquakes of Modified Mercalli Intensity Scale (MMI) V or greater have been centered in Rhode Island, including the 1951 South Kingstown earthquake of magnitude 4.6 on the Richter scale.

## Extent (Event Magnitude)

“The underlying geology of the State is largely composed of unsorted rock of varying size that is considered geologically stable and not prone to seismic amplification. However, areas

surrounding Narragansett Bay have been identified as having Outwash Deposits, which can be prone to seismic amplification, increasing the intensity of the seismic event.”<sup>54</sup>

### Impact and Damage Extent

The RHMC recognizes that the potential for an earthquake to strike Aquidneck Island is relatively low but the hazard could inflict island-wide damage, causing power outages, building collapses, water main breaks, dam failures, gas leaks, fires and injuries or deaths. Buildings that are most at risk from earthquakes are the historic structures.

### History

Only a few earthquakes have been felt and centered in Rhode Island. One past occurrence of note is the 1951 South Kingstown earthquake that had a magnitude of 4.7 on the Richter scale. Other past earthquakes which were centered in Narragansett Bay and most significantly impacted Newport, Bristol, and Providence counties.

No major earthquakes have happened on Aquidneck Island but have been felt in the state.

**Table 29 Historic Seismic Activity in/near Rhode Island<sup>55</sup>**

Date	Epicenter	Epicenter Magnitude	Mercalli Intensity Level
06/10/1951	South Kingstown, RI	4.6	Intensity level V felt beyond just in Kingston.
10/16/1963	Coastal MA	4.5	Caused some cracked plaster (MMI V) at Chepachet, Rhode Island.
6/14/1973	Western Maine	unknown	The intensities in Rhode Island were IV at Charlestown and I-III at Bristol, East Providence, Harmony, and Providence.
10/01/1974	West Warwick	2.5	Intensity level II.
03/11/1976	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.
04/20/2002	Plattsburgh, NY	5.2	Intensity level II to III shock effects felt throughout Rhode Island.
03/11/2008	Central Connecticut	2.9	No data reported for Rhode Island.
06/23/2010	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.
04/04/2013	Hope Valley, RI	1.8	Felt locally.
01/12/2015	Wauregan, CT	3.3	Felt locally in RI.
07/22/2015	East Providence, RI	2.3	Felt locally in RI.
11/08/2020	Buzzards Bay	3.6	Felt locally in RI, likely on Aquidneck Island.
11/22/2020	Buzzards Bay	2.0	Felt locally in RI, likely on Aquidneck Island.

<sup>54</sup> 2024 State of Rhode Island Hazard Mitigation Plan

<sup>55</sup> United States Geologic Survey [http://neic.usgs.gov/neis/states/rhode\\_island/rhode\\_island\\_history.html](http://neic.usgs.gov/neis/states/rhode_island/rhode_island_history.html) and Earthquake Hazards Program “Did You Feel It” Archives.

Date	Epicenter	Epicenter Magnitude	Mercalli Intensity Level
06/12/2022	Narragansett Bay	1.6	Felt locally in RI, epicenter between Aquidneck Island and Hog Island.

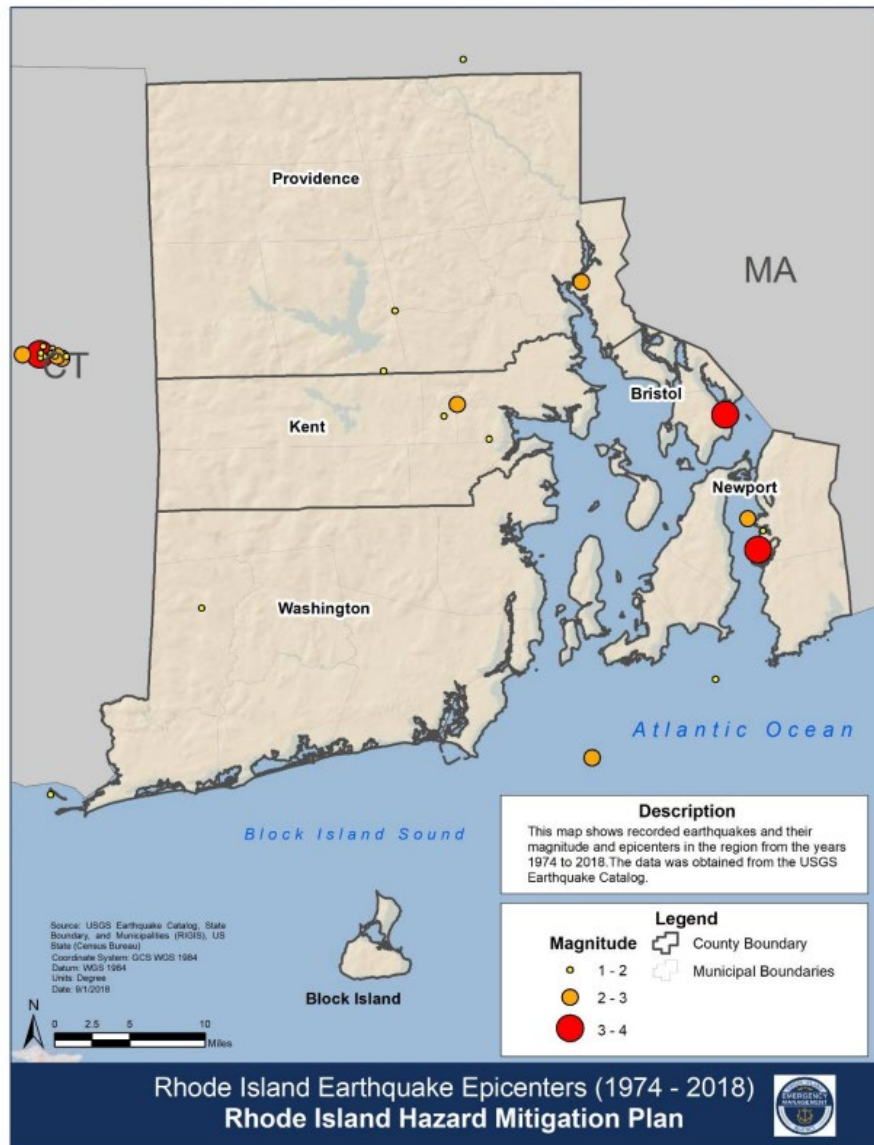
### Probability of Future Occurrence

Possible.

### Climate Change Impacts

It is uncertain how climate change will affect earthquake magnitude in and around Aquidneck Island.

Figure 9 Rhode Island Earthquake Epicenters (1974 -2018)



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## Tsunamis

### Description

Although tsunamis were not discussed in the Rhode Island State Hazard Mitigation Plan, they are profiled in the Massachusetts and Connecticut Plans. The Portsmouth Hazard Mitigation Committee perceives a probable likelihood of tsunamis in the future and is thus including them as an identified hazard in this plan.

Tsunamis (seismic waves) are a series of giant ocean waves created by underwater geologic activity such as an earthquake, landslide, volcanic eruption, or impact from a meteorite. This series of waves can travel hundreds of miles per hour across the open ocean and develop waves of 100 feet or more.

The configuration of the ocean bottom and magnitude of the tsunami will influence the size of the wave(s) when it hits land. The Pacific coastlines of California, Oregon, Washington, Alaska, and Hawaii are the most popular places for tsunamis to occur.

Because earth movements associated with large earthquakes are thousands of square kilometers in area, any vertical movement of the seafloor immediately changes the sea-surface. Tsunamis are most commonly generated by earthquakes in marine and coastal regions. Major tsunamis are produced by large (greater than 7 on the Richter scale), shallow focus (< 30km depth in the earth) earthquakes associated with the movement of oceanic and continental plates. Underwater landslides associated with smaller earthquakes are also capable of generating destructive tsunamis.<sup>56</sup>

Although the U.S. east coast is much less likely to be affected by a tsunami than the Pacific Coast of the United States, tsunami threats do exist in coastal areas. If a tsunami would be generated near Rhode Island, there would be little warning time to evacuate to higher ground. Tsunami exposure along the Rhode Island coast is unlikely; however, were an event to occur, it could have extensive and prolonged impacts to residents, the economy, natural systems, and infrastructure.

Traditionally the magnitude of tsunamis was measured by the wave height, speed, and associated earthquake magnitude. A Tsunami Intensity Scale, although not used that much has been proposed to quantify a large number of criteria.<sup>57</sup>

### Location

All of Portsmouth is susceptible to tsunami damage but low areas of the Island Park neighborhood and Common Fence Point are most vulnerable to tsunami waves that come onshore.

<sup>56</sup> NOAA Tsunami webpage <https://www.tsunami.noaa.gov/>

<sup>57</sup> UNESCO\_IOC <http://neamtic.ioc-unesco.org/images/Neamtic/PDF/intensity-scale.pdf>

## Extent (Event Magnitude)

Due to the low magnitude of seismic activity in the Atlantic Ocean, tsunamis that are formed off the coast of New England would be relatively small.

## Impact and Damage Extent

The amount of energy carried by a tsunami can cause widespread devastation and loss of life for miles. In addition to the sheer weight and force of the wave, all the debris it creates can further damage the area. Trees and natural habitats are destroyed, and coastal zones are polluted by the dangerous chemicals carried out by receding waves. Flooding and contaminated drinking water can quickly spread diseases.

## History

Rhode Island has not been impacted by a significant tsunami. Historically, the frequency of tsunami or run-up events on the East Coast of the United States is approximately one event for every 29 years.<sup>58</sup>

## Probability of Future Occurrence

Possible. Major subduction zones in the Atlantic are along the Caribbean Sea, there have been a relatively low frequency of tsunamis compared to the Pacific Ocean.

## Climate Change Impacts

Sea level rise and rising temperatures will accelerate ice melts and collapse of glaciers globally which may cause massive landslides (or glacial earthquakes) that may trigger tsunamis that will impact Rhode Island.

## Space Weather

### Description

Space Weather includes solar wind, solar flares, and coronal mass ejections, including any condition in outer space that impacts technology on earth. These events are naturally occurring phenomena that have the potential to result in failure of electric power systems; satellite, aircraft, and spacecraft operations; telecommunications; position, navigation, and timing services; and other technologies and infrastructures.<sup>59</sup>

According to the United States Department of Energy, **electromagnetic pulses (EMPs)** are “intense pulses of electromagnetic energy resulting from solar-caused effects on man-made nuclear and pulse power devices.” These EMPs can be naturally occurring or human-caused hazards. Examples of natural EMP events include a coronal mass ejection, also known as a solar electromagnetic pulse, and solar storm causing a geomagnetic disturbance. An EMP

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58 ResilientMass Plan: 2023 MA State of Hazard Mitigation and Climate Adaptation Plan.

59 U.S. Department of Homeland Security, Federal Operating Concept for Impending Space Weather Events, May 2019  
[https://www.fema.gov/sites/default/files/2020-07/fema\\_incident-annex\\_space-weather.pdf](https://www.fema.gov/sites/default/files/2020-07/fema_incident-annex_space-weather.pdf)

can also be caused by a nuclear or non-nuclear explosion that creates high magnitude electric and magnetic fields and induced currents in the earth and electric grid.

“In 2015, Congress amended the Homeland Security Act of 2002 by passing the Critical Infrastructure Protection Act (CIPA), which protects Americans from an EMP. It is also required reporting of EMP threats, research and development, and a campaign to educate planners and emergency responders about EMP events.”<sup>60</sup>

EMP mitigation is difficult and largely done at the national level. The federal government has focused efforts on shielding critical infrastructure from EMP effects.<sup>61</sup>

### **Location**

Space weather can occur in any location and is relatively unpredictable.

### **Extent (Event Magnitude)**

The strength of space weather is directly related to the magnitude of the solar flare/storm or high-altitude nuclear explosion.

### **Impact and Damage Extent**

EMPs can impact a wide range of electronic systems and devices such as communication systems on the power grid, and global-positioning systems (GPS) used for navigation. This could cause widespread destruction of property and life.

### **History**

There have been no reports of severe space weather in Rhode Island.

### **Probability of Future Occurrence**

Unlikely although possible.

### **Climate Change Impacts**

It is uncertain how climate change will affect space weather magnitude in and around Aquidneck Island.

## **Climate Change**

Changing climate patterns globally and in Rhode Island will worsen the effects of most natural hazards and affect future planning and mitigation efforts. Changes are already being observed and documented. On Aquidneck Island, climate change can be seen in sea level rise, high coastal flood waters, storm surges, and intense coastal storms. Long-term climate change is likely to cause the following impacts on Aquidneck Island:

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<sup>60</sup> Southeastern North Carolina Regional Hazard Mitigation Plan, January 2021.

<sup>61</sup> U.S. Department of Homeland Security, Science and Technology. *Electromagnetic Pulse Shielding Mitigations, Best Practices for Protection of Mission Critical Equipment*. August 2022.

- › Heavier, more frequent precipitation events, which may cause more coastal and riverine flooding and flash flooding events.
- › Longer periods of drought and heat waves which may affect public health, water availability and increase the threat for brushfires.
- › More frequent or intense high wind events such as hurricanes and Nor'easters which can cause dangerous storm surge, damage trees, cripple the electric grid, and damage property.
- › Increasing air and water temperatures.

How rapidly these climate changes will be felt is debatable but there is certainty within the state that municipalities need to be prepared. The communities on Aquidneck Island aim to become more adaptable/resilient to the changing conditions and respond to weather emergencies.

## Portsmouth Concerns

As with any community, Portsmouth is not uniformly vulnerable to natural hazards and climate change. Low-lying coastal neighborhoods such as Common Fence Point, Island Park, and Hummocks, have already seen an increase in flooding from high tides, storm surge, and heavy rain. Prudence Island, although minimally populated with about 100 residents, is susceptible to increased flooding, droughts and brushfires. The combination of these issues presents a challenge to emergency preparedness, response, and planning for resiliency.

## Middletown Concerns

In recent years, Middletown has experienced an increase in the frequency and intensity of severe weather events and heat waves. The impacts from such hazards include coastal flooding of critical infrastructure, bridges, roads, and low-lying areas of the coast; inland flooding from intense rain events; and property damage from trees, wind, snow ice. Longer periods of elevated heat during the summer have raised concerns about vulnerable segments of the population including the elderly and disabled.<sup>62</sup>

## Newport Concerns

The Point Neighborhood (east of the Goat Island causeway), one of Newport's most historic areas, has experienced flooding from both storm surge and freshwater stormwater that is unable to drain. Unless adaptations actions are implemented, this area will likely see massive flooding during future hurricanes and rainfall events.

"In recent decades, climate-related sea level rise has begun to change the frequency and severity of hurricanes along the East and Gulf coasts. Katrina, Irene, and Sandy wrought widespread destruction and suffering, including significant damage to cultural heritage.

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62 Middletown Municipal Resilience Program, Community Resiliency Building Workshop Summary of Findings, September 2020.

Since 1990 Newport County has been brushed by nine hurricanes, and eleven tropical storms.”<sup>63,64</sup>

There are four drinking water reservoirs (South Easton Pond, North Easton Pond/Green End Pond, Nelson Paradise Pond, and Gardiner Pond) located along the shoreline with low berms subject to failure during a major storm event.<sup>65</sup>

In Newport, climate change has become a real concern for historic preservationists, coastal homeowners, waterfront businesses, U.S. Navy, and the city. Through the exercise of creating this plan, the City of Newport is exploring ways to reduce their long and short-term risks to a variety of hazards. Any storm that comes up the eastern seaboard will likely impact Newport. As climate conditions intensify, the RHMC is prepared to update this regional plan accordingly.

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63 Keeping History Above Water, Climate Change in Newport <https://historyabovewater.org/climate-change-in-newport/>

64 Tropical Systems That Impacted Newport County RI – 1898 to Present.” NewportRIWeather.com, 2024  
[newportriweather.com/mwd/hurricanes/hurricanes1.htm](http://newportriweather.com/mwd/hurricanes/hurricanes1.htm)

65 Rhode Island Coastline Coastal Storm Risk Management, Final Integrated Feasibility Study and Environmental Assessment, 2023.



# 4

## Risk Assessment

FEMA has an online mapping application that identifies communities most at risk for natural hazards. This National Risk Index (NRI) was utilized to get a high-level view of Newport County’s expected annual losses and vulnerability to numerous natural hazards. The Risk Index takes into account expected annual losses for hazards, social vulnerability, and community resilience. See **Appendix D** for the full report. The Risk Index for Newport County is Relatively Low when compared to the rest of the United States. Table 23 below shows the Risk Index for each hazard.

**Table 30 FEMA National Risk Index for Newport County, RI**

Hazard	Risk Index	Expected Annual Loss
<b>Hurricane</b>	Relatively Low	Very Low
<b>Coastal Flooding</b>	Relatively Low	Very Low
<b>Riverine Flooding</b>	Relatively Low	Relatively Low
<b>Winter Weather</b>	Very Low	Very Low
<b>High Winds</b>	Very Low	Relatively Low
<b>Drought</b>	Relatively Low	Relatively Low
<b>Extreme Temperatures</b>	Very Low	Very Low
<b>Lightning</b>	Relatively Low	Relatively Low
<b>Hail</b>	Very Low	Very Low
<b>Wildfire</b>	Very Low	Very Low
<b>Tornado</b>	Very Low	Very Low
<b>Earthquake</b>	Very Low	Very Low

**Legend**

**Risk Index**

- Very High
- Relatively High
- Relatively Moderate
- Relatively Low
- Very Low
- No Rating
- Not Applicable
- Insufficient Data

**Expected Annual Loss**  
 $\times$  **Social Vulnerability**  
 $\div$  **Community Resilience**  
**= Risk Index**

Compared to the rest of the country, Aquidneck Island and Newport County may have a relatively low risk of disasters, but that is not a reason to sit by idly as the waters rise.

The following sections summarize Aquidneck Island resources at risk to natural hazards and what some potential losses or impacts would be from major storm events.

## Facilities/Resources Inventory

The first step in the assessment process was to create the inventory of facilities and resources of special concern to each municipality. In developing the inventory, the community's Lifelines were considered. A lifeline enables the continuous operation of critical government and business functions and is essential to human health and safety or economic security. Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function. FEMA has developed a construct for objectives-based response that prioritizes the rapid stabilization of Community Lifelines after a disaster. The integrated network of assets, services, and capabilities that provide lifeline services that are used day-to-day to support the recurring needs of the community and enable all other aspects of society to function. When disrupted, decisive intervention (e.g., rapid re-establishment or employment of contingency response solutions) is required to stabilize the incident. Taking mitigation steps to protect these assets pre-event is important. Lifelines include the following:



- › **Safety and Security** - Law Enforcement/Security, Fire Service, Search and Rescue, Government Service, Community Safety
- › **Food, Hydration, Shelter** - Food, Hydration, Shelter, Agriculture
- › **Health and Medical** - Medical Care, Public Health, Patient Movement, Medical Supply Chain, Fatality Management
- › **Energy** - Power Grid, Fuel
- › **Communications** - Infrastructure, Responder Communications, Alerts Warnings and Messages, Finance, 911 and Dispatch
- › **Transportation** - Highway/Roadway/Motor Vehicle, Mass Transit, Railway, Aviation, Maritime
- › **Hazardous Materials** - Facilities, HAZMAT, Pollutants, Contaminants Graphic
- › **Water Systems** - Potable Water Infrastructure, Wastewater Management

The RHMC identified the following as critical infrastructure/community assets:

- › Flood prone areas, streets, or infrastructure, and drainage systems
- › Bridges
- › Wastewater facilities
- › Water supply systems
- › Other services/utilities
- › Communication towers
- › Dams
- › Critical municipal hazard response facilities
- › Populations
- › Businesses
- › Schools
- › Recreational facilities
- › Natural resources
- › Historic resources

These most vulnerable assets are identified in the municipalities' Critical Infrastructure/Community Assets Matrices in **Appendix G**.

## Hazard Mitigation Mapping

Municipal GIS databases, including parcel data, orthophotography and FEMA flood zone information, were utilized to complete the assessment. The use of this system allowed the consultant to estimate potential fiscal and population impacts for individual parcels.

The final output of this exercise is the Aquidneck Island Community Assets Map in **Appendix E**. The focus of the map is not to duplicate all the spatial information generated through the inventorying process but rather to present the location of the identified vulnerable resources and areas.

## Fiscal Impact Analysis

The built environment is vulnerable to the impacts from flooding and strong winds. Aquidneck Island has over an estimated 23,000 buildings with a total replacement value (excluding contents) of \$13 billion. Approximately 85% of the buildings and 65% of the value are associated with residential housing.<sup>66</sup>

The more costly hazards of concern on Aquidneck Island are flooding, future sea level rise, and hurricanes. All involve a lot of water in the low-lying coastal communities, disrupting and

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66 HAZUS MH Version 6.1

even shutting down transportation, commerce, and local services. Below are examples of how those three hazards can impact the tax base and economy.

## Hurricanes

HAZUS-MH is a FEMA software tool that contains models for estimating potential losses from earthquakes, floods, and hurricanes. HAZUS-MH was used to further understand the potential risk from a large hurricane. For the purpose of this plan, two scenarios were run that captures the region’s risk from wind-borne hurricane damage. The first is looking at the wind speed of path of historic Hurricane Carol in 1954. The second scenario looks at a probability major hurricane (Category 3 or stronger).

### Hurricane Carol 1954

In 1954 Hurricane Carol, one of the worst hurricanes on record in Rhode Island, hit Aquidneck Island as a Category 1 storm with peak gusts at 110 mph. It tore through Southern New England, causing extensive damage throughout Rhode Island. If this same storm were to strike again today, it would cause over \$503 million dollars in total economic losses (property damage and business interruption loss) on Aquidneck Island. About 1,735 buildings are expected to be at least moderately damaged.<sup>67</sup> Approximately 214 would be completely destroyed. See **Appendix F**.

#### *HAZUS Qualitative Damage Description*

##### *No Damage or Very Minor Damage*

- › Little or no visible damage from the outside. No broken windows, or failed roof deck. Minimal loss of roof cover, with no or very limited water penetration.

##### *Minor Damage*

- › Maximum of one broken window, door or garage door. Moderate roof cover loss that can be covered to prevent additional water entering the building. Marks or dents on walls requiring painting or patching for repair.

##### *Moderate Damage*

- › Major roof cover damage, moderate window breakage. Minor roof sheathing failure. Some resulting damage to interior of building from water.

##### *Severe Damage*

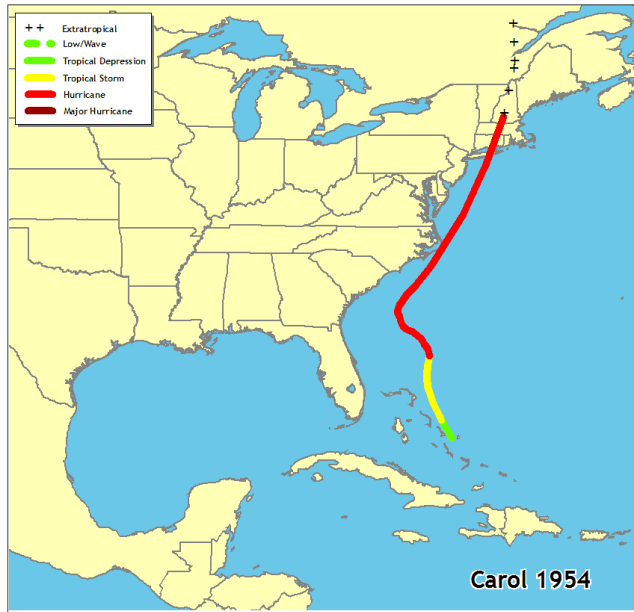
- › Major window damage or roof sheathing loss. Major roof cover loss. Extensive damage to interior from water.

##### *Destruction*

- › Complete roof failure and/or, failure of wall frame. Loss of more than 50% of roof sheathing.

<sup>67</sup> A representative analysis. No particular building is identified.

Figure 10 Hurricane Carol Path



Aftermath of Hurricane Carol, Newport. Photo Credit: Newport Daily News.

**Table 31 HAZUS-MH Scenarios for Aquidneck Island, RI**

<b>1954 Hurricane Carol Scenario – If It Happened Today<sup>68</sup></b>	
<b>Estimated Damage</b>	<b>Amount</b>
Debris generated	67,397 tons
Buildings destroyed	214
Buildings at least moderately damaged	1,735 (7% of total number of buildings)
Displaced households	256 households may be displaced. 172 people out of a population of 60,109 will seek temporary shelter in public shelters.
Essential Facility Damage (fire, police, schools)	17 of 41 facilities would expect to be non-operational for less than a day. With the exception of one school at least moderately destroyed, the other facilities shall remain operational.
Residential Property (capital stock)	\$444,129,790
Business interruptions	\$58,941,100



*Stone Bridge, once connecting Portsmouth and Tiverton was battered by Hurricane Carol. Photo Credit: The Providence Journal.*

<sup>68</sup> HAZUS-MH Hurricane Global Risk Report, run August 2024.

### Probabilistic Hurricane Scenario

A probabilistic hurricane model was run in HAZUS-MH to estimate the wind damages from a 10, 20, 50-100, 200, 500, and 1,000-year hurricane on Aquidneck Island.

- › For context, Aquidneck Island has experienced the following wind intensities lately:
  - Tropical Storm Irene 2011: 57-59 mph
  - Superstorm Sandy 2012: 37-60 mph
  - Tropical Storm Isaias 2020: 58 mph
  - Tropical Storm Heni 2021: 50-70 mph

The table below provides estimate wind speeds for each of the scenarios.

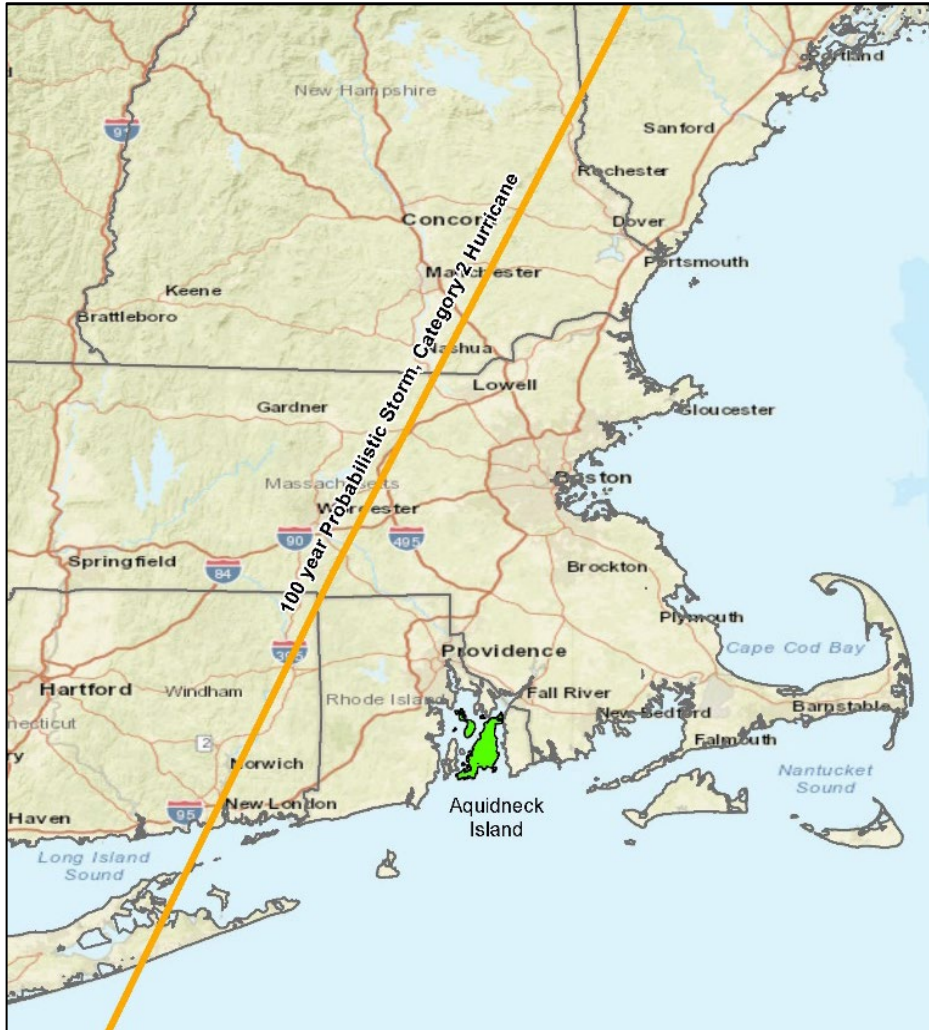
**Table 32 HAZUS-MH Hurricane Scenarios for Aquidneck Island, RI**

Return Period (% Chance)	Wind Speed (Mph) At Benton Point, Newport	Wind Speed (Mph) At Naval Station Newport, Middletown	Wind Speed (Mph) At Island Park, Portsmouth
10 (10% in any given year)	NA	NA	NA
20 (5% in any given year)	67	65.7	66.1
50 (2% in any given year)	87.3	85.5	86.4
100 (1% in any given year)	98.6	96.7	97.7
200 (0.5% in any given year)	108	105.9	107.1
500 (0.2% in any given year)	117.9	116.2	117.3
1,000 (0.1% in any given year)	124.3	122.3	124.3

For the purpose of this plan, 100-year return period, or a 1% annual chance storm of Category 2 or greater, with winds 96-100 mph was used to estimate a moderate hurricane. Less intensity storms are more in line with what the island has been experiencing.

Wind damages from the probable storm are summarized in **Table 33**.

Figure 11 Probabilistic Storm Track



Wind damage in Portsmouth. Photo credit: Portsmouth EMA.

**Table 33 HAZUS-MH Probabilistic Scenario for 1% Annual Chance Major Hurricane on Aquidneck Island, RI**

Probabilistic Category 2 Hurricane (Wind Speeds 96-110 mph) – If It Happened Today <sup>69</sup>	
Estimated Damage	Amount
Debris generated	53,225 tons
Buildings destroyed	121
Buildings at least moderately damaged	1,221 (5% of total number of buildings)
Displaced households	159 households may be displaced. 113 people out of a population of 60,109 will seek temporary shelter in public shelters.
Essential Facility Damage (fire, police, schools)	17 of 41 facilities would expect to be non-operational for less than a day. With the exception of one school at least moderately destroyed, the other facilities shall remain operational.
Residential Property (capital stock)	\$311,361,070
Business interruptions	\$40,637,700

## Flooding

Although wind and heavy snow can certainly rack up substantial damages, flooding is one of the hazards that most frequently affects island populations. Local parcel data and FEMA’s 1% annual chance floodplain data were utilized to generate estimates of potential fiscal impacts from natural hazard events such as flooding. The information utilized from the tax assessor’s database and GIS included the improvement values, land usage, and unit counts.



*FEMA Flood Map for Portsmouth.*

Note that this analysis does not account for sea level rise, erosion, or storm surge. The analysis showed that Aquidneck Island is comprised of 24,192 acres of land, with about 5,534 acres in the regulatory floodplain. These flood prone areas are largely located along the

<sup>69</sup> HAZUS-MH Hurricane Global Risk Report, run August 2024.

perimeter of the island, northeast of Boyds Lane in Portsmouth, along the Maidford River, Paradise Brook, and Bailey Brook in Middletown, and the area between Harrison Avenue and Moorland Road in Newport. Note that these FEMA-mapped areas do not consider erosion, sea level rise, or inadequate storm drainage.

During non-cyclone events, flooding can still impact the island. Tables 34 and 35 display potential damage estimates of property values of buildings within the Town’s Special Flood Hazard Area (SFHA), or regulatory floodplain. The parcel information, using the best available data, provides the number of parcels in the SFHA, and values of the buildings on each property. Land value was not considered for this exercise. The values provided are an estimate only. This percentage was calculated in order to assist with identifying which areas are at greater risk. According to Table 34, the island-wide total potential building damages for these floodplain areas are about \$377 million.

On average 76% of Aquidneck Island’s revenue is generated from real estate taxes.<sup>70</sup> Should any of the properties forming the tax base be destroyed by a hazardous event, a causal effect would be those property owners whose parcels remain intact would carry an increased financial burden with regards to property taxes. It is an important course of action for the municipalities to protect both lives and property from natural disasters. However, as Aquidneck Island’s population grows, the burden of protecting lives and property grows.

Using data from the E-911 structure data from the RI Geographic Information System (RIGIS) and information from the municipal Tax Assessors, the following table summarizes the value of the insurable buildings that are located within the Special Flood Hazard Areas.

The buildings that are located in each SFHA were first selected. The municipal parcel information for each building was then used to determine the building value. Parcels in the SFHA which do not have structures were not included in this assessment.

**Table 34 Value of Structures in the Floodplain**

Flood Zone	# of Parcels	Building Value
VE	1,209	\$1,365,468,804
AE	2,502	\$1,842,333,465
A	14	\$7,752,900
<b>TOTAL</b>	<b>3,725</b>	<b>\$3,215,565,179</b>

**Table 35 Value of Structures in the Floodplain by Land Use Type**

Land Use Type	# of Parcels with Parcels in the Floodplain	Assessed Building Value
Residential	3,306	\$2,120,080,379
Business	177	\$457,715,900
Mixed Use	107	\$110,509,300

<sup>70</sup> Based on municipal budgets for fiscal year 2023. 81% of Newport’s revenue is generated from property taxes, 84% in Portsmouth, and 63% in Middletown.

General Industry	90	\$295,561,200
Commercial	45	\$231,698,400
<b>TOTAL</b>		<b>\$3,215,565,179</b>

Using the Rhode Island GIS e911 structure file, FEMA flood insurance rate maps, and municipal GIS data, it was determined that \$3 billion in building values are located in the floodplain. Most of those are residential properties.

There are 1,781 flood insurance policies in place for an area that has an estimated 2,267 structures in the regulatory floodplain (VE, AE, and A-Zones). In the lower risk X-zones, 777 policies are in place, for added protection in case it floods. These policies are more affordable than those in the A and VE-Zones.

**Table 36 Flood Insurance Information**

	Newport	Middletown	Portsmouth	Aquidneck Island
Structures in the SFHA <sup>71</sup>	1,041	107	1,119	2,267
Total Number of Policies	1,162	98	521	1,781
X Zone	481	57	239	777
A Zone	608	24	251	883
VE Zone	73	17	31	121
Total Premiums	\$891,310	\$56,004	\$498,822	\$1,446,136
Insurance in Force	\$306,112,000	\$36,355,000	\$139,611,000	\$482,078,000
Total Number of Closed Paid Losses	224	36	137	397
\$ of Closed Paid Losses	\$9,057,493	\$370,648	\$840,343	\$10,268,484
Repetitive Loss Properties	24 (9 residential, 10 non-residential)	3 (residential)	7 (6 residential, 1 non-residential)	34
Severe Repetitive Loss Properties	5 (2 residential, 3 non-residential)	0	0	5

<sup>71</sup> Estimate number of structures based on E-911 building footprint GIS data and the FEMA Digital Flood Insurance Rate Map (DFIRM), 2022.

Areas that didn't experience flooding previously are now more vulnerable as sea level rises and riverine flood intensity and frequency increases. Municipalities have been encouraging development away from flood areas but most of this development predates recent regulations requiring flood proofing, leaving many vulnerable areas unprepared to face a storm of any significance.

Each municipality has identified critical community assets listed in the Critical Infrastructure/Community Assets (**Appendix E**). These lists include flood prone drainage systems, streets or infrastructure; bridges; wastewater; water supply; services/utility facilities; public communication equipment; dams; critical municipal hazard response facilities; populations; businesses; schools; recreational facilities; and historic resources. All of these important community resources have the potential to be affected by natural disasters. The magnitude of the losses would be dependent upon the type, location, and extent of each unique hazard.

The local zoning laws help dictate future development while maintaining Aquidneck Island's unique character. Continued enforcement of Rhode Island State building codes and new regulations as required will lessen potential damage caused by a natural hazard event. The codes adopted by Aquidneck Island range from building codes and design standards, to zoning regulations.

## Sea Level Rise

It is worth noting that although some buildings and roads may be past their design life by the time sea level rise impacts them, current planning efforts can better safeguard future developments.

With 60 miles of coastline, even on a sunny day, large areas of Aquidneck Island are susceptible to impacts from 1, 3, or 5 feet of sea level rise by 2100. Some impacts such as damage to transportation infrastructure are easier to quantify than saltwater intrusion into the marshes and drinking water. Parts of Rhode Island's south coast, Barrington, Warren, Bristol, and Warwick have been part of a University of Rhode Island-based STORMTOOLS Coastal Environmental Risk Index (CERI) assessment which predicts storm surge and wave, combined with shoreline change maps (erosion), and damage functions. Unfortunately, this type of analysis has not been conducted for Aquidneck Island.

As sea levels rise and storm surge boundaries move inland, more and more properties will be impacted by coastal flooding. Permanently flooded roads could isolate entire neighborhoods or permanently flood them. As sea levels rise, coastal land values may decrease as more areas are permanently flooded.

### FEMA A-Zone vs. AE-Zone

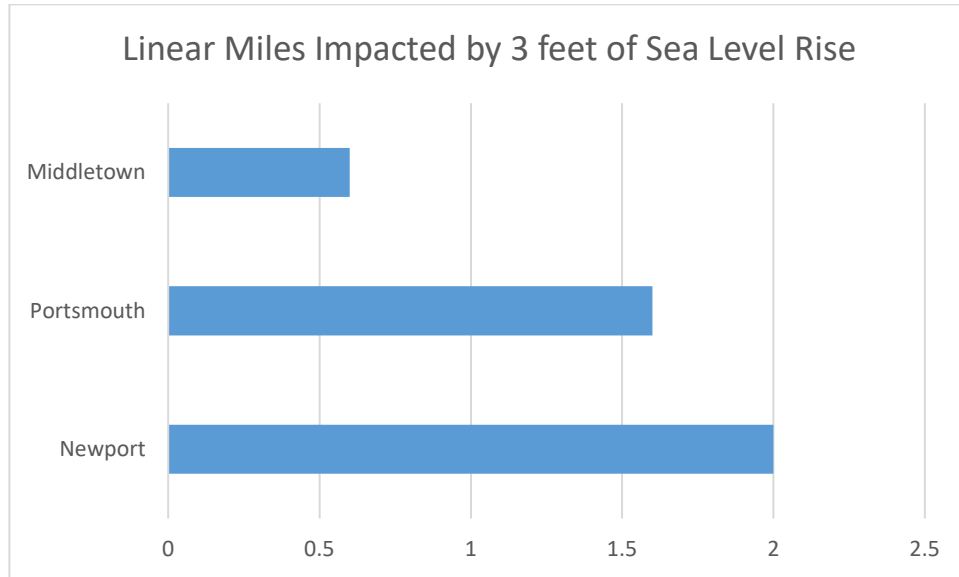
Both are considered Special Flood Hazards Areas- areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage.

**AE Zone:** Base Flood Elevations (BFEs) are provided on the FEMA maps. Formerly A1-A30 numbered zones.

**A Zones:** Detailed studies have not been conducted which indicate depth or base flood elevation.

Using the estimates from RI Statewide Planning, a moderate sea level projection of 3 feet can be expected within the next 40 years, within the design life of most roads. Looking at a 3-foot sea level scenario, there are 4.2 miles of roads on Aquidneck Island that would be impacted.<sup>72</sup>

**Figure 12 Sea Level Rise on Roads**



A very high-level analysis estimates the 4.2 linear miles of critical roadway could cost over \$19 million to reconstruct.

**Table 37 Estimate Cost (per linear mile) of Repairing a Typical 2-lane Road**

Reconstruction Items Included in Estimate	Repair Technique	
	Mill and Overlay	Full Reconstruction
Roadway Construction Mobilization (the movement of people, equipment and resources) Traffic Protection Engineering and Construction Contingency Police Detail	\$1.5 million per linear mile	\$4.5 million per linear mile

For the repair of more substantial roads, the addition of stormwater management and other roadway infrastructure would significantly increase these costs.

<sup>72</sup> Rhode Island Division of Statewide Planning <https://planning.ri.gov/planning-areas/climate-change-resilience/sea-level-rise/state-and-municipal-appendix-materials>

## Population Impact Analysis

Of primary concern during a hazard event is protecting the health and safety of Aquidneck Island residents. In addition to knowing the total population, it's also important to estimate how many people would be impacted by loss of service or need to evacuate. According to the 2023 American Community Survey 5-Year Estimates, there are 30,193 housing units in Aquidneck Island supporting a population estimate of 59,942. During a moderate hurricane, up to 159 households may be displaced and seek shelter. The population in Aquidneck Island is generally concentrated in the inland areas.

The 2020 Population data was used in Figure 13 to estimate the most densely populated areas based on the best available data.

Vulnerable populations include elderly/senior citizens, special needs, disabled, students, visitors and tourists, business owners, veterans, low-income residents, and the working waterfront community. Over 50% of Newport houses are used as rental properties.<sup>73</sup> Renters may not be aware of flood risks or have flood insurance covering contents. As a renter, they also may not have control over property repairs. Being a tourist destination, population of renters increases during the summer months on Aquidneck Island, especially in Newport. The non-residents may be unfamiliar with evacuation routes, sheltering options, or flood risks. They also are unlikely subscribed to the municipal Code Red systems which sends out automated emergency alerts.

Improving emergency response and educating these populations is important to all three communities.

A significant hazard can significantly cripple the area. In addition to direct damage to personal property, impacts can include the disruption of vital services, the loss of utilities, and the emotional strain from financial and physical losses. This is especially difficult when residents are forced to evacuate their homes.

### Community Anchor Points

A community is more than the people and their homes. Community institutions or anchor points are features of a city or town that enrich the lives of residents. Examples include schools, libraries, health centers, hospitals, public safety centers, community support organizations, and religious institutions. Loss of these resources can slow down recovery and extend the time before a community is back to normal. On Aquidneck Island, these anchor points can be impacted by a variety of hazards. The following are located in the flood zone, a place that is unquestionably vulnerable to flooding. See **Appendix E**.

**Table 38 Community Institutions in the Flood Zone**

Name	Address
Aquidneck Island Adult Learning Center/Newport Community School	23 America's Cup Avenue, Newport

<sup>73</sup> U.S. Census Bureau, Population Estimates Program v2024. <https://www.census.gov/quickfacts/fact/table/newportcityrhodeisland#>

Name	Address
MLK Center	20 Dr. Marcus F. Wheatland Blvd., Newport
Christian Congregation in the United States	5 Marcus F Wheatland Blvd, Newport
St John The Evangelist	61 Poplar St., Newport
US Customs and Border Protection Port of Entry	320 Thames St., Newport
Newport Fire Department Station 1	21 West Marlborough St., Newport
Naval War College	686 Cushing Road, Newport
Turning Around Ministries	40 Dr. Marcus F. Wheatland Blvd., Newport
Common Fence Point Arts, Wellness, & Community Center	933 Anthony Road, Portsmouth

## Environmental Justice

There are nearly 6,000 individuals that live in areas of Newport and Middletown that are burdened by low income and can be particularly susceptible the impacts of climate change. Both are prone to flooding.

These communities may experience the following hardships related to natural hazards and climate change:

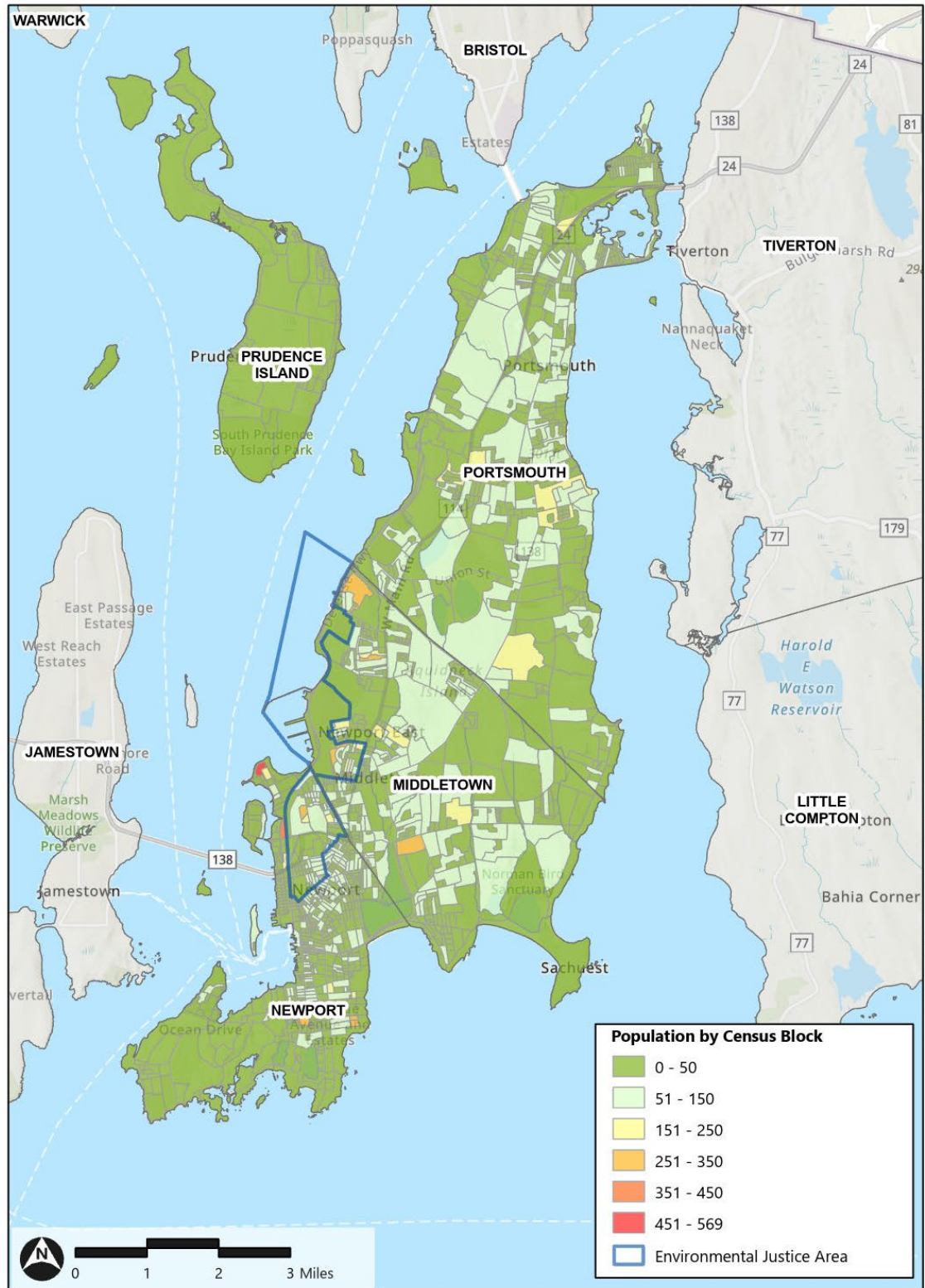
- › Residents of these communities may lack adequate health care, medicine, health insurance, and access to public health warnings in a language they can understand. In addition, they may not have access to transportation to escape the impacts of extreme weather, or home insurance and other resources to relocate or rebuild after a disaster.
- › Newport’s low-lying North End neighborhood experiences significant flooding. In addition to causing damage to homes, flood waters can promote mold growth in a community already overburdened and suffering from asthma.
- › Disadvantaged communities in Newport have higher rates of health conditions such as asthma. Periods of extreme heat and warming conditions can worsen pollen, air quality, and asthma.
- › Residents may not feel welcome at resources available to them during a disaster such as free meals, hotels, etc. if they don’t see people like them using it or telling them about it, they are less likely to use the resources.
- › Federal funding and post-disaster assistance are not available to those without Social Security numbers.
- › During the winter, many seasonal employees are out of work and are already experiencing hardships. This can be compounded if there is a weather emergency and they are already financially unstable.

The North End of Newport has been identified as a critical area for near-future economic and innovation development in the Newport Comprehensive Plan and Newport Tree, Park and Open Space Master Plan. The North End Urban Plan directs redevelopment which offers more diverse economic opportunities and aims to connect the North End and Newport’s downtown and waterfront.

Disadvantaged communities in Newport’s North End have been asked to participate in implementation of a variety of projects that meet climate adaptation and resiliency goals.

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Figure 13 2020 Population by Census Block



## Natural Environment

The following critical natural resources are present on Aquidneck Island:

- › Wetlands and salt marshes
- › Rivers, creeks, brooks, and associated tributaries
- › Floodplains
- › Soils
- › Habitats and endangered species
- › Open space/preserves
- › Wooded areas
- › Beaches and dunes
- › Bays and ocean

Impacts from natural hazards and climate change are not uniform throughout the island. The RHMC and participants in the Community Building Workshops have identified the following items as key environmental areas of concern:

- › Erosion and loss of beaches, dunes, wetlands, and salt marshes
- › Beach closures due to intense rain events
- › Long-term viability of drinking water reservoirs
- › More frequent flooding of smaller tributaries
- › High groundwater levels pose a risk to low-lying homes
- › Impacts of tree health from pests and natural aging
- › Threats to open space

Rhode Island has experienced a significant increase in both flood frequency and flood severity over the past 80 years. Climate change is expected to result in more frequent heavy rains, affecting stream flow.<sup>74</sup>

Hurricanes, Nor'easters, floods or any weather-related hazard event will have particular impacts on the natural environment. Differences in storm size, speed of movement, wind speeds, storm surge heights, timing with respect to tides and landfall location relative to vulnerable resources makes for high variability in impacts and related costs.

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

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<sup>74</sup> Rhode Island's Environmental Climate Change Coordinating Council (EC4) Science and Technical Advisory Board, *Current State of Climate Science in Rhode Island*, May 1, 2016 [Microsoft Word - STAB Ann Rpt Final.docx \(ri.gov\)](#)

## Vulnerability of Future Structures

### *Will future development or population shifts impact the area’s vulnerability to natural hazards?*

Aquidneck Island is not uniformly vulnerable to natural hazards and climate change. Certain locations, resources, and populations have and will be affected to a greater degree than others. The local zoning districts help to maintain these less densely developed areas. Growth should only occur when there is an available capacity for municipal services to absorb the growth, and there is a fiscal ability and community agreement to the expanded infrastructure required for growth.

Aquidneck Island’s vulnerability to natural hazards is not expected to dramatically change over the next five years due to widespread increased development.

- › In Portsmouth, only modest growth in population and residential development is expected between now and 2040.<sup>75</sup>
- › Approximately 60% of Middletown is zoned residential. Planned growth in Middletown is in the general vicinity of the intersection of West Main and East Main Roads which already is an established business corridor.<sup>76</sup>
- › 90% of Newport is developed and land use patterns are well established. Efforts to date have been focused on making existing development more resilient.<sup>77</sup>

Enforcement of current building codes will ensure that new or re-development will be stronger and more resilient than some of the older, historic structures on Aquidneck Island.

The communities on Aquidneck Island anticipate the following changes which may impact future vulnerability:

- › Expansion at Naval Station Newport may put more people to a vulnerable coastal area.
- › Potential development and redevelopment in Newport’s North End may be impacted by future coastal storms and flooding. This area is also planning for more green infrastructure to mitigate the risk.
- › The planned Marine Village development in Portsmouth is located on an undeveloped brownfield in the floodplain associated with Weaver Cove. This development will have 400 residential units, a marina, retail, and restaurant components. Having more people and infrastructure along the coast may impact the vulnerability of that region.

## Anticipated Future Vulnerability

### How will future climate conditions and hazards impact the area’s vulnerability?

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75 Portsmouth Comprehensive Community plan December 2022.

76 Middletown, Rhode Island Comprehensive Community Plan 2014.

77 Newport, RI Climate Resilience & Financing Prioritization Report, 2022.

As climate conditions change, increased storm intensity or frequency may put considerable stress on the infrastructure on Aquidneck Island. Roads will flood more often and may eventually become unusable. Drainage infrastructure may be overwhelmed more often. Increased runoff could threaten the quality of drinking water supply. Fire hydrants, pump stations, and sewer and water lines will be stressed or inaccessible by the rising streams and rivers. Areas that are not used to flooding may see flood waters inch closer to their property.

More intense heat waves are tempered by the ocean but during the summertime, when the population on Aquidneck Island is higher, there may be a greater stress on the electric grid if temperatures remain uncomfortable.

## Regional Needs Matrix

In reviewing the supporting documents for this RHMP, there were a number of regional recommendations that kept showing up. The Regional Needs Matrix (Table 39 ) is the result of RHMC brainstorming, the review of the various Aquidneck Island resiliency studies, workshops, and reports. The table summarizes the identified regional needs and the proposed regional mitigation actions to help reduce vulnerability and improve resilience. Details for each mitigation action are in **Section 6**.

Critical Infrastructure/Community Assets for each community are listed in **Appendix G**.



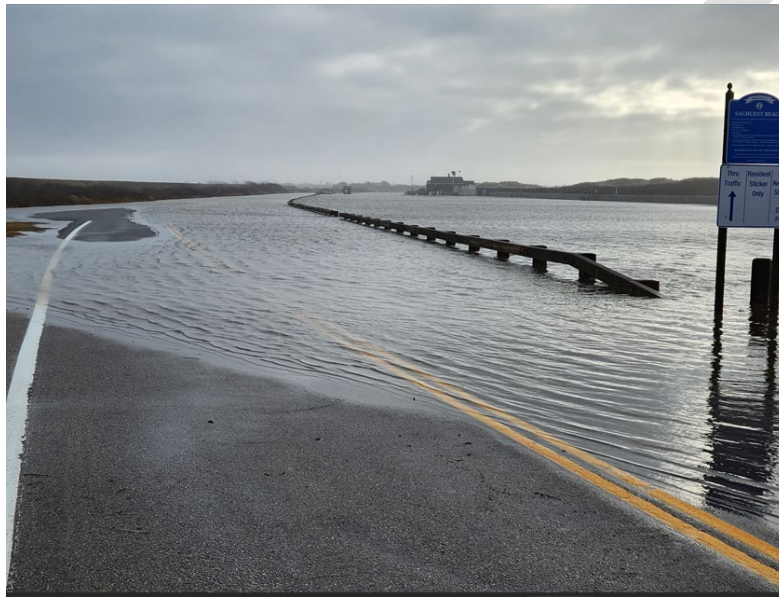
*Road flooding at entrance to Common Fence Point, Portsmouth. Grant money was used to install a better drainage system reducing the flooding depicted above but concern now exists as tides creep higher and water egresses in from the drainage system during extreme hightide events.*

**Table 39 Aquidneck Island’s Regional Resilience Needs**

Needs	Problems	Regional Mitigation Actions
<p><b>Island-wide Emergency Management</b></p>	<p>The local first responders in Portsmouth, Middletown, and Newport prioritize preparing and responding to emergencies. However, disaster and catastrophe level events call for an extraordinary level of multi-organizational planning and preparedness beyond the department level planning and preparedness practiced by our Fire and Police Departments. Not only is there limited bandwidth to focus on coordinated disaster and catastrophe level responses and planning, this approach requires unique skillsets. Disaster level planning calls for the creation of numerous detailed plans (EOP, EOC Ops plan, Damage Assessment, Evacuation, Critical Transportation, Commodities Dispensing, Medical Dispensing, Volunteer Management, Mass Casualty, Reunification Center Plan, Mass Sheltering, Debris Removal, Continuity of Ops, Hazard Mitigation, etc.) that includes identifying resources to execute and perform overhead management of the functions in all these plans. Having each municipality create essentially the same plans and staff and train the overhead management positions needed in a disaster is simply not efficient or achievable. A Regional Emergency Management Agency is a best practice nationally and can be implemented without compromising any one municipalities’ authority over response operations within their normal jurisdictions.</p> <p>There is no comprehensive evacuation plan for Aquidneck Island, the State, or our region. If</p>	<ol style="list-style-type: none"> <li>1. Build a regional Emergency Operations Center (EOC) and/or dual Incident Command Post (ICP) hybrid capability.               <ol style="list-style-type: none"> <li>a. Conduct a feasibility study: what is needed, organization need, authority.</li> <li>b. Build the infrastructure.</li> </ol> </li> <li>2. Establish the Aquidneck Island Emergency Management Capabilities (i.e. Agency or Coordinator).               <ol style="list-style-type: none"> <li>a. Conduct a feasibility study.</li> <li>b. Secure sustainable funding.</li> </ol> </li> <li>3. Develop a Comprehensive Evacuation Plan for all of Aquidneck Island, in collaboration with communities along most probable evacuation routes</li> <li>4. Partner with the University of Rhode Island to deploy RI-CHAMP advance storm modeling for Aquidneck Island.</li> </ol>

Needs	Problems	Regional Mitigation Actions
	<p>evacuation becomes necessary, it will require carefully planned coordination among many entities.</p> <p>Aquidneck Island is very vulnerable to substantial damage from hurricanes and Nor'easters. Local leaders and planners need a better understanding of the level of risk so that they can plan for appropriate resilience and mitigation actions.</p>	
<b>Drinking Water Protection</b>	Portions of the Easton Pond dams are vulnerable to sea level rise and increased frequency and intensity of coastal storms and precipitation.	5. Implement recommendations of Easton's Pond Resilience projects.
<b>Population Education</b>	The Aquidneck Island community needs consistent resilience messaging coming from the three municipalities, non-government organizations, (NGOs), Navy, and businesses.	6. Develop an island-wide public education plan communicating resiliency efforts and initiatives.
<b>Population Sheltering</b>	The emergency mass sheltering plan for all of Aquidneck and Prudence Island have the Gaudet Middle School in Middletown as the primary shelter, and Portsmouth Highschool as the secondary or overflow shelter. The Gaudet school, is being demolished and rebuilt. As storm intensities increase and other hazards become of greater risk, more people beyond those in the predicted inundation zones may need to take refuge in a shelter; but shelters need to meet specific occupancy criteria and be staffed.	7. Assess regional emergency sheltering capacity and capabilities.
<b>Natural System Protection</b>	Local streams and rivers have become infilled with silt and vegetative debris. Restoration can improve the capacity of the floodplain to store stormwater runoff and filter pollutants.	8. Conduct floodplain and stream restoration on local rivers and waterways to make them more efficient at carrying stormwater. <ul style="list-style-type: none"> <li>&gt; Maidford River</li> <li>&gt; Bailey Brook</li> </ul>

Needs	Problems	Regional Mitigation Actions
		<ul style="list-style-type: none"><li>› Founder’s Brook</li><li>› Elizabeth Brook</li></ul> <ol style="list-style-type: none"><li>9. Explore the feasibility of an Enterprise Fund for stormwater maintenance.</li><li>10. Explore the feasibility of a Regional Beach Preservation Program.</li></ol>



*Sachuest Beach/Second Beach, Middletown January 10, 2024*



*Wind damage at Naval Station Newport.*



# 5

## Existing Capabilities

### Purpose

This capability assessment examines the existing studies, plans, programs, and policies that have incorporated hazard mitigation and other resiliency tools into the local systems. The purpose of the capability assessment is to highlight successes, identify shortcomings, and to lay the groundwork for possible improvement. The Aquidneck Island communities recognize that the inclusion of mitigation initiatives not only benefits the island by reducing human suffering, damages and the costs of recovery, but also helps build and maintain the sustainability and economic health of the region. This section discusses the capabilities and effectiveness of the existing authorities, policies, programs, and resources available to accomplish hazard mitigation.



*Prudence Island, Portsmouth seawall restoration (2024).*

## Local Plans and Regulations

Various plans and regulations support hazard mitigation efforts.

**Table 40 Local Plans and Regulations**

	Portsmouth	Middletown	Newport
<b>Capital Improvement Plan (CIP)</b>	2020-2030	2022-2026	2025-2029
<b>Comprehensive Community Plan</b>	2022 Element 11 discusses natural hazards and climate change.	2015 Chapter III has climate change goals	2021 Chapter 13 includes natural hazards and climate change
<b>Continuity of Operations Plan (COOP)/Continuity of Government (COG)</b>	Yes	Underway	Yes
<b>Emergency Operations Plan</b>	Yes	Yes	Yes
<b>Erosion and Sediment Control Plan and Stormwater Pollution Prevention Plan (SWPP)</b>	Yes	Yes	Yes
<b>Harbor Management Plan and Harbor Ordinances</b>	Yes	Yes	Yes
<b>Municipal Resilience Program Community Resilience Building (CRB) Workshop, Summary of Findings</b>	2019	2020	2020
<b>National Flood Insurance Program</b>	Participant since 1973.	Participant since 1971.	Participant since 1970.
	Newport County FIS dated July 6, 2021	Newport County FIS dated July 6, 2021	Newport County FIS dated July 6, 2021
	Local NFIP Coordinator: Building Official	Local NFIP Coordinator: Building Official	Local NFIP Coordinator: Building Official

	<b>Portsmouth</b>	<b>Middletown</b>	<b>Newport</b>
	Article III, Section F of the Zoning Code of Ordinances is dedicated to floodplain management, minimizing hazards to persons and property from flooding.	Article 10 of the Zoning Code of Ordinances is dedicated to floodplain management, minimizing hazards to persons and property from flooding.	Chapter 15.24 of the City’s Building and Construction Code of Ordinances is dedicated to the floodplain management program, minimizing hazards to persons and property from flooding.
	Development in the Special Flood Hazard Area requires additional permit details.	All proposed development in the Special Flood Hazard Area requires a permit.	All proposed development in the Special Flood Hazard Area requires a permit.
	Copies of FIRMs, FEMA elevation certificates, and additional flood insurance data are available to the public.	Copies of FIRMs, FEMA elevation certificates, and additional flood insurance data are available to the public.	Copies of FIRMs, FEMA elevation certificates, and additional flood insurance data are available to the public.
<b>National Flood Insurance Program’s Community Rating System (CRS)</b>	No, do not currently have the capacity.	Class 7 15% discount on insurance premiums.	Class 7 15% discount on insurance premiums.
<b>Neighborhood Emergency Preparedness Committees</b>	Common Fence Point Preparedness Committee Prudence Island Preparedness Committee Island Park and Hummocks Preparedness Committee	No	No
<b>Onsite Wastewater Management Plan</b>	Yes	No. Needs support from Town Council.	Yes
<b>Open Burning Regulations</b>	Yes	Yes	Yes
<b>Open Space Plan</b>	2023	No	2017
<b>Prudence Island Wildland Fire Prevention Plan (2018)</b>	Yes. Reviewed in 2024.	NA	NA

	Portsmouth	Middletown	Newport
<b>Soil Erosion, Runoff and Sediment Control Ordinance</b>	Yes	Yes	Yes
<b>Subdivision and Development Regulations</b>	Yes	Yes	Yes
<b>Substantial Damage and Improvement Requirements</b>	<p>Defined in <i>Section F Flood Hazard Areas</i> of the Zoning Ordinance.</p> <p>The State Building Code (RIGL 23-27.3-106.0 to 106.5), which has been adopted by the Town of Portsmouth, covers substantial improvements and substantial damages for structures in the floodplain. Qualifying activities are tracked in the town’s electronic building permit system.</p>	<p>Defined in <i>Article 10 Flood Hazard Areas</i> of the Zoning Code.</p> <p>The State Building Code (RIGL 23-27.3-106.0 to 106.5), which has been adopted by the Town of Middletown, covers substantial improvements and substantial damages for structures in the floodplain. Qualifying activities are tracked in the town’s electronic building permit system.</p>	<p>Defined in <i>Chapter 15.24 Flood Hazard Area Development</i> of the Building and Construction Regulations.</p> <p>The State Building Code (RIGL 23-27.3-106.0 to 106.5), which has been adopted by the City of Newport, covers substantial improvements and substantial damages for structures in the floodplain. Qualifying activities are tracked in the town’s electronic building permit system.</p>
<b>Tree Trimming Program</b>	Yes	Yes	Yes
<b>Zoning Ordinance</b>	<p>Yes</p> <p>Includes zoning standards for the Special Flood Hazard Area.</p>	<p>Yes</p> <p>Includes floodplain overlay district.</p>	<p>Yes</p> <p>Includes floodplain overlay district.</p>

## Local Departments

Table 41 Local Departments

	Portsmouth	Middletown	Newport
<b>Governing Body</b>	Town Council	Town Council	City Council

	<b>Portsmouth</b>	<b>Middletown</b>	<b>Newport</b>
	7 elected members.	7 elected members.	7 elected members.
<b>CEO</b>	Town Administrator	Town Administrator	City Manager
<b>Aquidneck Island Emergency Volunteer Alliance</b>	Established in 2014, a group of volunteers have committed to serve Aquidneck Island in the event of a natural or man-made disaster, in collaboration with the Rhode Island Chapter of the American Red Cross.		
<b>Emergency Management Agency</b>	Director (Part time, 20 hrs/week) Partial EOC at Town Hall. Incident Communications Center (ICC) on second floor of the Fire Department. 1 staff car and 1 Emergency response Vehicle (utility truck).	EMA Director: Fire Chief EOC at Fire Department, 239 Wyatt Road	EMA Director: Fire Chief EOC at Police Station, 120 Broadway
<b>Fire Department</b>	Two fire stations (including 1 on Prudence Island) Staff: 40 full-time firefighters, 35 EMTs, various volunteers on Prudence Island. Equipment: 3 engines, 1 ladder truck, 3 EMT Rescues, a brush truck, a utility truck, 1 command cars, 4 ancillary vehicles, and 3 marine assists. Prudence Island Equipment: 2 engines, 3 tankers, 1 EMT rescue, 1 UTV with EMS skid, 2 pickup trucks, 1 command car	One station at 239 Wyatt Road Staff: 1 Captain, 4 full-time firefighters, and 1 Dispatcher. Equipment: 2 engines, 1 ladder truck, 3 EMT Rescues, 1 tanker truck, 1 inflatable rigid hull boat, 1 jet ski, 1 brush truck, 2 pickup trucks, 1 Kabota UTV.	Three fire stations Staff: 5 Fire Prevention, 2 Administrative, 88 Firefighters Equipment: 5 pump engines, 2 ladder trucks, 3 EMS rescues, 1 fire boat.
<b>Police Department</b>	One station at 2270 E. Main Road Staff: 38 sworn officers,	One station at 123 Valley Road	One station/EOC at 120 Broadway Staff: 83 sworn officers, 1 animal control officer, 20

	Portsmouth	Middletown	Newport
			non-sworn civil employees, 33 part-time retired officers. Equipment: 18 marked vehicles, 12 unmarked vehicles
<b>Planning</b>	Planning Department Planning Board Prudence Island Planning Commission	Planning Department Planning Board	Department of Planning and Economic Development Planning Board
<b>Zoning</b>	Building Inspection to include two certified "safety Assessment Officials".  Zoning Board of Review	Building and Zoning Department Zoning Board of Review	Zoning and Inspections Department Zoning Board of Review
<b>Utilities</b>	Water and Fire District	None	Department of Utilities oversees the Water Division (drinking water) and the Water Pollution Control Division (sanitary sewer and stormwater).
<b>Public Works</b>	Department of Public Works	Department of Public Works	Department of Public Services which includes Public Works, Parks and Recreation, and Engineering.
<b>Harbormaster</b>	Full time (from May through September) civilian within the Portsmouth Police Department.	Yes	Staff: 1 full time Harbormaster, 8 Assistant Harbormasters, 3 administrative personnel, various temporary seasonal employees.
<b>Schools</b>	School Department is responsible for maintenance of all school and municipal buildings on school grounds.	School Department is responsible for maintenance of all school and municipal buildings on school grounds.	School Department is responsible for maintenance of all school and municipal buildings on school grounds.

	<b>Portsmouth</b>	<b>Middletown</b>	<b>Newport</b>
<b>Historic Resource Management</b>	None	None	Historic Preservation Planner Historic District Commission Cliff Walk Commission
<b>Environment</b>	Conservation Commission Tree Commission	Conservation Commission Open Space and Fields Committee	Tree and Open Space Commission Energy and Environment Commission
<b>Economic Development</b>	Economic Development Committee	Economic Development Department Economic Development Advisory Committee	Planning & Economic Development Waterfront Commission

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## Local/Regional Implementation Challenges

The following challenges in implementing hazard mitigation measures are common to most coastal municipalities in the region. These challenges can impact the effectiveness of existing authorities, policies, programs, and resources; however, it should be noted that local governments have a number of procedures and tools available that can allow them to adjust, over time, their programs, procedures, and resources to more effectively mitigate natural hazards.

**Table 42 Challenges and Opportunities to Improve Resilience Capabilities**

	Portsmouth	Middletown	Newport
<b>Regional coordination among multiple jurisdictions.</b>	Low-lying coastal Island Park, Hummocks, and Common Fence Point residential neighborhoods experience frequent flooding.	Interim Fire Chief serving in 2025.	Historic assets and cultural resources vulnerable to sea level rise and flooding.
<b>Limited resources.</b>	Securing funding to reduce street flooding and improve public safety.	Securing funding to reduce street flooding and improve public safety.	Securing funding to reduce street flooding and improve public safety.
<b>Vulnerability to flooding and sea level rise.</b>	Enhance stormwater capabilities. Stormwater mitigation efforts need to include sea level rise.	Enhance stormwater capabilities. Stormwater mitigation efforts need to include sea level rise.	Enhance stormwater capabilities. Stormwater mitigation efforts need to include sea level rise.

## State Programs

### Rhode Island Coastal Resources Management Council (CRMC)

New development along coastal areas in Aquidneck Island is regulated by Rhode Island Coastal Resources Management Council (CRMC) and the municipalities. One CRMC regulation requires a Coastal Buffer Zone, or a “land area adjacent to a Shoreline (Coastal) Feature that is, or will be, vegetated with native shoreline species and which acts as a natural transition zone between the coast and adjacent upland development,” on property within 200 feet of the inland edge of a coastal feature. The benefits of the Coastal Buffer Zone include protection of water quality, protection of coastal habitat, protection of scenic and aesthetic quality, erosion control, and flood control.

The CRMC has adopted shoreline change maps that delineate shoreline rates of change that will be applied to pertinent sections of the Council's regulatory programs to address issues including setbacks of activities from coastal features. These shoreline change maps detail erosion rates for the shoreline and are further detailed into shoreline segments for each map. There are 45 such maps for Aquidneck Island.

Qualifying projects are required to submit a Coastal Hazard Application (CHA) Worksheet when submitting a standard CRMC Application. The purpose of the worksheet is to notify the applicant of potential coastal hazards such as sea level rise, storm surge and associated flooding and shoreline erosion. It is CRMC's goal to guide development away from these vulnerable areas.<sup>78</sup>

### Rhode Island Department of Environmental Management (DEM)

- › **Division of Law Enforcement:** The Rhode Island DEM Division of Law Enforcement serves to protect the natural resources and ensure compliance with all environmental conservation laws through law enforcement and education.

### Land Revitalization and Sustainable Materials Management

- › **Recreation Trail Grants:** provides financial assistance to municipalities and non-profit organizations for the development and maintenance of recreational trails and trail-related projects. This federally funded program receives its funding from a portion of federal gas taxes paid on fuel. Grant funding is dependent on Rhode Island receiving allocation of funds from the Federal Highway Administration.
- › **Section 319 Nonpoint Source Grant Program:** to prevent, control or abate nonpoint source pollution to the waters of the state – surface waters (both freshwater and saltwater) and groundwater. The Section 319 competitive grant funds are intended to provide financial assistance for projects that will protect or improve water quality and aquatic habitats, thus enhancing the designated uses of the state's waters by addressing sources of nonpoint pollution, correcting hydromodification issues, and providing for habitat restoration.
- › **Urban and Community Forest Program:** This RIDEM Division of Forest Management program supports activities which lead to a more effective and efficient management of urban and community forests and improve public understanding of the benefits of preserving existing tree cover in communities.
- › **Wetland Regulations:** RIDEM is responsible for regulating alterations of the freshwater wetlands throughout the State. Since many floodplains are also wetlands, appropriately managing these resources help maintain proper floodplain function. These regulations ensure that actions in this plan which will alter the physical landscape will not do so at the expense of wetlands.

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78 CRMC Coastal Hazard Application <http://www.crmc.ri.gov/coastalhazardapp.html>

### **Rhode Island Department of Health**

The Rhode Island Department of Health (DOH), not only strives to prevent disease and increase health and safety, but they also promote the Special Needs Emergency Registry. By voluntarily enrolling in this list, local emergency managers, police, fire, and other local responders can better prepare for and respond to an individual's needs during an emergency or disaster.

### **Rhode Island Department of Transportation**

The Rhode Island Department of Transportation (RIDOT) designs, constructs, and maintains the state-owned surface transportation system. This includes not only roads and bridges but also the state's rail stations, tolling program, bike paths and ferry service.

### **Rhode Island Emergency Management Agency**

The Rhode Island Emergency Management Agency (RIEMA) is the State agency assigned to reduce the loss of life and property for the whole community while ensuring that as a State we work together to build, sustain, and improve our capability to prepare for, protect against, respond to, recover from, and mitigate all natural, human-caused, and technological hazards. RIEMA is also the pass-through agency for FEMA mitigation funding.

### **Rhode Island Enhanced 9-1-1 Telephone System**

Portsmouth, Middletown, and Newport utilize the state's E-911 system which provides 24-hour public safety communication services from one answering point in North Scituate. Each call is routed to the appropriate response team. The system processes both landline and wireless 9-1-1 calls.

### **Rhode Island Executive Climate Change Coordinating Council**

Established in 2014, the Executive Climate Change Coordinating Council (EC4) sets specific greenhouse gas reduction targets and incorporates consideration of climate change impacts into the powers and duties of all state agencies. The legislation emphasizes the concept of resilience, building on our collective strength to develop practical solutions that allow Rhode Island to "weather the storm." The 13-member Council is chaired by RIDEM.

### **Rhode Island Infrastructure Bank**

Established in 1989, the RI Infrastructure Bank provides fundings (loans, grants, etc.) to finance municipal infrastructure improvements related to water and wastewater, roads and bridges, energy efficiency and renewable energy, and brownfield restoration. This is a potential funding source for stormwater infrastructure improvements.

### **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 2018 and provides comprehensive construction requirements designed to

mitigate the impacts from natural hazards, such as high wind events. The Code is enforced by the municipal Building Departments and provides an additional layer of regulatory control to those discussed above.

The State Building Code (RIGL 23-27.3-106.0 to 106.5) covers substantial improvements and substantial damages for structures in the floodplain. If a building is damaged or improved by 50% of the physical value of the building, the code's requirement for flood resistant construction for new structures shall apply.

### **Rhode Island State Fire Code Regulations**

Local municipalities have adopted the Rhode Island Fire Safety Codes to safeguard life and property from the hazards of fire and explosives in accordance with safe practice. The Fire Code provides reasonable minimum requirements for fire prevention and protection. For existing structures, the Fire Code is enforced by the four fire districts for existing structures. The Building Officials enforce the Fire Code for new structures.

### **Rhode Island State Dam Safety Program**

Portsmouth, Middletown, and Newport participate in the State Dam Safety Program because of the high and significant hazard dams on Aquidneck Island. The State Dam Safety Program was created to facilitate the enforcement of the primary dam inspection law (RIGL 46-19, Inspection of Dams and Reservoirs). RIGL 46-19 states that dam owners are responsible for the safe operation, maintenance, repair, and rehabilitation of a dam, which are the essential elements in preventing dam failure; furthermore, dam owners are liable for the consequences of accidents or failures of their dams. According to the State of Rhode Island 2023 Dam Safety Program Report, the following have been identified as program limitations: unclear ownership of numerous high hazard dams, construction of buildings within inundation areas below dams, lack of funding to repair or remove privately owned dams, inadequate spillway capacities and engineering analyses, lack of Emergency Action Plans across the state, inadequate staffing, increase in rainstorm intensities.

### **Rhode Island Turnpike and Bridge Authority**

The Rhode Island Turnpike and Bridge Authority (RITBA) operates and maintains the Mount Hope Bridge which connects Bristol to the Portsmouth, and the Claiborne Pell Bridge which connects Jamestown and Newport. The RITBA was created in 1954 by the Rhode Island General Assembly as a body corporate and politic, with powers to construct, acquire, maintain, and operate applicable bridge projects. Town coordination with this agency is important during severe weather when people may be evacuating Aquidneck Island.

## **Federal Programs**

### **Community Development Block Grant (CDBG)**

The United States Department of Housing and Urban Development (HUD) manages the Community Development Block Grant (CDBG) Program. This program supports municipal

activities to build stronger and more resilient communities. Activities may address needs such as infrastructure, economic development projects, public facilities installation, community centers, housing rehabilitation, public services, clearance/acquisition, microenterprise assistance, code enforcement, homeowner assistance, etc.

### Federal Emergency Management Agency

The Federal Emergency Management Agency (FEMA), an agency of the U.S. Department of Homeland Security, coordinates disaster response when local and state resources are maxed out. The agency also provides grant funding for pre-and post-disaster mitigation projects.

- › ***Building Resilient Infrastructure and Communities (BRIC)***: supports states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. In addition to project selections, the BRIC program offers help to communities in the form of non-financial direct technical assistance that can provide holistic hazard mitigation planning and project support. This competitive grant usually has an annual application period that is open from fall to winter. Final project selections are announced the following summer. Participating communities must have a current, FEMA-approved hazard mitigation plan to receive competitive BRIC funding.
- › ***Flood Mitigation Assistance (FMA)***: supports projects which reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program. Participating communities must have a current, FEMA-approved hazard mitigation plan to receive competitive FMA funding.
- › ***Hazard Mitigation Grant Program (HMGP)***: provides funding to state, local, tribal and territorial governments so they can develop hazard mitigation plans and rebuild in a way that reduces, or mitigates, future disaster losses in their communities. This grant funding is available after a presidentially declared disaster. Participating communities must have a current, FEMA-approved hazard mitigation plan to receive competitive HMGP funding.
- › ***Emergency Management Performance Grant (EMPG)***: provides funding to support local emergency management agencies in carrying out the National Preparedness Goals. The five mission areas include prevention, protection, mitigation, response, and recovery.
- › ***Fire Prevention & Safety Grants (FP&S)***: provides critically needed resources to fire departments and non-profit organizations to carry out fire prevention education and training, fire code enforcement, fire/arson investigation, firefighter safety and health programming, strategic national projects, prevention efforts, and research and development. These competitive grants are available annually.

### US Department of Agriculture, Natural Resource Conservation Service (NRCS)

Provides technical and financial assistance to local governments to help communities implement conservation practices that address watershed resource concerns. NRCS supports programs which reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damage caused by floods and other natural disasters.

## US Department of Transportation (USDOT)

- › ***Promote Resilience Operations for Transformative, Efficient, and Cost-saving Transportation Program (PROTECT)***: provides funding to ensure surface transportation resilience to natural hazards including climate change, sea level rise, flooding, extreme weather events, and other natural disasters through support of planning activities, resilience improvements, community resilience and evacuation routes, and at-risk coastal infrastructure.
- › ***Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant Program***: provides grants for surface transportation infrastructure projects with significant local or regional impact. Award funds to support capital and planning projects that will improve safety, environmental sustainability, quality of life, mobility and community connectivity, economic competitiveness, state of good repair, partnership and collaboration, and innovation.

## US EPA Water Infrastructure Improvements for the Nation (WIIN) Act

Provides funds to small, underserved, and disadvantaged communities to assist public water systems in meeting Safe Drinking Water Act requirements.

## Other Resources

***American Red Cross in Rhode Island***: The American Red Cross in Rhode Island offers free programs to help children, adults, and organizations better prepare for emergencies. During a large disaster, The American Red Cross will staff regional shelters and provide additional resources.

***Aquidneck Land Trust***: A regional organization that is preserving and stewarding Aquidneck Island's open spaces while benefiting the community and connecting people with the natural lands. Aquidneck Land Trust is a key regional collaborator, assisting the island's municipalities with implementing resiliency actions.

***East Bay Community Action Program***: a community-based organization that serves the needs of residents of Rhode Island's East Bay, including East Providence, Barrington, Warren, Bristol, Little Compton, Tiverton, Portsmouth, Middletown, Newport, and Jamestown. assesses people's needs and helps them find resources such as food pantries, housing support, prescription assistance, and emergency services.

***Eastern Rhode Island Conservation District***: A non-profit agency working with people and groups providing information and technical assistance for activities which protect natural resources such as soil, water, and air.

***Gaudet Middle School***: The Gaudet Middle School in Middletown is the primary shelter for all of Aquidneck Island. If there is a more local need present, Portsmouth will open their shelter at Portsmouth Middle School.

The Portsmouth high school is a local/overflow shelter for the island and will open up if needed.

**Newport Hospital:** Located at 20 Powel Avenue in Newport, the Newport Hospital serves the medical needs of patients in the area. Among other documented procedures, the hospital has its own ingress plan as well as an emergency evacuation plan.

**Preserve Rhode Island:** A statewide non-profit dedicated to protecting historic places through advocacy, stewardship, and preservation programs. The organization’s Revolving Fund supports repairs for at-risk historic properties.

**Rhode Island Energy (Electricity and Natural Gas):** Rhode Island Energy is the major provider of natural gas and electricity in the state. Recent projects include:

- › Improved tree trimming
- › Various gas line replacements in conjunction with local paving projects.

**Save The Bay:** A member-supported nonprofit organization whose mission is to protect and improve Narragansett Bay. Save The Bay is eager to continue supporting the town to strengthen the community’s climate resilience by engaging diverse stakeholder groups, restoring critical habitats such as wetlands, marshes, and floodplains, and co-developing innovative solutions to the risks associated with natural disasters.

**Tree City USA:** All three municipalities on Aquidneck Island have been recognized by the National Arbor Day Foundation as a “Tree City USA”. Portsmouth (18 years), Middletown (6 years), and Newport (33 years) have proven dedication to maintaining street trees and improving how trees are integrated into long range planning.

**United Way 2-1-1:** United Way 2-1-1 in Rhode Island is a free, confidential service that provides information, referrals, and is available in multiple languages. This service connects residents with community services they may need such as childcare, housing, health insurance, and tax preparation.

**van Beuren Charitable Foundation:** provides funding to nonprofit organizations and public institutions for projects and activities that advance its mission of improving the quality of life and quality of place on Aquidneck Island and surrounding communities.



# 6

## Mitigation Actions

### Mission Statement

The communities of Portsmouth, Middletown, and Newport are building a disaster resistant Aquidneck Island and achieving sustainable development through the commitment of state and local government and its policymakers to mitigate hazard impacts before disaster strikes. By doing so, local leaders aim to preserve and enhance the quality of life, property, and resources.

### Mitigation Goals

To effectuate the mission statement, the RHMC establishes the following hazard mitigation goals, toward which all action must reach:

1. Protect public health, safety and welfare; minimize social dislocation and distress due to impacts from natural hazards.
2. Prioritize underserved and disadvantaged communities, especially those in high-risk areas.
3. Reduce property damages caused by natural hazards.
4. Reduce economic loss and minimize disruption to local business due to natural hazards.
5. Implement actions which protect Aquidneck Island's cultural, historic, and natural environments.
6. Protect the ongoing operations of critical facilities and infrastructure during and after a storm/event.
7. Expedite post-disaster mitigation efforts during the recovery phase.
8. Promote non-structural flood and coastal erosion measures to reduce the risk of damage to the surrounding properties and environmental habitats.

## Status of Prior Actions

This is a new Regional Hazard Mitigation and Flood Management Plan. For the status of each community's mitigation actions, please see **Appendix G**.

## Recent Regional Actions

- › Easton Pond Dam and Moat Study complete.
- › Climate Change Vulnerability Assessment – Design – Advancing to Prelim Engineering and Permitting
- › Redesigning of Newport Bridge approaches that were in the flood zone.
- › Military Installation Resilience Review
- › RIDOT Resiliency on Aquidneck Island (ongoing)
- › Emergency Shelter Assessment (recently underway)

## Mitigation Actions

The RHMC decided to propose actions that addressed certain vulnerabilities that were identified earlier in the planning process. See Chapter 4.

The worksheets below summarize the specific problem and proposed possible solution, details the primary tasks to be undertaken, identifies an appropriate lead and anticipates financing options.

After all of the action details were completed, the RHMC discussed the priority level of each action. The RHMC went through each action and decided if it was a high, medium, or low priority for Aquidneck Island. This helps to generally prioritize needs when funding becomes available or budgeted. Actions that received a high priority ranking would provide more benefits than low priority items. Understanding that priorities can and will change, it was helpful to document what is important at that moment in time. Having this discussion as a group helped the RHMC consider maximum benefits to the entire region, not just individual municipal departments or residents.

The RHMC has not proposed strong mitigation actions for tsunamis and solar flares at this time but have included them in hazard mitigation education and evacuation planning. The RHMC will revisit the region's vulnerability at the next plan update and determine if stronger actions are needed.

The RHMC was encouraged to propose a range of mitigation actions regardless of project costs. Some of the less expensive action items such as building a stormwater enterprise fund may be met with political opposition but can still provide benefit to the region. Implementing recommendations from the Easton Pond resilient projects is of high importance, yet it will require substantial funds and island-wide coordination. If costs have already been set aside for a particular mitigation action, the RHMC prioritized that action to ensure that it was completed, and funds were spent in a timely manner.

Funding and staff time will be the determining factors on when various actions are completed. The RHMC understands that implementation of many of these proposed actions requires securing external funding.

This RHMP includes actions which prevent or reduce the consequences of disaster (mitigation), planning and education (preparedness), improved response in the immediate aftermath of an event (response), and improved restoration efforts (recovery). Those which are true mitigation actions are noted as such.

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

Mitigation actions for each individual community can be found in **Appendix G**.

### Priority Level

- › High: Reduces the greatest risks, is important to accomplish first, funding has already been secured.
- › Medium: May need other actions to be completed first, funding may need to be identified.
- › Low: Less of an impact on safety and property

### Time Frame (from date of plan adoption)

- › Short Term: less than 2 years
- › Medium Term: 2-3 years
- › Long Term: 3-5 years

## VULNERABILITY: Island-wide Emergency Management

<b>MITIGATION ACTION:</b> 1. Build a Regional Emergency Operations Center (EOC) and Incident Command Post (ICP) hybrid capability. <ol style="list-style-type: none"> <li>Conduct a feasibility study to determine what is needed, organizational needs, authorities.</li> <li>Build an adequate space to support a hybrid multiorganization EOC/ICP disaster incident management team.</li> </ol>	<b>ACTION PRIORITY</b> <input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b> New

### Rationale

The communities on Aquidneck Island do not have the capacity to plan for, train, house and staff three fully operational EOCs or incident command posts for a large disaster or catastrophe events.

### Benefits

Centralized location for emergency response and recovery support during incidents. Shared resources. Collaborative thinking. Office space for shared Emergency Management Coordinator.

### Hazard Addressed

All hazards (such as hurricanes, Nor’easters, flooding, severe winter weather, extreme temperatures, lightning, brushfires, dam failure, tornadoes and earthquakes) that may impact Aquidneck Island.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input checked="" type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Staffing of EOC (See action #2).

<b>Lead/Champion</b>	<b>Support</b>	
Newport Fire Department/EMA	Portsmouth EMA and Middletown EMA	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
Bonds	<input type="checkbox"/> less than \$10,000	<input type="checkbox"/> Short Term (less than 2 years)
FEMA Grants	<input type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)
	<input checked="" type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Long Term (4-5 years)

### Other Notes

Success dependent on Action #2. Newport is proposing a new Public Safety facility located in the North End which would have a new EOC. This would be available for other communities. \$98.5M bond was approved in November 2024 which includes monies (\$13M) to acquire land for EOC and do architectural drawings. Next bond would be used to build facility. This activity will be moving the Newport fire station out of flood zone.

An analysis will outline the functions the center will serve, and staffing and equipment needs.

Newport Fire and Police Departments are already discussing space needs to become a regional asset. All 3 municipalities need to be aligned and in decision making process.

See also [https://www.fema.gov/sites/default/files/documents/fema\\_eoc-quick-reference-guide.pdf](https://www.fema.gov/sites/default/files/documents/fema_eoc-quick-reference-guide.pdf)

## VULNERABILITY: Island-wide Emergency Management

<b>MITIGATION ACTION:</b>		<b>ACTION PRIORITY</b>	
2. Establish the Aquidneck Island emergency management capabilities (i.e. agency or coordinator). <ul style="list-style-type: none"> <li>a. Conduct a feasibility study.</li> <li>b. Secure sustainable funding.</li> </ul>		<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low	
		<b>Action Status</b>	
		New	
<b>Rationale</b>			
The local first responders in Portsmouth, Middletown, and Newport prioritize responding to emergencies. There is limited bandwidth to focus on coordinated planning with other towns. This new entity would engage in disaster planning, resource allocation, public education, and response coordination needed to support local authorities.			
<b>Benefits</b>			
Island-wide emergency management engagement. Coordinated response.			
<b>Hazard Addressed</b>			
All hazards (such as hurricanes, Nor'easters, flooding, severe winter weather, high winds, drought, extreme temperatures, lightning, brushfires, dam failure, tornadoes and earthquakes) that may impact Aquidneck Island.			
<b>Mitigation Type</b>	<b>Supporting Plans/Efforts</b>	<b>Alignment With Plan Goals</b>	
<input type="checkbox"/> Prevention <input type="checkbox"/> Property Protection <input checked="" type="checkbox"/> Emergency Services <input type="checkbox"/> Local Plans and Regulations <input type="checkbox"/> Structure and Infrastructure <input type="checkbox"/> Natural Systems Protection <input type="checkbox"/> Education and Awareness	<input type="checkbox"/> Local Hazard Mitigation Plans <input type="checkbox"/> CRB Workshop Summary of Findings <input type="checkbox"/> Local Capital Improvement Plans <input type="checkbox"/> Local Comprehensive Plans <input checked="" type="checkbox"/> Military Installation Resilience Review	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 5 <input checked="" type="checkbox"/> 6 <input checked="" type="checkbox"/> 7 <input type="checkbox"/> 8
<b>Obstacles</b>			
Funding. Coordination without losing local authority.			
<b>Lead/Champion</b>		<b>Support</b>	
Portsmouth EMA		RIEMA, Portsmouth EMA, Newport EMA, Middletown EMA	
<b>Potential Funding Sources</b>		<b>Estimated Cost</b>	<b>Timeline</b>
FEMA funding. EMPG		<input type="checkbox"/> less than \$10,000 <input checked="" type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Short Term (less than 2 years) <input checked="" type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (4-5 years)
<b>Other Notes</b>			
This action was also suggested during the public workshops/survey. May be longer than 5 years and aligns with Action #1.			

## VULNERABILITY: Island-wide Emergency Management

<b>MITIGATION ACTION:</b> 3. Develop a comprehensive evacuation plan for all of Aquidneck Island.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High
	<input type="checkbox"/> Medium
	<input type="checkbox"/> Low
<b>Action Status</b>	
New	

### Rationale

None of the communities have a written evacuation plan. Protective actions such as evacuation and shelter-in-place are important to local emergency management operations. As a whole, Aquidneck Island and surrounding communities need to consider demographics, location, infrastructure, resources, authorities, and decision-making processes.

### Benefits

Coordinated effort to follow through with evacuation or shelter in place orders, manage traffic flow, identify shelters, and consider a process for reunification.

### Hazard Addressed

Hurricanes and other large disasters and catastrophes.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Regional beyond Aquidneck Island. Only effective if other jurisdictions along evacuation routes outside of Aquidneck Island are in alignment with evacuation management protocols and are coordinated.

<b>Lead/Champion</b> Portsmouth EMA	<b>Support</b> RIEMA, Portsmouth EMA, Newport EMA, Middletown EMA, Naval Station Newport				
<b>Potential Funding Sources</b> FEMA BRIC	<table border="1"> <tr> <td> <b>Estimated Cost</b> </td> <td> <b>Timeline</b> </td> </tr> <tr> <td> <input type="checkbox"/> less than \$10,000  <input checked="" type="checkbox"/> \$10,000 to \$100,000  <input type="checkbox"/> Over \$100,000                 </td> <td> <input checked="" type="checkbox"/> Short Term (less than 2 years)  <input type="checkbox"/> Medium Term (2-3 years)  <input type="checkbox"/> Long Term (4-5 years)                 </td> </tr> </table>	<b>Estimated Cost</b>	<b>Timeline</b>	<input type="checkbox"/> less than \$10,000 <input checked="" type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (4-5 years)
<b>Estimated Cost</b>	<b>Timeline</b>				
<input type="checkbox"/> less than \$10,000 <input checked="" type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (4-5 years)				

### Other Notes

This action was also suggested during the public workshops. Limited evacuation routes and no state evacuation plan. According to a Naval Postgraduate School Evacuation Study, clear sky evacuating off island could take upwards of 14 hours. This will increase as conditions worsen. It is critical to involve Naval Station, Tiverton, Jamestown, Fall River, and other surrounding communities.

See the FEMA resource here: <https://www.fema.gov/sites/default/files/2020-07/planning-considerations-evacuation-and-shelter-in-place.pdf> See also an academic thesis (2021) *Evacuation Plans for Naval Station Newport and Aquidneck Island Under Uncertainty* <https://apps.dtic.mil/sti/trecms/pdf/AD1200452.pdf>

Include Tsunami warning (NOAA DART System) and Tsunami specific evacuation guidance in planned Aquidneck Island wide overall evacuation plan.

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## VULNERABILITY: Island-wide Emergency Management

<b>MITIGATION ACTION:</b>		<b>ACTION PRIORITY</b>	
4. Partner with the University of Rhode Island to deploy RI-CHAMP advance storm modeling for Aquidneck Island.		<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low	
		<b>Action Status</b>	
		New	
<b>Rationale</b>			
The RI-CHAMP project advances storm model capabilities and develops a real-time hazard and impact prediction system for hurricanes and nor'easters in Southern New England. The system includes cascading consequences of extreme weather impacting critical infrastructure such as wastewater treatment facilities, sewer systems, airports and seaports.			
<b>Benefits</b>			
Wind and inundation modeling for a hypothetical storm can help local planners and critical facility managers understand the level of risk and plan appropriate resilience actions.			
<b>Hazard Addressed</b>			
Hurricanes and Nor'easters			
<b>Mitigation Type</b>	<b>Supporting Plans/Efforts</b>	<b>Alignment With Plan Goals</b>	
<input type="checkbox"/> Prevention <input type="checkbox"/> Property Protection <input type="checkbox"/> Emergency Services <input checked="" type="checkbox"/> Local Plans and Regulations <input type="checkbox"/> Structure and Infrastructure <input type="checkbox"/> Natural Systems Protection <input type="checkbox"/> Education and Awareness	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans <input type="checkbox"/> CRB Workshop Summary of Findings <input type="checkbox"/> Local Capital Improvement Plans <input type="checkbox"/> Local Comprehensive Plans <input type="checkbox"/> Military Installation Resilience Review	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 5 <input checked="" type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
<b>Obstacles</b>			
Funding.			
<b>Lead/Champion</b>	<b>Support</b>		
Portsmouth EMA	RIEMA, Portsmouth EMA, Newport EMA, Middletown EMA, Naval Station Newport		
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>	
FEMA BRIC grant USDOT PROTECT grant	<input type="checkbox"/> less than \$10,000 <input checked="" type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input checked="" type="checkbox"/> Long Term (4-5 years)	
<b>Other Notes</b>			
Have the modeling done before the 5-year update of this Regional Hazard Mitigation Plan.			

## VULNERABILITY: Drinking Water

<b>MITIGATION ACTION:</b>		<b>ACTION PRIORITY</b>	
5. Implement recommendations of Easton Pond resilience projects.		<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low	
		<b>Action Status</b>	
		New	
<b>Rationale</b>			
Portions of the dams are vulnerable to sea level rise and increased frequency and intensity of coastal storms and precipitation. Present day, there is a 5% annual chance of saltwater inundation at South Easton Pond and a 1% annual chance of saltwater inundation at North Easton Pond from storm surge.			
<b>Benefits</b>			
Improve the resiliency of the embankments and spillways.			
<b>Hazard Addressed</b>			
Hurricanes, Nor'easters, flooding, sea level rise			
<b>Mitigation Type</b>	<b>Supporting Plans/Efforts</b>	<b>Alignment With Plan Goals</b>	
<input type="checkbox"/> Prevention <input checked="" type="checkbox"/> Property Protection <input type="checkbox"/> Emergency Services <input type="checkbox"/> Local Plans and Regulations <input type="checkbox"/> Structure and Infrastructure <input type="checkbox"/> Natural Systems Protection <input type="checkbox"/> Education and Awareness	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans <input checked="" type="checkbox"/> CRB Workshop Summary of Findings <input type="checkbox"/> Local Capital Improvement Plans <input checked="" type="checkbox"/> Local Comprehensive Plans <input type="checkbox"/> Military Installation Resilience Review	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4	<input checked="" type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
<b>Obstacles</b>			
Prioritizing implementation actions. Funding. Coordination with multiple towns. Scaling the projects for success.			
<b>Lead/Champion</b>	<b>Support</b>		
Newport Public Utilities	Aquidneck Island Land Trust, surrounding communities		
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>	
Grants. FEMA BRIC EPA Stormwater	<input type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input checked="" type="checkbox"/> Over \$100,000 (TBD)	<input type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input checked="" type="checkbox"/> Long Term (4-5 years)	
<b>Other Notes</b>			
City of Newport is currently working with Woods Hole Group and Fuss & O'Neill to look at resilience improvements at Easton's Beach. RIDOT is also conducting a resilience study, which has identified Memorial Boulevard, which is located between Easton's Ponds and the beach, as a vulnerable RIDOT asset.			

## VULNERABILITY: Population Education

<b>MITIGATION ACTION:</b>		<b>ACTION PRIORITY</b>	
6. Develop an island-wide public education plan communicating resiliency efforts and initiatives.		<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low	
		<b>Action Status</b>	
		New	
<b>Rationale</b>			
Increase the education and awareness of the public on the importance of resiliency and enhance the current collaboration between leadership, staff, residents, utilities, businesses, NGOs, and adjoining municipalities and Navy on Aquidneck Island. Outline the problem to be addressed, the messages to be conveyed, the target audiences, and methods to be used (social media, news article, etc.).			
<b>Benefits</b>			
Better public understanding of resiliency, local buy-in for mitigation actions, transparency.			
<b>Hazard Addressed</b>			
All hazards (such as hurricanes, Nor'easters, flooding, severe winter weather, high winds, drought, extreme temperatures, lightning, brushfires, dam failure, tornadoes and earthquakes) that may impact Aquidneck Island.			
<b>Mitigation Type</b>	<b>Supporting Plans/Efforts</b>	<b>Alignment With Plan Goals</b>	
<input type="checkbox"/> Prevention <input type="checkbox"/> Property Protection <input type="checkbox"/> Emergency Services <input checked="" type="checkbox"/> Local Plans and Regulations <input type="checkbox"/> Structure and Infrastructure <input type="checkbox"/> Natural Systems Protection <input type="checkbox"/> Education and Awareness	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans <input checked="" type="checkbox"/> CRB Workshop Summary of Findings <input type="checkbox"/> Local Capital Improvement Plans <input checked="" type="checkbox"/> Local Comprehensive Plans <input checked="" type="checkbox"/> Military Installation Resilience Review	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input checked="" type="checkbox"/> 8
<b>Obstacles</b>			
Reaching a wide range of diverse populations.			
<b>Lead/Champion</b>		<b>Support</b>	
Aquidneck Island Land Trust		Portsmouth EMA	
<b>Potential Funding Sources</b>		<b>Estimated Cost</b>	<b>Timeline</b>
NOAA Climate Resilience Regional Challenge grant funding awarded to Aquidneck Land Trust		<input type="checkbox"/> less than \$10,000 <input checked="" type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Short Term (less than 2 years) <input checked="" type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (4-5 years)
<b>Other Notes</b>			

Topics for consideration:

- › Maintaining wetlands
- › Increasing pervious surfaces
- › Native, drought or salt tolerant plantings
- › Emergency planning, solar storm, tsunami education
- › Hurricane shutters
- › Home elevation
- › Reducing flammable vegetation close to buildings
- › Neighborhood heating/cooling centers
- › Energy conservation

## VULNERABILITY: Population Sheltering

<b>MITIGATION ACTION:</b> 7. Assess regional emergency sheltering capacity and capabilities.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	New

### Rationale

During a large hurricane, people may utilize local emergency shelters. Many shelters in Rhode Island operate under a system developed by the American Red Cross. Shelter staffing can include any combination of municipal staff, local volunteers, social service workers, Red Cross volunteers. These are not to be confused with homeless shelters.

The shelter currently used by Middletown and Newport, the Gaudet School, is being demolished and rebuilt. The new facility (high school and middle school) will have sheltering capabilities. There is no emergency shelter on Prudence Island (Portsmouth).

### Benefits

Shelters outside the storm surge and flood zones must meet state building codes and Red Cross sheltering standards to provide a safe place for people who must leave the hazard areas.

### Hazard Addressed

Hurricanes, severe winter weather, tornadoes, and other destructive storms.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 6
<input checked="" type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

More priority efforts in the municipalities. In competition with education funding.

<b>Lead/Champion</b>	<b>Support</b>	
Middletown EMA	Newport and Portsmouth EMA	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
FEMA	<input checked="" type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (4-5 years)

### Other Notes

See: <https://www.ri.gov/hurricane/shelters.php>

## VULNERABILITY: Natural System Protection

<b>MITIGATION ACTION:</b>		<b>ACTION PRIORITY</b>	
<p>8. Conduct floodplain and stream restoration on local rivers and waterways to make them more efficient at carrying stormwater.</p> <ul style="list-style-type: none"> <li>&gt; Maidford River</li> <li>&gt; Bailey Brook</li> <li>&gt; Founder’s Brook</li> <li>&gt; Elizabeth Brook</li> </ul>		<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low	
		<b>Action Status</b>	
		New	
<b>Rationale</b>			
These areas have become infilled with silt and vegetative debris. Restoration by removing debris reestablishes the general structure, function, and dynamic, self-sustaining behavior of the ecosystem. The floodplain of a riverine or stream system provides capacity for storing storm water runoff, reducing the number and severity of floods, and minimizing non-point source pollution.			
<b>Benefits</b>			
Mitigate erosion and flood risk, improving water quality and habitat for fish and wildlife, recreational opportunities, and erosion control.			
<b>Hazard Addressed</b>			
Flooding, hurricanes, Nor’easters			
<b>Mitigation Type</b>	<b>Supporting Plans/Efforts</b>	<b>Alignment With Plan Goals</b>	
<input type="checkbox"/> Prevention <input type="checkbox"/> Property Protection <input type="checkbox"/> Emergency Services <input type="checkbox"/> Local Plans and Regulations <input type="checkbox"/> Structure and Infrastructure <input checked="" type="checkbox"/> Natural Systems Protection <input type="checkbox"/> Education and Awareness	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans <input checked="" type="checkbox"/> CRB Workshop Summary of Findings <input checked="" type="checkbox"/> Local Capital Improvement Plans <input checked="" type="checkbox"/> Local Comprehensive Plans <input type="checkbox"/> Military Installation Resilience Review	<input type="checkbox"/> 1 <input checked="" type="checkbox"/> 5 <input type="checkbox"/> 2 <input type="checkbox"/> 6 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 7 <input checked="" type="checkbox"/> 4 <input checked="" type="checkbox"/> 8	
<b>Obstacles</b>			
Funding. Private property approval to do work.			
<b>Lead/Champion</b>		<b>Support</b>	
Middletown DPW/Engineering		Portsmouth DPW, Newport DPW, Aquidneck Island Land Trust	
<b>Potential Funding Sources</b>		<b>Estimated Cost</b>	<b>Timeline</b>
NRCS grants RIDEM clean water grants Volunteer groups Bonds (Newport)		<input type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input checked="" type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (4-5 years)
<b>Other Notes</b>			
Public education need. Long term for final design/construction. Portsmouth had to withdraw MRP grant application for Founders Brook to focus on Riverside project.			

## VULNERABILITY: Natural System Protection

<b>MITIGATION ACTION:</b> 9. Explore the feasibility of an enterprise fund for stormwater maintenance.	<b>ACTION PRIORITY</b> <input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b> New

### Rationale

Similar to a water or sewer utility fee, it's a fee that residents pay to convey stormwater from their properties. The fees pay for improving and maintaining the storm drainage system. Use Stormwater Utility enabling legislation.

### Benefits

Improved environment, better access to roads during storm events, and reduced flooding.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input checked="" type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Political and public buy-in. Resiliency fund could pay for more but would need approval from State.

<b>Lead/Champion</b>	<b>Support</b>	
Middletown Town Administrator	Newport and Portsmouth CEOs. Aquidneck Island Land Trust	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
RIDEM/RIIB Clean Water State Revolving Fund Loans	<input checked="" type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (4-5 years)

### Other Notes

Portsmouth may be cautiously interested in Enterprise Funds.

Middletown is interested and has done some initial work but needs political support. May be brought to new council in January 2025

Newport is interested.

See: <https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/FundingStormwater.pdf>

## VULNERABILITY: Natural System Protection

<b>MITIGATION ACTION:</b>  10. Explore the feasibility of a Regional Beach Preservation Plan.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High
	<input checked="" type="checkbox"/> Medium
	<input type="checkbox"/> Low
	<b>Action Status</b>
	New

### Rationale

The beaches in all three communities are susceptible to various rates of erosion. Beaches diffuse wave impacts and prevent overwash into the nearshore built environment. A wide, flat stretch of sand between the dunes and the ocean can reduce wave damage, and erosion.

Ideas include beach renourishment, planning for more building mobility (food trucks instead of a stand alone snack bar), wave attenuation solutions such as oyster reefs and sea grass planting.

### Benefits

Reduce coastal flooding from storm surge, high waves, and high tides.

### Hazard Addressed

Flooding, SLR, Hurricanes, Nor'easters

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Support for more aggressive alternatives when buildings in the flood zone are destroyed.

<b>Lead/Champion</b>	<b>Support</b>	
Newport Resiliency Department	Aquidneck Land Trust, Local Planners	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
BRIC, Town funds	<input type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input checked="" type="checkbox"/> Over \$100,000	<input type="checkbox"/> Short Term (less than 2 years) <input checked="" type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (4-5 years)

### Other Notes

[Erosion Study in Middletown](#)



# 7

## Implementation and Adoption

### Implementing the Plan

Aquidneck Island and the Regional Hazard Mitigation Committee realize that successful hazard mitigation is an ongoing process that requires implementation, evaluation, and updates to this plan. The municipalities also understand the importance of integrating appropriate sections of the plan into the local Comprehensive Community/Land Use Plans, Emergency Operations Plans, and site plan review processes. It is intended that this plan and the ongoing efforts of the RHMC will preserve and enhance the quality of life, property, and resources for Aquidneck Island.

Adoption of this mitigation plan increases Aquidneck Island and the municipalities' eligibility for federal hazard mitigation grants. These grants originate from FEMA's Pre-Disaster Flood Mitigation Assistance (FMA), Pre-Disaster Mitigation (PDM), Building Resilient Infrastructure in Communities (BRIC) and post-disaster Hazard Mitigation Grant (HMGP) Programs.

### Monitoring and Evaluation

The RHMC, under the leadership of the Director of Climate Resilience at the Aquidneck Land Trust, will meet annually (or more frequently if necessary), to monitor and evaluate the actions contained in the plan. This annual review will occur in the month the plan was adopted. During the annual evaluation process, the mitigation actions will be promoted online for public review. Comments and suggestions will be sent directly to the Director of Resilience or brought up at the advertised annual meeting.

The RHMC has developed a tracking sheet that can be used by the island municipalities to document updates in mitigation actions. A copy of the tracking sheet will be provided to the RHMC prior to the annual meeting in the timeframe corresponding to the anniversary of this RHMP approval. At each annual meeting, the committee members will discuss the actions assigned to them to ensure continual progress with mitigation efforts. The planning process status of each mitigation action will be documented, in the tracking sheet, and minutes recorded for the record. The RHMC will base its evaluation on whether the actions have met

the following criteria: increased public awareness/education, reduction in hazard damage potential, actions being implemented in the designated time frames, and actions staying within the cost estimate. The RHMC will document its findings and provide an annual summary report to each Council.

The RHMC will also continue to re-evaluate membership on the committee to ensure effective engagement of the appropriate parties. New members may be invited to serve on the RHMC as priorities shift.

The mitigation actions for Portsmouth, Middletown, and Newport will be reviewed separately either immediately before or after the annual review of the regional plan.

## Revisions

Recognizing that this is a living document, the RHMC will make changes to it after a disaster, as conditions warrant. Otherwise, it is expected that a revised plan will be adopted every five years. These revisions will reflect changes to hazards, existing conditions, priorities, and funding strategies.

Eighteen months to two years before the plan is expected to expire, the Aquidneck Land Trust will begin to secure funding for a plan update.

Eighteen before the current plan is expected to expire, the Aquidneck Island Land Trust's Director of Climate Resilience will either secure a third-party contractor to lead the update effort or identify a lead in-house. A full revision of the plan should commence at least one year in advance of the plan's expiration date to ensure the island municipalities always has an up-to-date plan. The RHMC should plan on spending nine months updating the plan before it is submitted to RIEMA and FEMA for review. The RIEMA and FEMA review should expect to take up to six months.

During the next plan revision, the breadth of the RHMC may be expanded. Potential stakeholders to invite to the planning process include RIEMA, Save the Bay, and the East Bay Community Action Program. Prior to finalizing the group, the RHMC will also consider local business leaders, relevant interest groups, and other organizations that may provide valuable insight to the plan update. If invitees cannot commit to being on the RHMC, they may be designated as a stakeholder and brought into the conversation as needed.

All future revisions will involve public input and it is the hope of the RHMC that once the public education and outreach actions begin, public involvement and interest in the Plan will increase and will be reflected in future revisions.

The RHMC will involve the public in the annual meeting by posting it on the website, in the local library, and in the local newspaper to encourage involvement.

Revised plans will be sent to the neighboring communities for comment.

The revised plan/update will incorporate a formalized process for prioritizing actions and weighing the cost/benefit of such actions. See FEMA's *Local Mitigation Planning Policy Guide*, Effective April 19, 2023 [https://www.fema.gov/sites/default/files/documents/fema\\_local-](https://www.fema.gov/sites/default/files/documents/fema_local-)

[mitigation-planning-policy-guide 042022.pdf](#). All updates or revisions to the plan will be submitted to RIEMA and FEMA.

Future RHMP updates may include deleting recommendations as projects are completed, adding recommendations as new hazard effects arise, or modifying hazard vulnerabilities as land use changes. In addition, the lists of shelters and other critical facilities should be updated as necessary or at least during each RHMP update.

## Adoption

After each evaluation cycle (every 5 years), a FEMA-compliant Aquidneck Island Hazard Mitigation and Flood Management Plan will be presented to and adopted by each local Council. The associated ordinance documentation will be kept as part of this plan.

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## **Appendix A: List of Stakeholders**

<b>Group or Organization</b>	<b>Point of Contact</b>
11th Hour Racing	Michelle Carnevale
Aquidneck Community Table	Bevan Linsley
Aquidneck Land Trust	Terry Sullivan
Bike Newport	Bari Freeman
Bowen's Wharf	Adrienne Krueger
Boys & Girls Clubs of Newport County	Thomas Darnowski
Church Community Housing	Christian Belden
Common Fence Point Association / Preparedness Committee	Nicole Gotovich
Common Fence Point Association / Preparedness Committee	Conley Zani
Community Member	Sarah Whitehouse
Community Member	Lola Herrera-Ximenez
Community Member & NEEC Vice Chair	Emily Conklin
Community Member / NEEC / Elizabeth Brook Working Group	Sam Whitin
Connexion Latina Newport	Rebekah Rosen-Gomez
Discover Newport	Cassandra Earle
Eastern Rhode Island Conservation District	Sara Churgin
Easton's Point Association	General email
Edward King House	Carmela Geer
FabNewport	Steve Heath
Middletown Conservation	Jim Gedney
Middletown Open Space and Fields Committee	Nick Coogan
Middletown Tree Committee	Karen Day
MLK Center	Heather Hole Strout
Newport County Chamber of Commerce	Erin Donovan-Boyle
Newport County YMCA	Mike Miller
Newport Energy & Environment Commission (NEEC)	Avery Robertson
Newport Friends of the Waterfront	via Tom Gibson
Newport HEZ / Women's Resource Center	Sydney Ormerod
Newport HEZ / Women's Resource Center	Jessica Walsh
Newport HEZ / Women's Resource Center	Makalah Chapman
Newport Housing Authority	Rhonda Mitchell
Newport Restoration Foundation	Alyssa Lozupone
Newport Tree Conservancy	Lilly Dick
Newport Utilities Dept	Rob Schultz
Norman Bird Sanctuary	Kaity Ryan
Portsmouth Conservation	Constance Harding
Portsmouth Tree Committee	Scott Wheeler
Rhode Island Marine Trades Association (RIMTA)	Brian Dursey
Rose Island Light & Fort Hamilton Trust	Sean O'Connor
Sail Newport	Jamie Haines
Salve Regina University	Jameson Chace
Salve Regina University	Mike Semenza
Salve Regina University	Mike Caruolo

Sankofa Art & Solace	Niko Merritt
Save The Bay	Topher Hamblett
Save The Bay	Wenley Ferguson
SNEP	Elizabeth Scott
State Rep	Terri Courtvriend
State Rep	Lauren Carson
State Rep	Lou DiPalma
State Rep	Michelle McGaw
State Rep	Linda Ujifusa
State Rep	Marvin Abney
State Rep	Alex Finkleman
State Rep	Susan Donovan
URI CRC / RI Sea Grant	Pam Rubinoff
vBCF	Thomas Brendler



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## **Appendix B: Public Engagement and Outreach**

**B1: Survey Results**

**B2: Copies of Outreach Efforts**

## Responses Overview Closed

Responses

138



Average Time

09:21



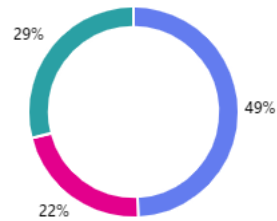
Duration

265 Days



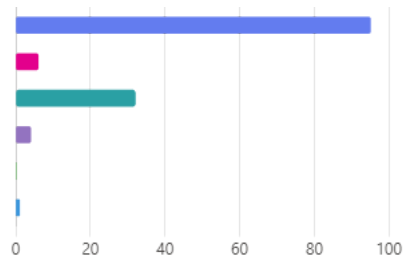
1. Which municipality do you primarily live in, work in, or visit?

● Portsmouth	68
● Middletown	30
● Newport	40



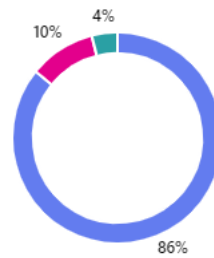
2. How are you connected to Aquidneck Island?

● I live here.	95
● I work here.	6
● I live and work here.	32
● Non-resident property or business owner.	4
● Frequent visitor.	0
● Other	1



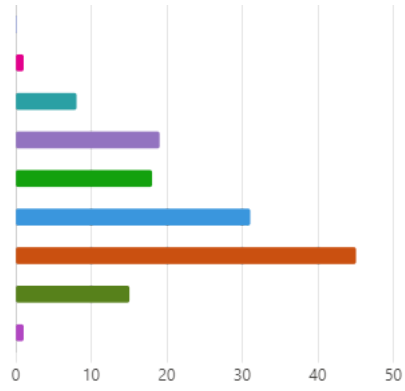
3. Which best describes you?

● Year-round resident, own a home.	109
● Year-round resident, rent a home.	13
● Part-time resident, own a home.	5
● Part-time resident, rent a home.	0



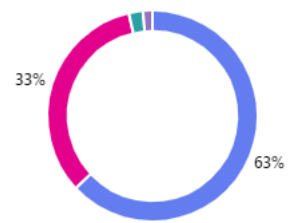
4. What is your age range?

Under 18	0
18-24	1
25-34	8
35-44	19
45-54	18
55-64	31
65-74	45
75+	15
Prefer not to say.	1



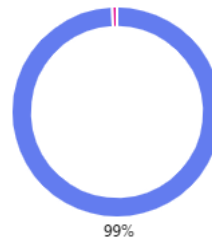
5. What is your gender?

Woman	87
Man	46
Non-binary	3
Prefer not to say	2

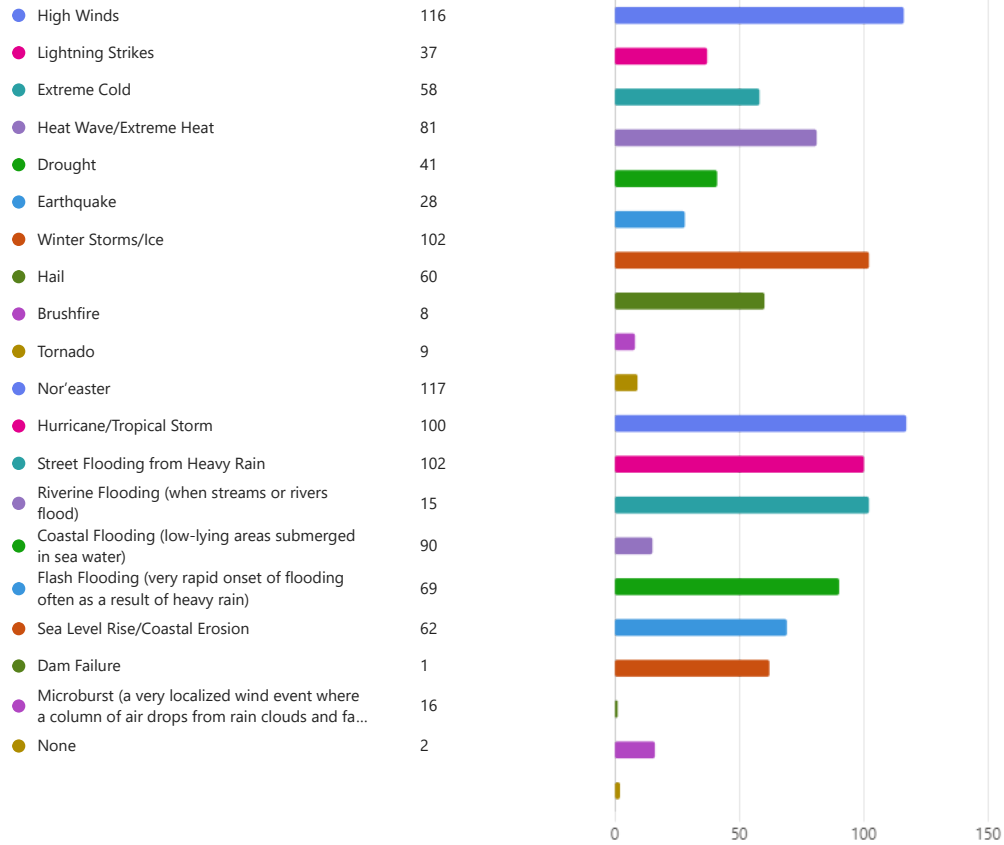


6. What is the primary language spoken in your home?

English	137
Spanish	1
Portuguese	0
Other	0



7. What types of natural hazards have you experienced on Aquidneck Island?  
(Check all that apply.)

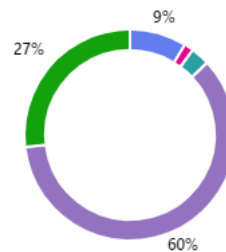


8. Please re-order the list of hazards so that the 3 you are MOST CONCERNED about are at the top. If you are completing a paper copy of this survey, please write a 1, 2, or 3 next to your top hazards of concern.



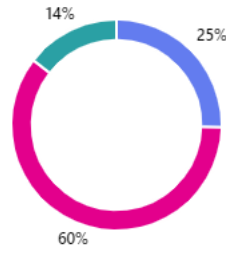
9. How prepared do you feel that YOU are for the probable impacts of natural hazards?

Preparedness Level	Count
I'm not sure how to prepare.	12
Not Prepared- no need.	2
Not Prepared- never thought about it.	4
Somewhat prepared for some events.	83
Prepared for most events.	37



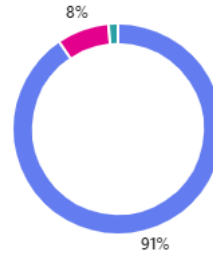
10. How many days to you prepare for when you hear of severe weather?

- Just 1 day 35
- 2-3 days 83
- 4+ days 20



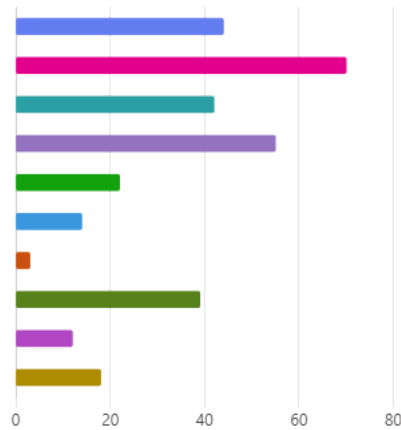
11. How would a natural disaster such as a hurricane impact your food security?

- Minor: I would probably have enough food on hand to last a few days. 125
- Moderate: I might not be able to get to a food bank or utilize the school lunch program. 11
- Severe: I rarely have enough food to last more than a day. 2



12. If you have taken actions to make your home, business, or neighborhood more resilient to natural hazards, please give us examples. (Check all that apply).

- Installed a generator 44
- Trim trees 70
- Plant native vegetation 42
- Installed a sump pump 55
- Used wind resistant building materials/techniques 22
- Elevated house/mechanical equipment 14
- Floodproofing (business) 3
- Involved in community resilience efforts. 39
- Trained employees on emergency procedures. 12
- Other 18

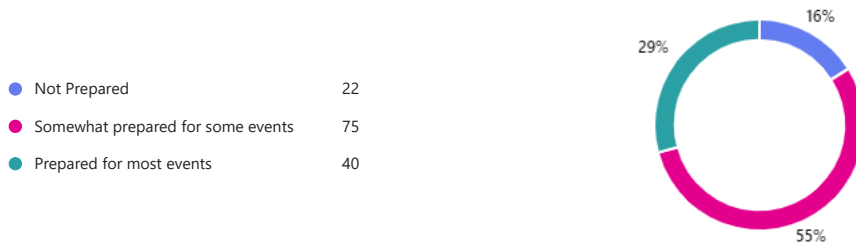


13. A quick reminder. If there are dead standing trees or hanging limbs on your property, please trim them appropriately or bring in professionals. For work near powerlines, always contact RI Energy first.

- Got it! 127



14. How prepared do you feel that your Town/City is for the probable impacts of natural hazards?



15. Does your street flood when it rains?



16. If "always" or "sometimes", please provide the street name and nearest cross street. Or tell us of a place you know floods.

48  
Responses

Latest Responses  
"Paradise Ave"  
...

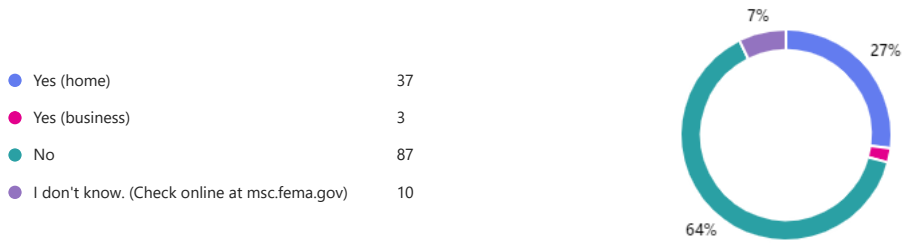
9 respondents (19%) answered Common Fence for this question.



17. How many times has that street flooded in the last 12 months?



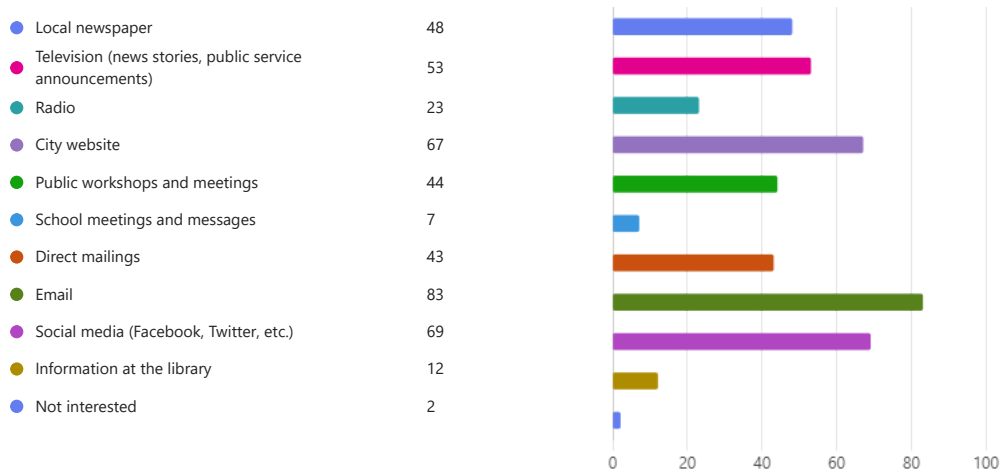
18. Is your home/business on Aquidneck Island located in a floodplain or flood zone?



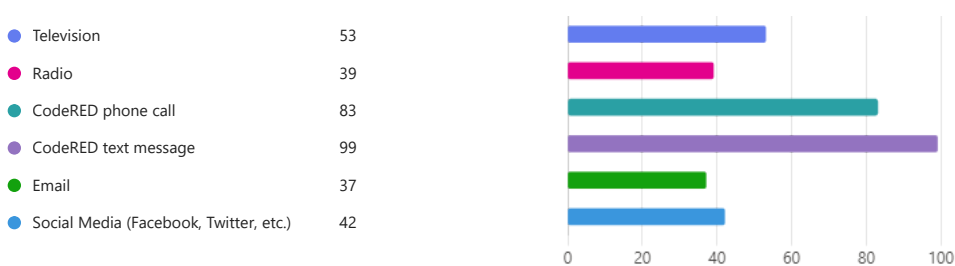
19. Do you currently have flood insurance on your home/business?



20. How do you prefer to receive educational information about how to better protect your home, business, or neighborhood?  
Check all that apply. (Don't worry, we aren't adding you to a list.)



21. How do you currently receive EMERGENCY alerts?



22. Please share additional thoughts on how Aquidneck Island improve its resiliency and better prepare for the next natural hazard event.

Latest Responses

61

Responses

"Stop hardening the shoreline and instead do the opposite - begin retreating hard..."

"Making sure people know how to protect themselves in their homes."

"Increase revenue by pulling over the constant speeders on Paradise Avenue and ... "

...

14 respondents (23%) answered island for this question.



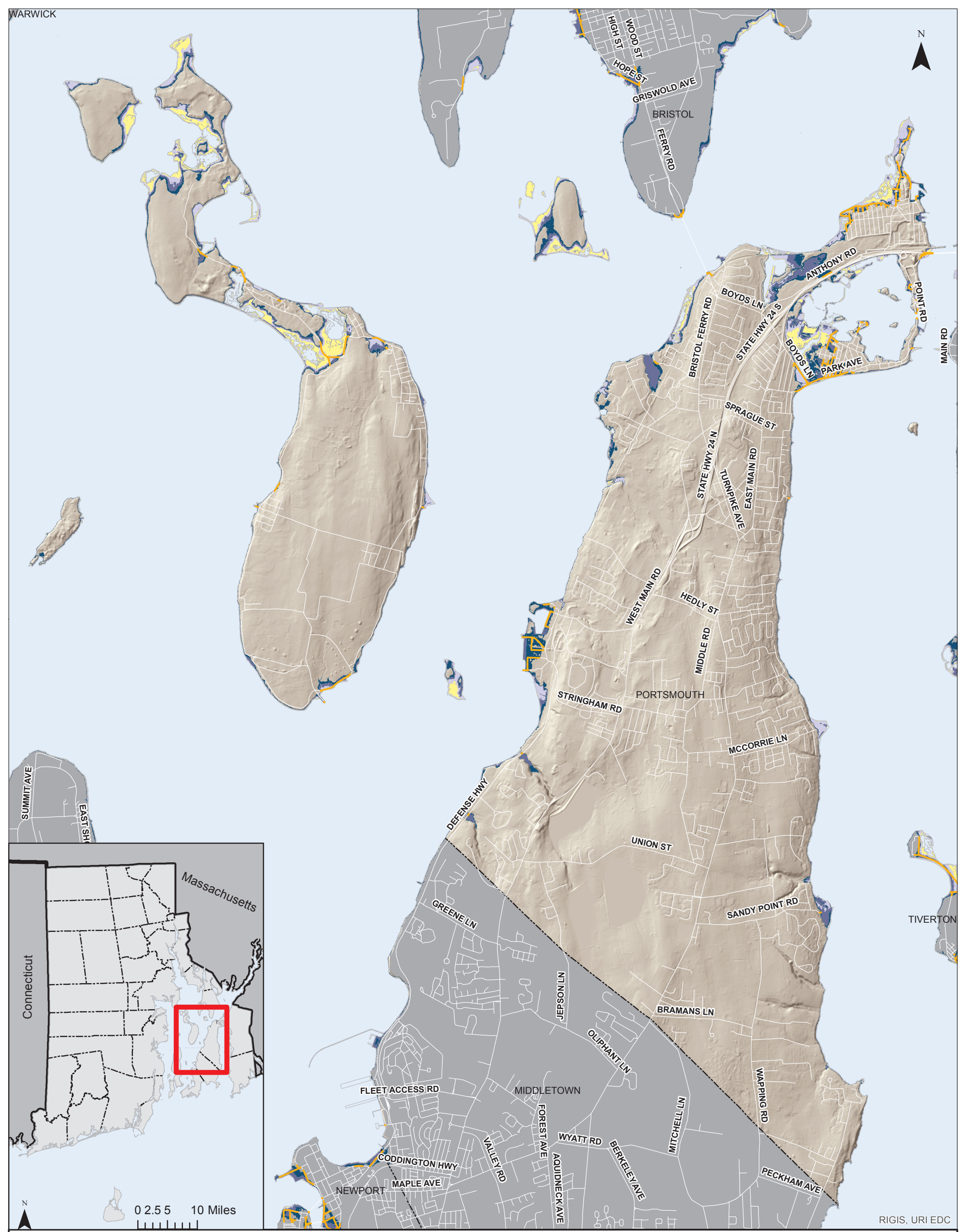
## Survey Results

Town Council Agenda to be inserted.

Public Notices to be inserted.

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## **Appendix C: Transportation Vulnerability Reports**



# Sea Level Rise Scenarios Affecting Roads

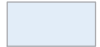







Town of Portsmouth

Map Created: 8/11/2016


**Map Legend**

NOTES:  
 The Sea Level Rise (SLR) Inundation modified bathtub model does not take into consideration future erosion or storm surge.

Includes Hillshade from USGS 2011 LiDAR

	Current Mean Higher High Water		City and Town Boundaries
	1Ft Sea Level Rise		Potentially Affected Roads
	3Ft Sea Level Rise		Roads
	5Ft Sea Level Rise		
	7Ft Sea Level Rise		

0 0.25 0.5 1 Miles

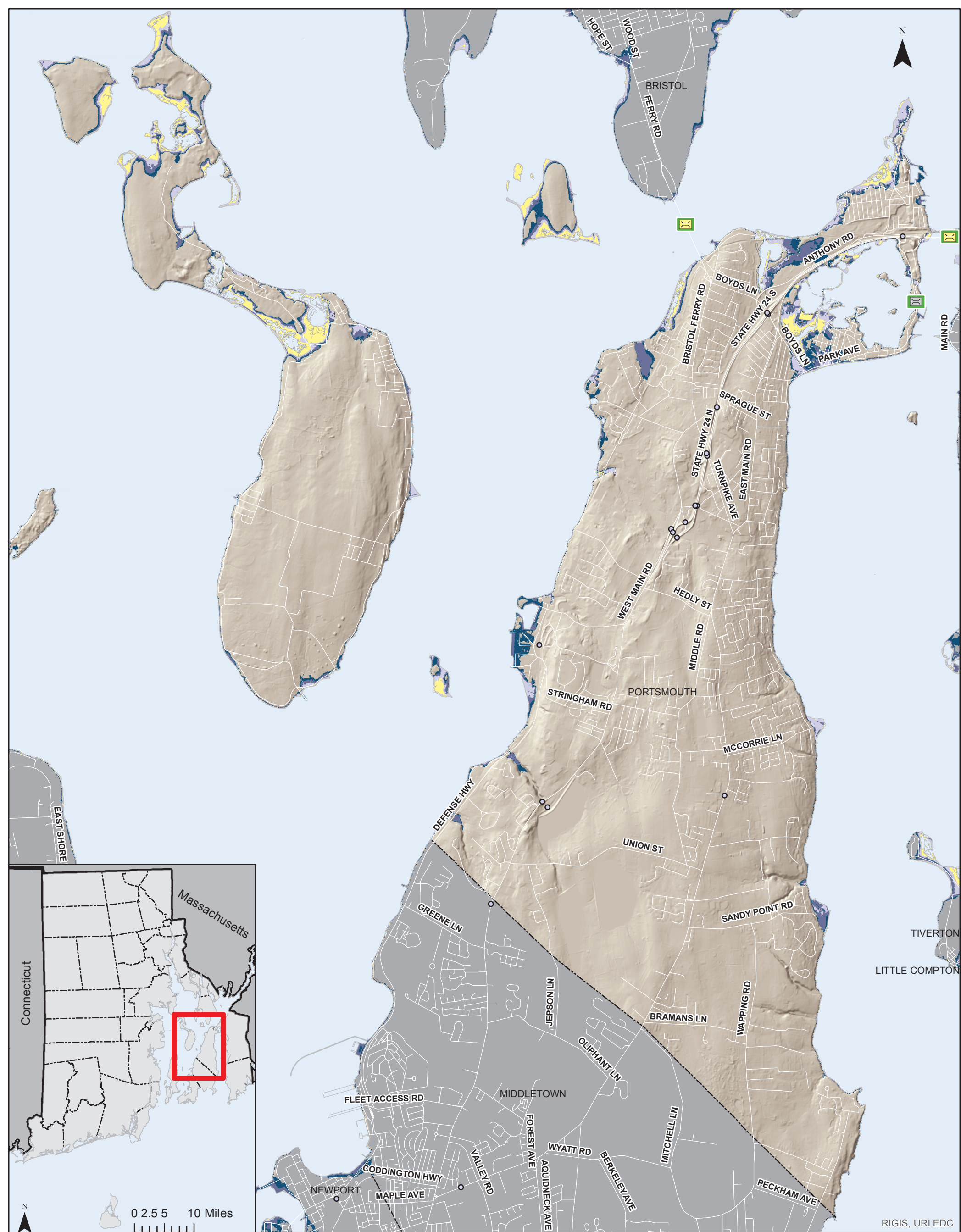


Map Disclaimer: This map is not the product of a Professional Land Survey. It was created by RI Statewide Planning Program for general reference, informational, planning and guidance use, and is not a legally authoritative source as to location of natural or manmade features. Proper interpretation of this map may require the assistance of appropriate professional services. RI Statewide Planning Program makes no warranty, express or implied, related to the spatial accuracy, reliability, completeness, or currentness of this map.

RIGIS, URI EDC

Relative Road Vulnerability to Sea Level Rise													
Portsmouth			Linear Feet of Road Inundated At:										
Muni Rank	State Rank	Road Name	1 Foot of SLR	3 Feet of SLR	5 Feet of SLR	7 Feet of SLR	Total Linear Feet	Haz. Score	Evacuation Route	Intermodal Facility	Functional Classification	Sys. Score	Vuln. Score
1	141	BOYDS LN		286	978	121	1,385	3.33	No	No	Major Coll.	1.20	4.53
2	151	NARRAGANSETT AVE		967	693	336	1,996	3.89	No	No	Local	0.60	4.49
3	158	NECK FARM RD		1,168	679	563	2,410	3.76	No	No	Local	0.60	4.36
4	174	COMMON FENCE POINT BLVD		1,029	1,189	594	2,812	3.63	No	No	Local	0.60	4.23
5	176	PARK AVE		641	1,396	650	2,687	3.02	No	No	Major Coll.	1.19	4.21
6	178	STATE HWY 24 N			3	39	42	1.50	No	No	Freeways	2.70	4.20
7	197	UNNAMED_11				1,225	1,225	3.50	No	No	Local	0.60	4.10
8	198	UNNAMED-6				1,170	1,170	3.50	No	No	Local	0.60	4.10
9	235	ANTHONY RD		355	1,296	1,678	3,329	3.25	No	No	Local	0.68	3.92
10	239	MOUNT HOPE BRG	9	16	21	7	54	1.50	No	No	Principal Art.	2.40	3.90
11	266	LAGOON RD		72	771	85	928	3.16	No	No	Local	0.60	3.76
12	292	SOUTH PRUDENCE BAY ISLAND PARK		352	1,001	380	1,734	3.06	No	No	Local	0.60	3.66
13	333	MASON AVE		589	150	133	872	2.85	No	No	Local	0.60	3.45
14	353	MARINE AVE		238	149		387	2.73	No	No	Local	0.60	3.33
15	369	ORMEROD AVE		219	524	521	1,263	2.68	No	No	Local	0.60	3.28
16	381	GORMLEY AVE		203	68	93	365	2.61	No	No	Local	0.60	3.21
17	387	CLIFF AVE		203	94	77	374	2.58	No	No	Local	0.60	3.18
18	434	CEDAR AVE		208	139	106	453	2.42	No	No	Local	0.60	3.02
19	442	ATTLEBORO AVE		142	140	47	330	2.36	No	No	Local	0.60	2.96
20	451	RIVERSIDE AVE		355	308	179	842	2.34	No	No	Local	0.60	2.94
21	452	RHODE ISLAND BLVD		151	149	59	360	2.34	No	No	Local	0.60	2.94
22	472	HIGHLAND AVE		317	249	313	878	2.22	No	No	Local	0.60	2.82
23	474	BAY AVE		326	134	517	978	2.17	No	No	Local	0.60	2.77
24	480	SAKONNET DR		282	359	275	916	2.12	No	No	Local	0.60	2.72
25	499	DEFENSE HWY			52	46	98	1.50	No	No	Major Coll.	1.20	2.70
26	543	POINT RD	7	7	50	54	118	1.50	No	No	Local	0.74	2.24
27	558	LAKEVILLE AVE			5	135	141	1.50	No	No	Local	0.60	2.10
28	559	SEACONNET AVE			330	32	362	1.50	No	No	Local	0.60	2.10
29	958	ALDEN LANDING				538	538	1.50	No	No	Local	0.60	2.10
30	959	ALEXANDER RD			182	157	338	1.50	No	No	Local	0.60	2.10
31	960	BEACH RD			101	26	128	1.50	No	No	Local	0.60	2.10
32	961	BERKLEY AVE			396	172	569	1.50	No	No	Local	0.60	2.10
33	962	CANTON AVE		36	91	76	203	1.50	No	No	Local	0.60	2.10
34	963	CHESTNUT ST			13	61	74	1.50	No	No	Local	0.60	2.10
35	964	COTTAGE AVE			370	99	469	1.50	No	No	Local	0.60	2.10
36	965	E POWER ST			13	21	34	1.50	No	No	Local	0.60	2.10
37	966	EASTON AVE		91	92	56	239	1.50	No	No	Local	0.60	2.10
38	967	FOUNTAIN AVE				175	175	1.50	No	No	Local	0.60	2.10
39	968	FOXBORO AVE		18	73	96	186	1.50	No	No	Local	0.60	2.10
40	969	GREENFIELD AVE			10	26	36	1.50	No	No	Local	0.60	2.10
41	970	HARBOR RD			31	15	46	1.50	No	No	Local	0.60	2.10
42	971	HILLSIDE AV			2	36	38	1.50	No	No	Local	0.60	2.10
43	972	HOLLISTON AVE			69	73	141	1.50	No	No	Local	0.60	2.10
44	973	ISLAND RD		72	73	521	666	1.50	No	No	Local	0.60	2.10
45	974	ISLINGTON AVE			53	56	109	1.50	No	No	Local	0.60	2.10
46	975	KENSINGTON AVE				116	116	1.50	No	No	Local	0.60	2.10
47	976	LANDING LN			63	29	92	1.50	No	No	Local	0.60	2.10
48	977	LEEDHAM ST				26	26	1.50	No	No	Local	0.60	2.10
49	978	LITTLE HARBOR LNDG				577	577	1.50	No	No	Local	0.60	2.10
50	979	MARITIME DR				250	250	1.50	No	No	Local	0.60	2.10
51	980	NARRAGANSETT RD		30	24	33	87	1.50	No	No	Local	0.60	2.10
52	981	NORSEMAN DR				156	156	1.50	No	No	Local	0.60	2.10
53	982	NORTH WATER ST			106	116	222	1.50	No	No	Local	0.60	2.10
54	983	NORWOOD AVE				1	1	1.50	No	No	Local	0.60	2.10
55	984	OAK ST		72	55	54	181	1.50	No	No	Local	0.60	2.10
56	985	OLD PIER RD				195	195	1.50	No	No	Local	0.60	2.10
57	986	PEARL ST			122	80	202	1.50	No	No	Local	0.60	2.10
58	987	PINE ST			319	197	517	1.50	No	No	Local	0.60	2.10
59	988	RAILROAD AVE		44	26	20	90	1.50	No	No	Local	0.60	2.10
60	989	RAVINE RD				5	5	1.50	No	No	Local	0.60	2.10
61	990	RAYNHAM AVE				4	4	1.50	No	No	Local	0.60	2.10
62	991	RIVERSIDE ST			400	787	1,187	1.50	No	No	Local	0.60	2.10
63	992	ROSS AV				80	80	1.50	No	No	Local	0.60	2.10
64	993	RUSSELL AVE				16	16	1.50	No	No	Local	0.60	2.10
65	994	SANDY POINT RD			64	23	87	1.50	No	No	Minor Coll.	0.60	2.10
66	995	TERMINAL RD				198	198	1.50	No	No	Local	0.60	2.10
67	996	UNNAMED_17			49	95	144	1.50	No	No	Local	0.60	2.10
68	997	WALNUT ST				126	126	1.50	No	No	Local	0.60	2.10
69	1,377	BROADWAY			46	74	120	1.50	No	No	Local	0.60	2.10
70	1,378	DIGHTON AVE		31	152	96	279	1.50	No	No	Local	0.60	2.10
71	1,379	NARRAGANSETT BLVD			219	39	258	1.50	No	No	Local	0.60	2.10

Muni Rank	State Rank	Road Name	1 Foot of SLR	3 Feet of SLR	5 Feet of SLR	7 Feet of SLR	Total Linear Feet	Haz. Score	Evacuation Route	Intermodal Facility	Functional Classification	Sys. Score	Vuln. Score
		TOTAL LINEAR FEET	16	8,521	14,143	15,033	37,712						



# Sea Level Rise Scenarios Affecting Bridges

Map Created: 8/11/2016

## Town of Portsmouth

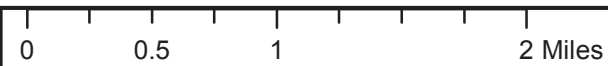
### Map Legend

**NOTES:**

The Sea Level Rise (SLR) Inundation modified bathtub model does not take into consideration future erosion or storm surge.

Includes Hillshade from USGS 2011 LiDAR

- Freeboard Potentially Affected by SLR
- Current Mean Higher High Water
- City and Town Boundaries
- Freeboard Unlikely to be Affected by SLR
- 1ft Sea Level Rise
- Roads
- Not Exposed to SLR
- 3ft Sea Level Rise
- Bridge Accessible
- 5ft Sea Level Rise
- Possible Bridge Access Problem
- 7ft Sea Level Rise

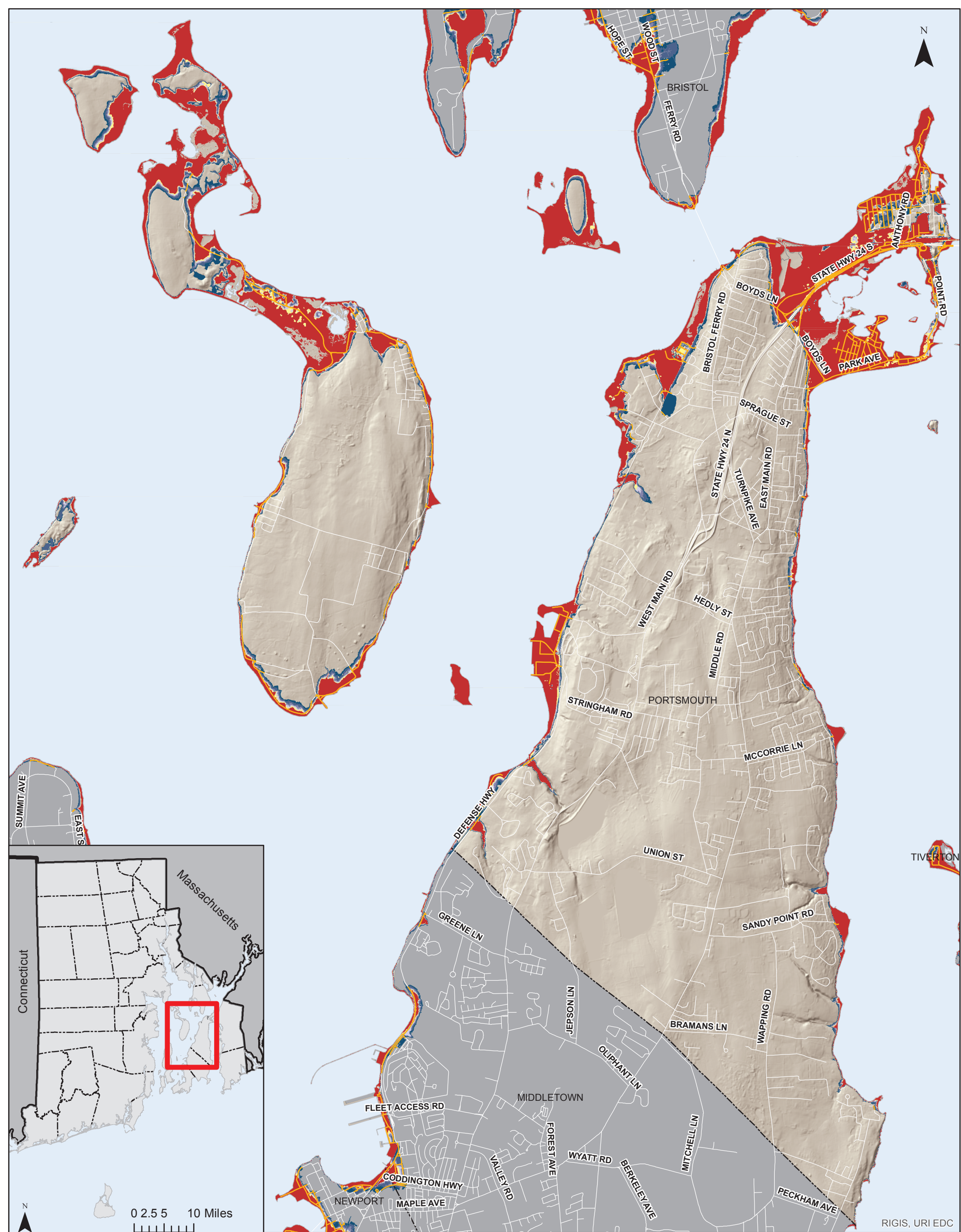


**Map Disclaimer:** This map is not the product of a Professional Land Survey. It was created by RI Statewide Planning Program for general reference, informational, planning and guidance use, and is not a legally authoritative source as to location of natural or manmade features. Proper interpretation of this map may require the assistance of appropriate professional services. RI Statewide Planning Program makes no warranty, express or implied, related to the spatial accuracy, reliability, completeness, or currentness of this map.

RIGIS, URI EDC

Bridges Possibly Affected by Sea Level Rise in the Town of Portsmouth

Mun. Rank	State Rank	Bridge Name	Facility Carried	Feature Intersected	Inches of Freeboard Relative to 7FtSLR	Terrain Crossed	Landing Access	Hazard Score	Intermodal Facility	Evacuation Route	AADT	System Score	Vulnerability Score
1	28	Sakonnet River	RI 24 & RI 138	SAKONNET R	-84	MHHW	Access	3.00	Yes	No	40,000	4.00	7.00



# 100 Year Storm Surge Event Plus Sea Level Rise Scenarios Affecting Roads

Town of Portsmouth

Map Created: 8/11/2016

## Map Legend

### NOTES:

The Sea Level Rise (SLR) Inundation modified bathtub model does not take into consideration future erosion or storm surge.

Includes Hillshade from USGS 2011 LiDAR

- Current Ponds & Mean Higher High Water
- 100-Year Storm Event
- 100-Year Plus 1 ft. of SLR
- 100-Year Plus 2 ft. of SLR
- 100-Year Plus 3 ft. of SLR
- 100-Year Plus 5 ft. of SLR
- 100-Year Plus 7 ft. of SLR
- City and Town Boundaries
- Potentially Affected Roads
- Roads



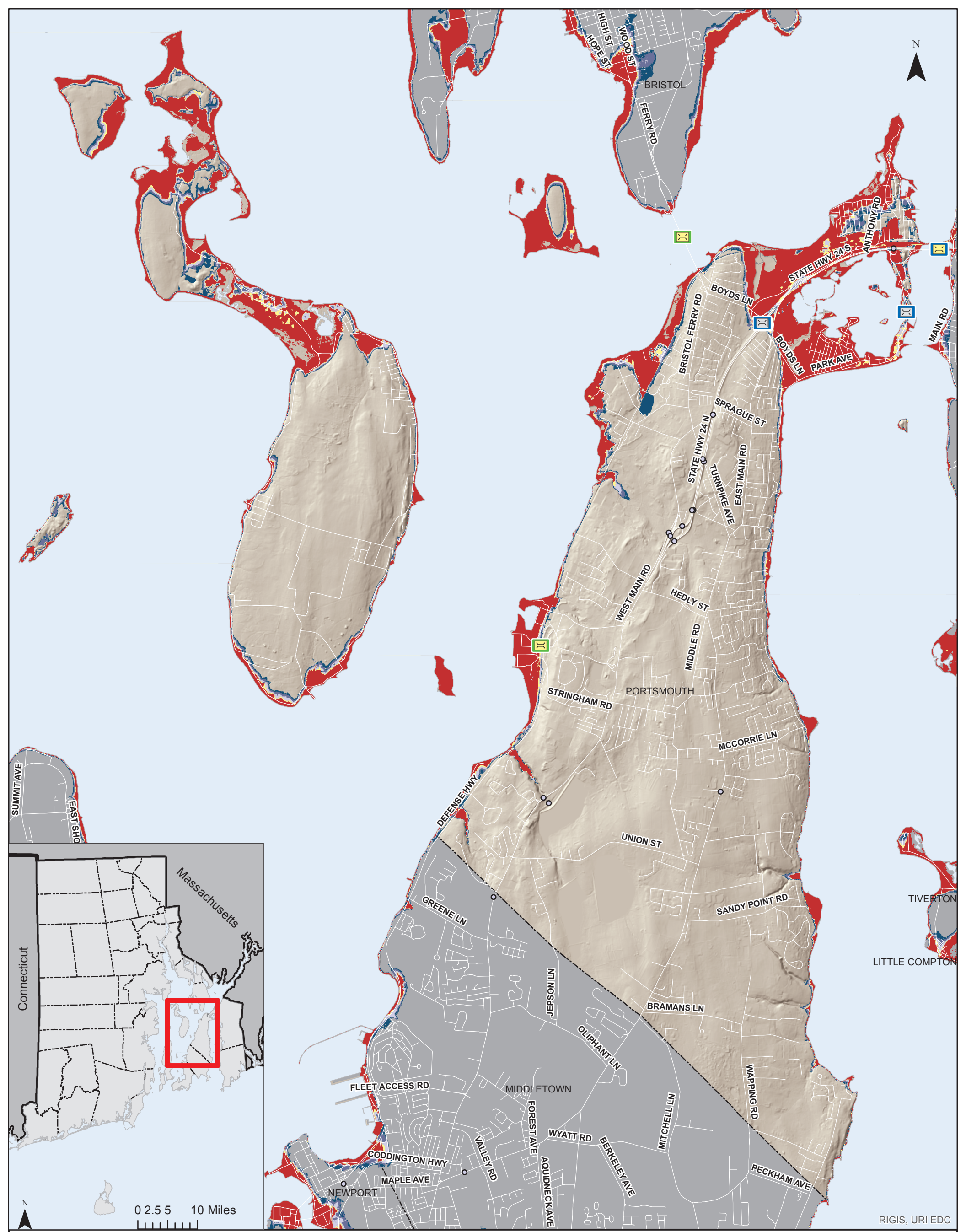
Map Disclaimer: This map is not the product of a Professional Land Survey. It was created by RI Statewide Planning Program for general reference, informational, planning and guidance use, and is not a legally authoritative source as to location of natural or manmade features. Proper interpretation of this map may require the assistance of appropriate professional services. RI Statewide Planning Program makes no warranty, express or implied, related to the spatial accuracy, reliability, completeness, or currentness of this map.

RIGIS, URI EDC

Relative Road Vulnerability to 100-Year Storm Surge Event Plus Sea Level Rise														
Portsmouth			Linear Feet Inundated During 100 Year Surge Event Plus:											
Muni. Rank	State Rank	NAME	No SLR	1 Foot of SLR	3 Feet of SLR	5 Feet of SLR	7 Feet of SLR	Total Linear Feet	Haz. Score	Evac. Route	Intermodal Facility	Functional Classification	Sys. Score	Vulnerability Score
1	6	STATE HWY 24 N	1,267	1,480	2,176	1,280	365	6,569	4.18	No	Yes	Freeways	4.53	8.70
2	44	MOUNT HOPE BRG	168	18	18	14	14	233	4.18	No	Yes	Principal Art.	3.40	7.58
3	67	STATE HWY 24 S	1,199	1,621	2,795	1,935	351	7,900	4.10	No	No	Principal Art.	3.11	7.21
4	89	ON RAMP RI-24 N	1,182	865	533	211	311	3,103	4.01	No	Yes	Principal Art.	2.86	6.87
5	104	EXIT 2	734	71	245	316	439	1,804	3.27	No	Yes	Freeways	3.38	6.65
6	178	BOYDS LN	2,521	137	282	399	480	3,819	3.88	No	No	Minor Art.	2.22	6.10
7	189	PARK AVE	5,719	409	450	36	36	6,650	4.84	No	No	Major Coll.	1.17	6.00
8	201	RAILROAD AVE	1,076	19	28	3	5	1,131	4.83	No	No	Major Coll.	1.08	5.91
9	234	ANTHONY RD	11,145	277	934	205	219	12,780	4.77	No	No	Minor Coll.	0.98	5.76
10	660	ALDEN LANDING	931					931	5.00	No	No	Local	0.60	5.60
11	661	ATTLEBORO AVE	752					752	5.00	No	No	Local	0.60	5.60
12	662	BAY ST	526					526	5.00	No	No	Local	0.60	5.60
13	663	BEACH ST	124					124	5.00	No	No	Local	0.60	5.60
14	664	BLUE BILL WAY	343					343	5.00	No	No	Local	0.60	5.60
15	665	CEDAR AVE	992					992	5.00	No	No	Local	0.60	5.60
16	666	CHESTNUT ST	319					319	5.00	No	No	Local	0.60	5.60
17	667	COMMON FENCE POINT BLVD	3,179					3,179	5.00	No	No	Local	0.60	5.60
18	668	CORAL AVE	712					712	5.00	No	No	Local	0.60	5.60
19	669	COTTAGE AVE	1,541					1,541	5.00	No	No	Local	0.60	5.60
20	670	COVE ST	1,094					1,094	5.00	No	No	Local	0.60	5.60
21	671	EDITH AVE	129					129	5.00	No	No	Local	0.60	5.60
22	672	FOUNTAIN AVE	880					880	5.00	No	No	Local	0.60	5.60
23	673	GORMLEY AVE	1,464					1,464	5.00	No	No	Local	0.60	5.60
24	674	GOULD ST	154					154	5.00	No	No	Local	0.60	5.60
25	675	GREENE ST	628					628	5.00	No	No	Local	0.60	5.60
26	676	HIGHLAND AVE	1,429					1,429	5.00	No	No	Local	0.60	5.60
27	677	ISLAND AVE	794					794	5.00	No	No	Local	0.60	5.60
28	678	ISLAND PARK AVE	216					216	5.00	No	No	Local	0.60	5.60
29	679	ISLAND RD	844					844	5.00	No	No	Local	0.60	5.60
30	680	LAGOON RD	1,080					1,080	5.00	No	No	Local	0.60	5.60
31	681	LEEDHAM ST	163					163	5.00	No	No	Local	0.60	5.60
32	682	LIBERTY ST	762					762	5.00	No	No	Local	0.60	5.60
33	683	LITTLE HARBOR LNDG	597					597	5.00	No	No	Local	0.60	5.60
34	684	MAIN RD	1,180					1,180	5.00	No	No	Local	0.60	5.60
35	685	MARINE AVE	387					387	5.00	No	No	Local	0.60	5.60
36	686	MARITIME DR	1,389					1,389	5.00	No	No	Local	0.60	5.60
37	687	MASON AVE	1,246					1,246	5.00	No	No	Local	0.60	5.60
38	688	MORGAN ST	826					826	5.00	No	No	Local	0.60	5.60
39	689	NARRAGANSETT RD	785					785	5.00	No	No	Local	0.60	5.60
40	690	NORTH WATER ST	374					374	5.00	No	No	Local	0.60	5.60
41	691	OAK ST	583					583	5.00	No	No	Local	0.60	5.60
42	692	OLD BOYD S LN	644					644	5.00	No	No	Local	0.60	5.60
43	693	ORMEROD AVE	1,574					1,574	5.00	No	No	Local	0.60	5.60
44	694	PEACE ST	1,421					1,421	5.00	No	No	Local	0.60	5.60
45	695	PEARL ST	386					386	5.00	No	No	Local	0.60	5.60
46	696	PINE ST	721					721	5.00	No	No	Local	0.60	5.60
47	697	POINT ST	64					64	5.00	No	No	Local	0.60	5.60
48	698	REGATTA WAY	518					518	5.00	No	No	Local	0.60	5.60
49	699	RIVERSIDE ST	3,699					3,699	5.00	No	No	Local	0.60	5.60
50	700	RUSSELL AVE	501					501	5.00	No	No	Local	0.60	5.60
51	701	RUTH AVE	219					219	5.00	No	No	Local	0.60	5.60
52	702	SAGAMORE ST	566					566	5.00	No	No	Local	0.60	5.60
53	703	SEACONNET AVE	424					424	5.00	No	No	Local	0.60	5.60
54	704	STAFFORD ST	271					271	5.00	Yes	Yes	Local	0.60	5.60
55	705	THORPE AVE	185					185	5.00	No	No	Local	0.60	5.60
56	706	UNNAMED_11	1,315					1,315	5.00	No	No	Local	0.60	5.60
57	707	UNNAMED-6	1,243					1,243	5.00	No	No	Local	0.60	5.60
58	708	WALNUT ST	1,131					1,131	5.00	No	No	Local	0.60	5.60
59	709	WARCAM WAY	461					461	5.00	No	No	Local	0.60	5.60
60	1,027	SEACONNET BLVD	1,333	16				1,349	4.98	No	No	Local	0.60	5.58
61	1,051	ON RAMP RI-24 S	260	326	11			597	4.94	No	No	Local	0.60	5.54
62	1,072	HALL RD	425	25				450	4.92	No	No	Local	0.60	5.52
63	1,108	TERMINAL RD	1,017	19	10	30		1,076	4.84	No	No	Local	0.60	5.44
64	1,118	POINT RD	918	1,096	245	181	193	2,632	4.28	No	No	Major Coll.	1.15	5.43
65	1,122	ROSS AV	286	23	6			315	4.83	No	No	Local	0.60	5.43
66	1,144	ALEXANDER RD	2,780	408	416	27	18	3,649	4.77	No	No	Local	0.60	5.37
67	1,167	BERKLEY AVE	1,263	23	40	33	24	1,382	4.73	No	No	Local	0.60	5.33
68	1,232	HUMMOCKS AVE	559	55	66	69	72	822	4.02	No	No	Major Coll.	1.20	5.22
69	1,256	ATLANTIC AVE	324	372	94			791	4.58	No	No	Local	0.60	5.18
70	1,266	HOPE AVE	459	13	52			524	4.56	No	No	Local	0.60	5.16
71	1,280	NARRAGANSETT AVE	5,974	1,087	1,950	1,168	615	10,793	4.55	No	No	Local	0.60	5.15

Muni. Rank	State Rank	NAME	No SLR	1 Foot of SLR	3 Feet of SLR	5 Feet of SLR	7 Feet of SLR	Total Linear Feet	Haz. Score	Evac. Route	Intermodal Facility	Functional Classification	Sys. Score	Vulnerability Score
72	1,293	SOUTH PRUDENCE BAY ISLAND PA	3,442	130	227	225	197	4,221	4.52	No	No	Local	0.60	5.12
73	1,323	NECK FARM RD	6,027	917	1,058	801	708	9,511	4.45	No	No	Local	0.60	5.05
74	1,336	LEVESQUE MEMORIAL DR	2,915	306	197	243	272	3,934	4.42	No	No	Local	0.60	5.02
75	1,389	RIVERSIDE AVE	1,188	19	36	42	197	1,482	4.33	No	No	Local	0.60	4.93
76	1,422	CANTON AVE	963	76	119	69	36	1,264	4.29	No	No	Local	0.60	4.89
77	1,429	DEFENSE HWY	712	113	192	167	235	1,418	3.68	No	No	Major Coll.	1.20	4.88
78	1,474	LANDING LN	136	5	13	14	6	175	4.22	No	No	Local	0.60	4.82
79	1,479	KENSINGTON AVE	403	46	92	13		555	4.21	No	No	Local	0.60	4.81
80	1,493	SAKONNET DR	1,143	105	87	132	158	1,625	4.19	No	No	Local	0.60	4.79
81	1,509	LAKEVILLE AVE	306	17	28	17	47	415	4.16	No	No	Local	0.60	4.76
82	1,526	UNNAMED_17	433	44	48	41	41	607	4.14	No	No	Local	0.60	4.74
83	1,544	BAY AVE	3,745	282	362	352	929	5,670	4.11	No	No	Local	0.60	4.71
84	1,551	NEWPORT BEACH DR	570	482	635	67	149	1,903	4.10	No	No	Local	0.60	4.70
85	1,590	BROADWAY	258	14	32	25	25	354	4.05	No	No	Local	0.60	4.65
86	1,625	BAKER RD	96	251	706			1,053	3.99	No	No	Local	0.60	4.59
87	1,639	MASSASOIT AVE	627	13	187	105	92	1,024	3.98	No	No	Local	0.60	4.58
88	1,658	RAYNHAM AVE	369	20	33	37	87	546	3.93	No	No	Local	0.60	4.53
89	1,694	THERIEN RD	499	96	265	142		1,002	3.88	No	No	Local	0.60	4.48
90	1,715	SUMMIT RD	197	13	21	34	28	294	3.85	No	No	Local	0.60	4.45
91	1,733	CLIFF RD	1,306	282	941	794	575	3,897	3.82	No	No	Local	0.60	4.42
92	1,738	HARBOR RD	317	54	135	21		527	3.81	No	No	Local	0.60	4.41
93	1,739	CARNEGIE HEIGHTS DR	445	45	87	64	72	713	3.81	No	No	Local	0.60	4.41
94	1,742	OLD PIER RD	397	42	67	70	63	640	3.81	No	No	Local	0.60	4.41
95	1,769	DIGHTON AVE	784	33	59	188	175	1,240	3.77	No	No	Local	0.60	4.37
96	1,774	EXIT 3	527	200	124	429		1,280	3.45	No	No	Minor Coll.	0.91	4.36
97	1,787	SANDY POINT RD	132	8	21	27	20	207	3.73	No	No	Minor Coll.	0.60	4.33
98	1,794	MANSFIELD AVE	216	29	100	21		367	3.72	No	No	Local	0.60	4.32
99	1,812	AQUIDNECK AVE		488	335	122	83	1,028	3.70	No	No	Local	0.60	4.30
100	1,818	UNNAMED_12	152	15	31	46		243	3.69	No	No	Local	0.60	4.29
101	1,834	CLIFF AVE	557	42	330	574	246	1,750	3.66	No	No	Local	0.60	4.26
102	1,838	EASTON AVE	431	234	324	376	18	1,383	3.65	No	No	Local	0.60	4.25
103	1,844	UNNAMED_8	1,070	82	86	124	461	1,824	3.64	No	No	Local	0.60	4.24
104	1,847	WILLOW LN	215	23	53	43	40	374	3.64	No	No	Local	0.60	4.24
105	1,865	BEACH RD	635	101	146	220	120	1,222	3.61	No	No	Local	0.60	4.21
106	1,867	MADISON AVE	68	7	14	14	10	112	3.60	No	No	Local	0.60	4.20
107	1,881	BAY RD	70	358	622	517	238	1,805	3.59	No	No	Local	0.60	4.19
108	1,893	FOXBORO AVE	401	17	36	700	224	1,377	3.56	No	No	Local	0.60	4.16
109	1,900	NORWOOD AVE	240	30	58	49	63	441	3.54	No	No	Local	0.60	4.14
110	1,908	BAYVIEW AVE	389	66	487	799	169	1,910	3.53	No	No	Local	0.60	4.13
111	1,923	ISLINGTON AVE	234	13	317	511	142	1,218	3.51	No	No	Local	0.60	4.11
112	1,924	RAPHAEL AVE	268	31	54	97	49	499	3.51	No	No	Local	0.60	4.11
113	1,989	EDDA AVE	68	14	17	13	10	122	3.45	No	No	Local	0.60	4.05
114	2,013	E POWER ST	94	15	19	21	21	171	3.43	No	No	Local	0.60	4.03
115	2,018	HOLBROOK AVE	66	7	17	17	14	121	3.42	No	No	Local	0.60	4.02
116	2,065	RHODE ISLAND BLVD	825	59	327	780	809	2,800	3.32	No	No	Local	0.60	3.92
117	2,148	HOLLISTON AVE	316	40	99	159	92	706	3.18	No	No	Local	0.60	3.78
118	2,156	FRANCIS AVE	55	8	19	19	16	117	3.16	No	No	Local	0.60	3.76
119	2,157	BRISTOL FERRY RD	79	8	21	19	65	193	2.94	No	No	Local	0.82	3.76
120	2,162	NORSEMAN DR	540	59	150	171	294	1,214	3.15	No	No	Local	0.60	3.75
121	2,174	SOUTH CARNEGIE BEACH DR	246	22	48	34	208	558	3.12	No	No	Local	0.60	3.72
122	2,176	UNNAMED_9			383	733	265	1,382	3.12	No	No	Local	0.60	3.72
123	2,222	DANIEL AVE	129	57	64	61	65	377	3.01	No	No	Local	0.60	3.61
124	2,224	NARRAGANSETT BLVD	353	67	228	178	388	1,214	3.00	No	No	Local	0.60	3.60
125	2,233	WEST BUNKER RD	358	73	140	226	140	938	2.99	No	No	Local	0.60	3.59
126	2,307	HILLSIDE AV	102	20	40	29	122	313	2.77	No	No	Local	0.60	3.37
127	2,313	PORTSMOUTH LN	2	142	97	128	26	395	2.76	No	No	Local	0.60	3.36
128	2,328	RAVINE RD	46	4	9	7	10	75	2.72	No	No	Local	0.60	3.32
129	2,454	HOPE VIEW RD	422	46	99	465	616	1,648	2.45	No	No	Local	0.60	3.05
130	2,477	GREENFIELD AVE	274	56	59	327	499	1,215	2.38	No	No	Local	0.60	2.98
131	2,509	THIRD ST	16	16	26	16	10	85	2.26	No	No	Local	0.60	2.86
132	2,513	WELL LN	38	10	20	20	13	101	2.26	No	No	Local	0.60	2.86
133	2,523	HERITAGE DR			217	256	127	600	2.22	No	No	Local	0.60	2.82
134	2,527	KING PHILLIP ST		61	200	135	135	531	2.21	No	No	Local	0.60	2.81
135	2,591	UNNAMED_13	48	17	41	55	58	218	2.09	No	No	Local	0.60	2.69
136	2,612	MASSACHUSETTS BLVD	87	22	37	48	455	648	2.04	No	No	Local	0.60	2.64
137	2,625	JOHN OLDHAM RD	21	52	144	28	42	286	2.01	No	No	Local	0.60	2.61
138	2,630	VALHALLA DR		71	109	57	44	280	2.00	No	No	Local	0.60	2.60
139	2,634	DEPOT AVE	31	14	25	29	27	126	1.99	No	No	Local	0.60	2.59
140	2,639	CHASE AVE		19	24	21	17	81	1.97	No	No	Local	0.60	2.57
141	2,653	MORNINGSIDE LN		21	26	23	23	93	1.95	No	No	Local	0.60	2.55
142	2,668	MUSSELBED SHOAL RD	6	85	39	30	248	408	1.92	No	No	Local	0.60	2.52
143	2,670	ALICE AVE		23	38	19	32	112	1.91	No	No	Local	0.60	2.51
144	2,676	EAST CORYS LN		25	36	36	30	127	1.89	No	No	Local	0.60	2.49

Muni. Rank	State Rank	NAME	No SLR	1 Foot of SLR	3 Feet of SLR	5 Feet of SLR	7 Feet of SLR	Total Linear Feet	Haz. Score	Evac. Route	Intermodal Facility	Functional Classification	Sys. Score	Vulnerability Score
145	2,678	MCCORRIE LN	21	14	26	26	21	107	1.89	No	No	Local	0.60	2.49
146	2,683	BAYSIDE AVE			127	252	159	538	1.88	No	No	Local	0.60	2.48
147	2,684	BEACH RD SOUTH	19	20	53	57	60	210	1.88	No	No	Local	0.60	2.48
148	2,711	UNNAMED_14		38	28	155	85	307	1.75	No	No	Local	0.60	2.35
149	2,714	HOMESTEAD LN		21	80	39	30	170	1.74	No	No	Local	0.60	2.34
150	2,733	WEST SHORE RD		16	81	100	380	577	1.56	No	No	Local	0.60	2.16
151	2,751	DEXTER RD			16	188	148	352	1.50	No	No	Local	0.60	2.10
152	2,752	SIMONELLI RD			25	37	37	99	1.50	No	No	Local	0.60	2.10
153	3,034	BLACK POINT LN					177	177	1.50	No	No	Local	0.60	2.10
154	3,035	BROWN LN					16	16	1.50	No	No	Local	0.60	2.10
155	3,036	CARNEGIE HARBOR DR				134	805	938	1.50	No	No	Local	0.60	2.10
156	3,037	CRAM RD					268	268	1.50	No	No	Local	0.60	2.10
157	3,038	EVANS WAY					201	201	1.50	No	No	Local	0.60	2.10
158	3,039	FAIRVIEW LN				53	22	75	1.50	No	No	Local	0.60	2.10
159	3,040	HARRIET AVE			28	19	18	65	1.50	No	No	Local	0.60	2.10
160	3,041	MOUNT TOM RD				85	75	160	1.50	No	No	Local	0.60	2.10
161	3,042	NEWPORT HARBOR DR		7	37	43	101	188	1.50	No	No	Local	0.60	2.10
162	3,043	OAKDALE AVE					252	252	1.50	No	No	Local	0.60	2.10
163	3,044	OLIVER HAZARD PERRY RD					377	377	1.50	No	No	Local	0.60	2.10
164	3,045	PARK RD					18	18	1.50	No	No	Local	0.60	2.10
165	3,046	PEAR TREE LN				10	23	34	1.50	No	No	Local	0.60	2.10
166	3,047	PIER ST					32	32	1.50	No	No	Local	0.60	2.10
167	3,048	SUNSET LN					3	3	1.50	No	No	Local	0.60	2.10
168	3,049	WARNER AVE			17	39	32	87	1.50	No	No	Local	0.60	2.10
169	3,339	ALLEN LN				10	23	33	1.50	No	No	Local	0.60	2.10
170	3,340	CONCORD AVE		7	14	11	15	47	1.50	No	No	Local	0.60	2.10
171	3,341	HARGRAVES DR			8	33	33	74	1.50	No	No	Local	0.60	2.10
172	3,342	MACOMBER LN				102	94	196	1.50	No	No	Local	0.60	2.10
173	3,343	METACOMET ST			35	23	319	377	1.50	No	No	Local	0.60	2.10
174	3,344	RICHARD DR				101	42	143	1.50	No	No	Local	0.60	2.10
175	3,345	ROSS LN			105	46	57	208	1.50	No	No	Local	0.60	2.10
176	3,346	TALLMAN AVE			27	50	43	120	1.50	No	No	Local	0.60	2.10
177	3,347	UNNAMED_10				316	138	454	1.50	No	No	Local	0.60	2.10
		Total Linear Feet	119,517	14,763	22,646	20,015	18,003	194,943						



# 100 Year Storm Surge Event Plus Sea Level Rise Scenarios Affecting Bridges

Town of Portsmouth

Map Created: 8/11/2016

**Map Legend**

NOTES:  
 The Sea Level Rise (SLR) Inundation modified bathtub model does not take into consideration future erosion or storm surge.  
 Includes Hillshade from USGS 2011 LiDAR

- Freeboard Potentially Affected by Surge
- Freeboard Unlikely to be Affected by Surge
- Bridge Accessible
- Possible Bridge Access Problem
- 100-Year Storm Event
- 100-Year Plus 1 ft. of SLR
- 100-Year Plus 3 ft. of SLR
- 100-Year Plus 5 ft. of SLR
- 100-Year Plus 7 ft. of SLR
- City and Town Boundaries
- Roads

0 0.25 0.5 1 Miles

**RIGIS**

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Relative Bridge Vulnerability to 100-Year Storm Surge Event Plus Sea Level Rise in the Town of Portsmouth

Mun. Rank	State Rank	Bridge Name	Facility Carried	Feature Intersected	Inches of Freeboard Relative to 7FtSLR	Terrain Crossed	Landing Access	Haz. Score	Intermodal Facility	Evac. Route	AADT	Sys. Score	Vuln. Score
1	13	Sakonnet River	RI 24 & RI 138	SAKONNET R	-228	MHHW	Problem	5.00	Yes	No	40,000	4.00	9.00
2	26	Boyd Lane NB	RI 24 NB	BOYD LANE	144	Land	Problem	2.80	Yes	Yes	19,516	5.00	7.80
3	50	Boyd Lane SB	RI 24 SB	BOYD LANE	132	Land	Problem	2.80	Yes	No	19,516	4.00	6.80
4	105	The Cove	HUMMOCKS POINT RD	TIDAL INLET	64	MHHW	Problem	4.60	No	No	2,043	0.60	5.20
5	132	Bradford Ave RR	BRADFORD AV	NEWPORT SEC RR	-66	Water	Access	2.50	Yes	No	100	1.60	4.10



# Sea Level Rise Scenarios Affecting Roads

Town of Middletown

Map Created: 8/4/2016

## Map Legend

### NOTES:

The Sea Level Rise (SLR) Inundation modified bathtub model does not take into consideration future erosion or storm surge.

Includes Hillshade from USGS 2011 LiDAR

- Current Mean Higher High Water
- 1ft Sea Level Rise
- 3ft Sea Level Rise
- 5ft Sea Level Rise
- 7ft Sea Level Rise
- City and Town Boundaries
- Potentially Affected Roads
- Roads

0 0.25 0.5 1 Miles

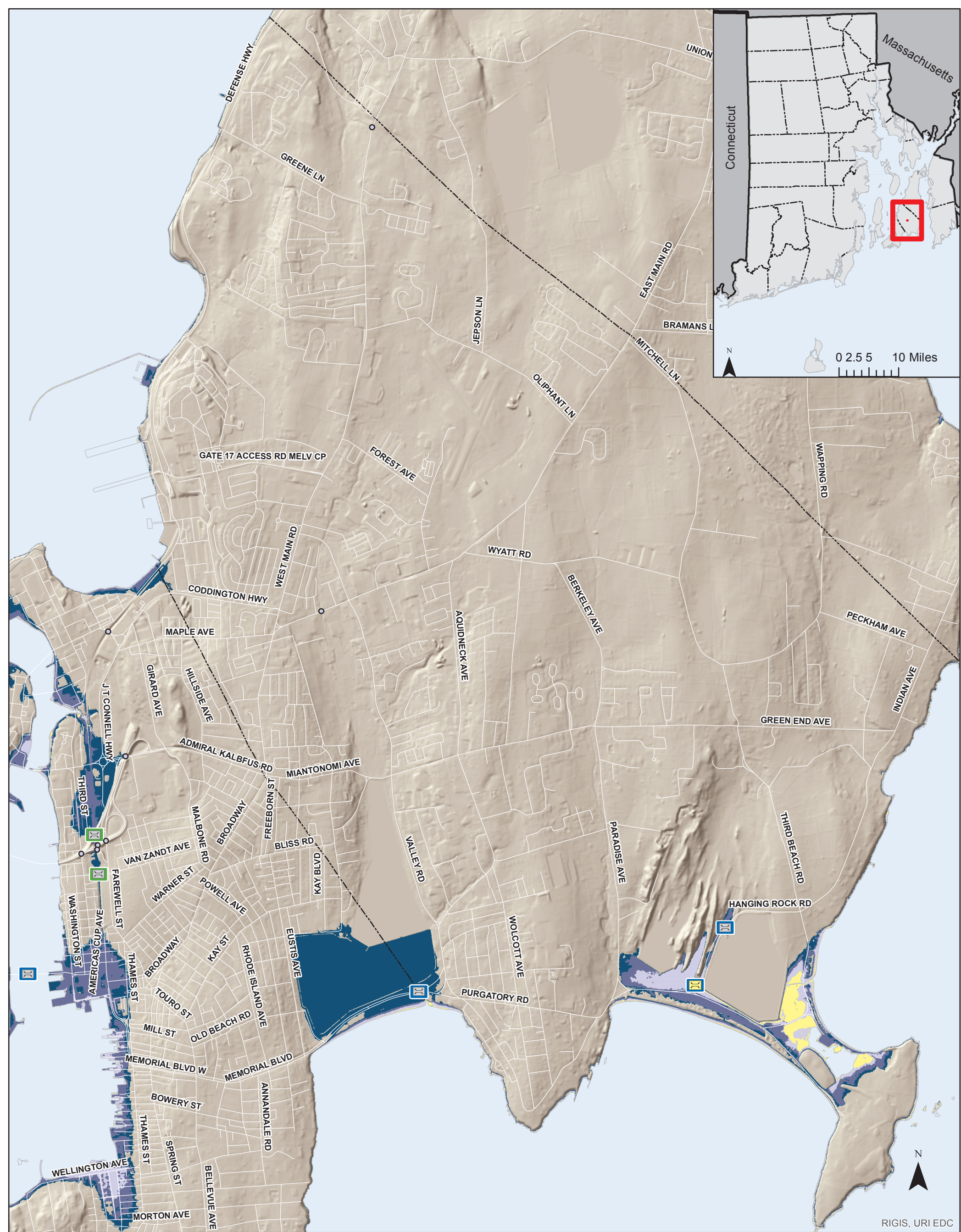


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Relative Road Vulnerability to Sea Level Rise

		Middletown	Linear Feet of Road Inundated At:										
Muni Rank	State Rank	Road Name	1 Foot of SLR	3 Feet of SLR	5 Feet of SLR	7 Feet of SLR	Total Linear Feet	Hazard Score	Evacuation Route	Intermodal Facility	Functional Classification	System Score	Vulnerability Score
1	58	THIRD BEACH RD	13	2,722	1,694	99	4,528	4.91	No	No	Local	0.60	5.51
2	70	PURGATORY RD				608	608	1.50	Yes	Yes	Principal Art.	3.93	5.43
3	91	HANGING ROCK RD	7	417	2,814	1,324	4,562	4.07	No	No	Major Coll.	1.06	5.14
4	103	SACHUEST POINT RD			3,402	740	4,142	4.37	No	No	Local	0.60	4.97
5	112	AQUIDNECK AVE				100	100	1.50	Yes	No	Principal Art.	3.40	4.90
6	756	ANDERSEN AVE		3		3	7	1.50	No	No	Local	0.60	2.10
7	757	DEFENSE HWY				44	44	1.50	No	No	Local	0.60	2.10
8	758	WAVE AVE				551	551	1.50	No	No	Local	0.60	2.10
		TOTAL LINEAR FEET	20	3,142	7,910	3,469	14,542						



# Sea Level Rise Scenarios Affecting Bridges

Town of Middletown

Map Created: 8/4/2016

## Map Legend

### NOTES:

The Sea Level Rise (SLR) Inundation modified bathtub model does not take into consideration future erosion or storm surge.

Includes Hillshade from USGS 2011 LiDAR

- |  |                                |                          |
|--|--------------------------------|--------------------------|
| Freeboard Potentially Affected by SLR    | Current Mean Higher High Water | City and Town Boundaries |
| Freeboard Unlikely to be Affected by SLR | 1Ft Sea Level Rise             | Roads                    |
| Not Exposed to SLR                       | 3Ft Sea Level Rise             |                          |
| Bridge Accessible                        | 5Ft Sea Level Rise             |                          |
| Possible Bridge Access Problem           | 7Ft Sea Level Rise             |                          |

0 0.25 0.5 1 Miles

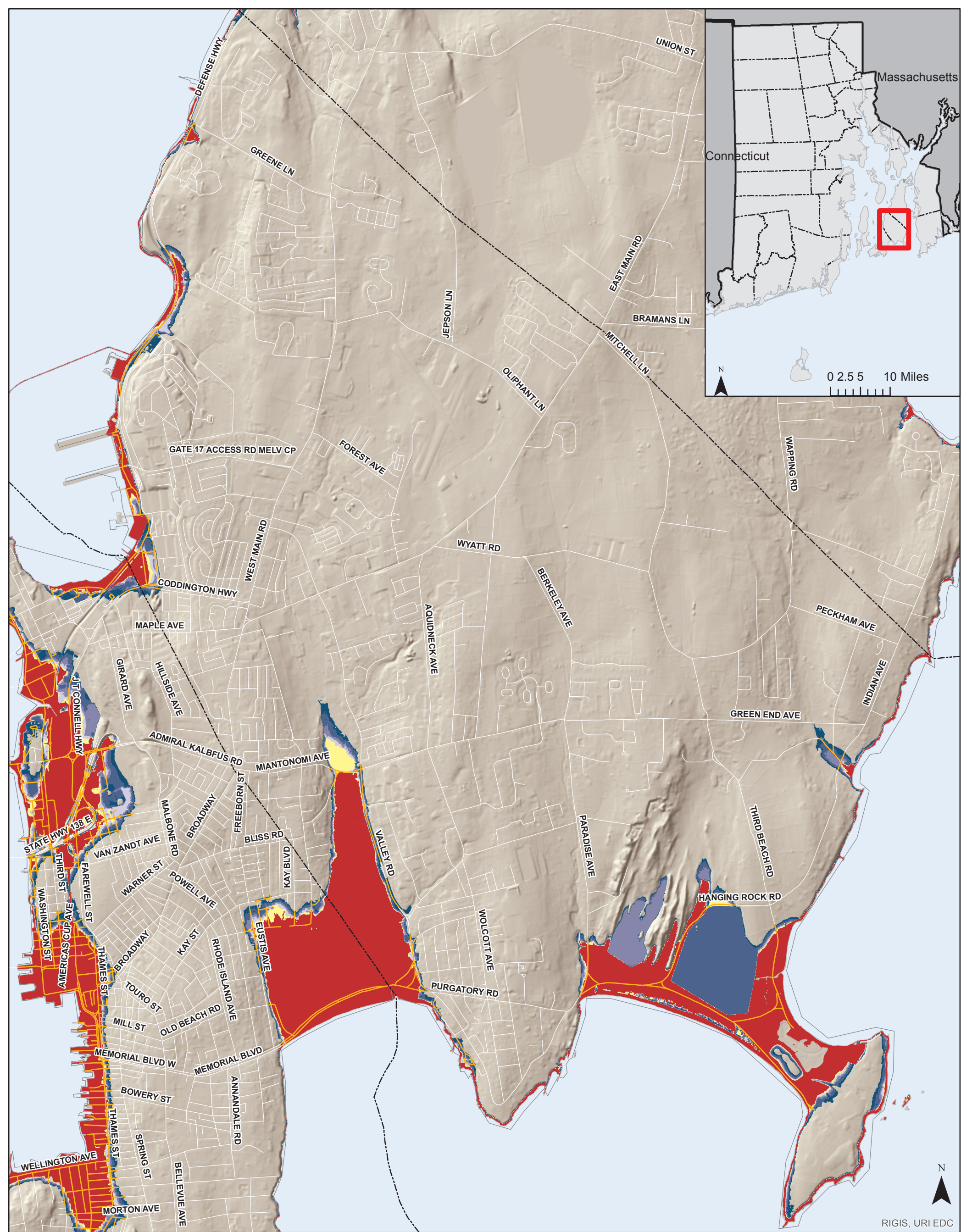


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Bridges Possibly Affected by Sea Level Rise in the Town of Middletown

Mun. Rank	State Rank	Bridge Name	Facility Carried	Feature Intersected	Inches of Freeboard Relative to 7ftSLR	Terrain Crossed	Landing Access	Haz. Score	Intermodal Facility	Evacuation Route	AADT	Sys. Score	Vuln. Score
1	5	Easton Beach	RI 138 MEMORIAL BD	EASTON POND CHANNEL	18	Water	Problem	3.30	Yes	Yes	18,000	5.00	8.30
2	54	Hanging Rock Road 1	HANGING ROCK ROAD	MAIDFORD R	-72	Water	Problem	4.50	No	No	1,500	1.50	6.00
3	62	Hanging Rock Road 2	HANGING ROCK ROAD	NO NAME BROOK	8	Water	Problem	4.10	No	No	1,500	1.50	5.60



# 100 Year Storm Surge Event Plus Sea Level Rise Scenarios Affecting Roads

Town of Middletown











Map Created: 8/4/2016

## Map Legend

### NOTES:

The Sea Level Rise (SLR) Inundation modified bathtub model does not take into consideration future erosion or storm surge.

Includes Hillshade from USGS 2011 LiDAR

- |   |  |   |                            |
|---|--|---|----------------------------|
|  | Current Ponds & Mean Higher High Water |  | City and Town Boundaries   |
|  | 100-Year Storm Event                   |  | Potentially Affected Roads |
|  | 100-Year Plus 1 ft. of SLR             |  | Roads                      |
|  | 100-Year Plus 2 ft. of SLR             |   |                            |
|  | 100-Year Plus 3 ft. of SLR             |   |                            |
|  | 100-Year Plus 5 ft. of SLR             |   |                            |
|  | 100-Year Plus 7 ft. of SLR             |   |                            |

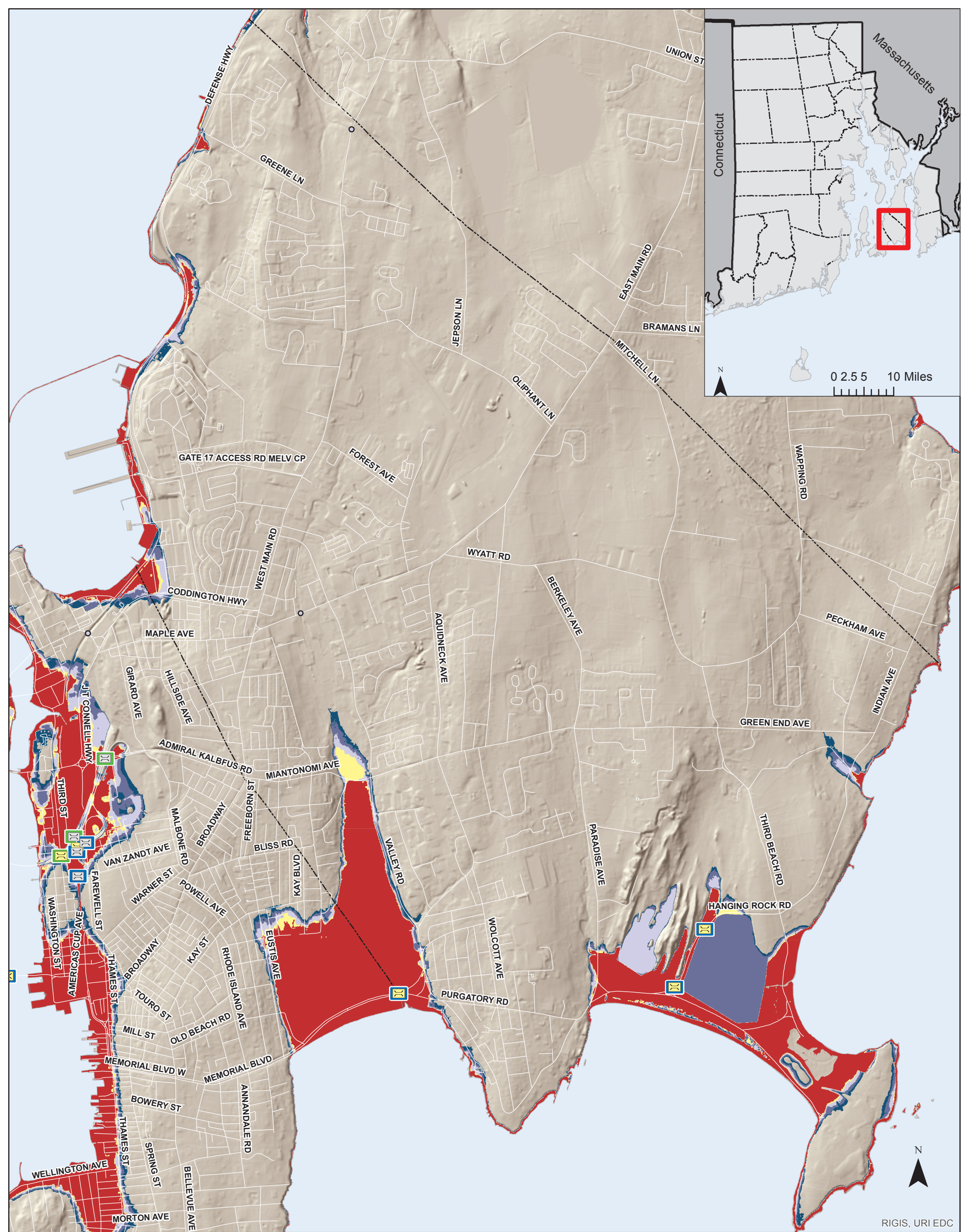
0 0.25 0.5 1 Miles



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Relative Road Vulnerability to 100-Year Storm Surge Event Plus Sea Level Rise														
Middletown			Linear Feet Inundated During 100 Year Surge Event Plus:											
Muni. Rank	State Rank	NAME	No SLR	1 Foot of SLR	3 Feet of SLR	5 Feet of SLR	7 Feet of SLR	Total Linear Feet	Haz. Score	Evac. Route	Intermodal Facility	Functional Classification	Sys. Score	Vulnerability Score
1	37	AQUIDNECK AVE	699	414	283	73	66	1,536	4.34	Yes	No	Principal Art.	3.40	7.74
2	61	PURGATORY RD	861	30	70	70	66	1,096	4.30	No	No	Minor Art.	2.98	7.29
3	186	HANGING ROCK RD	5,656	705	66	33	30	6,489	4.93	No	No	Major Coll.	1.10	6.03
4	226	PARADISE AVE	1,293	492	169	88	76	2,117	4.55	No	No	Major Coll.	1.23	5.78
5	252	DEFENSE HWY	1,412	504	2,085	1,707	951	6,659	3.78	No	Yes	Major Coll.	1.85	5.63
6	1,077	WAVE AVE	793	51				843	4.91	No	No	Local	0.60	5.51
7	1,078	SACHUEST POINT RD	5,246	78	76	33	0	5,434	4.91	No	No	Local	0.60	5.51
8	1,079	UNNAMED_46	843	56				899	4.91	No	No	Local	0.60	5.51
9	1,096	THIRD BEACH RD	4,666	37	58	51	41	4,852	4.88	No	No	Local	0.60	5.48
10	1,116	CODDINGTON HWY			149	301	104	554	2.04	No	Yes	Principal Art.	3.40	5.44
11	1,191	VALLEY RD			501	1,078	1,980	3,559	3.50	No	No	Minor Art.	1.80	5.30
12	1,236	UNNAMED_19	2,136	36	131	121		2,424	4.61	No	No	Local	0.60	5.21
13	1,281	GREEN END AVE	175	611	388	154	130	1,457	3.71	No	No	Major Coll.	1.44	5.15
14	1,369	UNNAMED_48			1,201	89	96	1,387	4.37	No	No	Local	0.60	4.97
15	1,440	UNNAMED_49	883	25	132	96		1,136	4.26	No	No	Local	0.60	4.86
16	2,004	UNNAMED_36	68	23	237			329	3.43	No	No	Local	0.60	4.03
17	2,072	UNNAMED_30	106	14	27	27	30	204	3.31	No	No	Local	0.60	3.91
18	2,074	CRESCENT RD	313	56	62	51	186	669	3.31	No	No	Local	0.60	3.91
19	2,175	UNNAMED_18	80	20	33	34	31	197	3.12	No	No	Local	0.60	3.72
20	2,210	UNNAMED_40			251	26	49	327	3.04	No	No	Local	0.60	3.64
21	2,273	HUNT ST				720	334	1,054	2.87	No	No	Local	0.60	3.47
22	2,329	INDIAN AVE			152	206	136	495	2.12	No	No	Major Coll.	1.20	3.32
23	2,337	MIANTONOMI AVE		14	93	36	28	172	1.50	No	No	Minor Art.	1.80	3.30
24	2,468	BRIARWOOD AVE	47	16	26	26	23	139	2.41	No	No	Local	0.60	3.01
25	2,552	ANDERSEN AVE	46	46	69	63	70	295	2.13	No	No	Local	0.60	2.73
26	2,567	GREENE LN					58	58	1.50	No	No	Major Coll.	1.20	2.70
27	2,648	VAUCLUSE AVE			118	294	108	520	1.95	No	No	Local	0.60	2.55
28	2,654	SHORE DR			330	372	773	1,474	1.95	No	No	Local	0.60	2.55
29	2,708	NEWPORT AVE		44	142	87	60	333	1.77	No	No	Local	0.60	2.37
30	2,904	ESPLANADE				397	144	541	1.50	No	No	Local	0.60	2.10
31	2,905	HOWLAND AVE				405	197	602	1.50	No	No	Local	0.60	2.10
32	2,906	PORTER ST			69	74	51	194	1.50	No	No	Local	0.60	2.10
33	2,907	UNNAMED_24				52	71	123	1.50	No	No	Local	0.60	2.10
34	2,908	UNNAMED_33					74	74	1.50	No	No	Local	0.60	2.10
35	2,909	UNNAMED_47					14	14	1.50	No	No	Local	0.60	2.10
36	3,288	CHANDLER ST				10	138	148	1.50	No	No	Local	0.60	2.10
37	3,289	JOHNNY CAKE HILL RD			81	33	27	140	1.50	No	No	Local	0.60	2.10
38	3,290	UNNAMED_37			24	16	13	54	1.50	No	No	Local	0.60	2.10
Total Linear Feet			25,323	3,273	6,998	6,807	6,143	48,544						



# 100 Year Storm Surge Event Plus Sea Level Rise Scenarios Affecting Bridges

Town of Middletown

Map Created: 8/4/2016

## Map Legend

### NOTES:

The Sea Level Rise (SLR) inundation modified bathtub model does not take into consideration future erosion or storm surge.

Includes Hillshade from USGS 2011 LiDAR

- |  |                            |                          |
|--|----------------------------|--------------------------|
| Freeboard Potentially Affected by Surge    | 100-Year Storm Event       | City and Town Boundaries |
| Freeboard Unlikely to be Affected by Surge | 100-Year Plus 1 ft. of SLR | Roads                    |
| Not Exposed to Surge                       | 100-Year Plus 3 ft. of SLR |                          |
| Bridge Accessible                          | 100-Year Plus 5 ft. of SLR |                          |
| Possible Bridge Access Problem             | 100-Year Plus 7 ft. of SLR |                          |

0 0.225 0.45 0.9 Miles

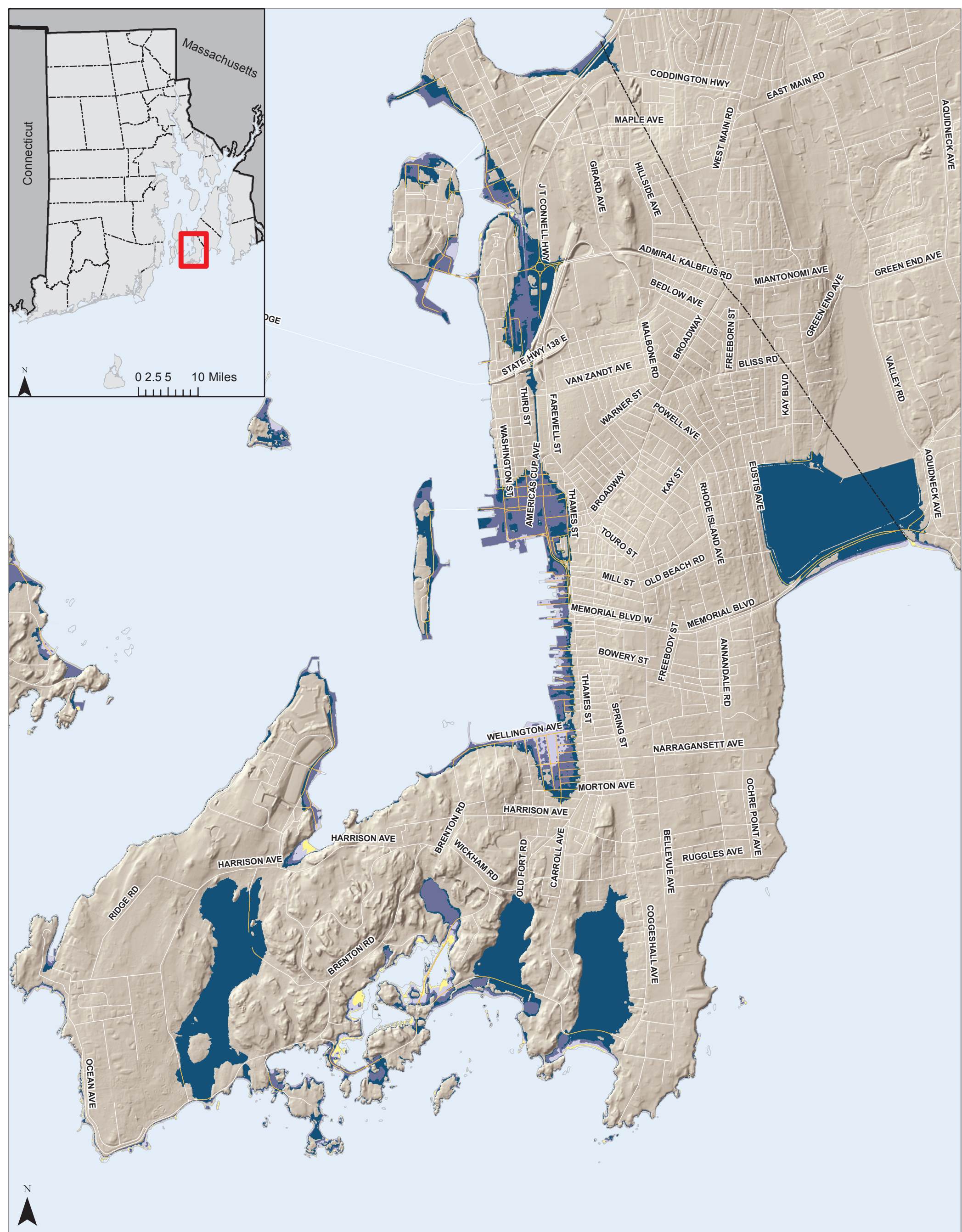


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Relative Bridge Vulnerability to 100-Year Storm Surge Event Plus Sea Level Rise in the Town of Middletown

Mun. Rank	State Rank	Bridge Name	Facility Carried	Feature Intersected	Inches of Freeboard Relative to 7FtSLR	Terrain Crossed	Landing Access	Haz. Score	Intermodal Facility	Evac. Route	AADT	Sys. Score	Vuln. Score
1	4	Easton Beach	RI 138 MEMORIAL BD	EASTON POND CHANNEL	-115	Water	Problem	4.50	Yes	Yes	18,000	5.00	9.50
2	109	Hanging Rock Road 1	HANGING ROCK ROAD	MAIDFORD R	-204	Water	Problem	4.50	No	No	1,500	0.60	5.10
3	110	Hanging Rock Road 2	HANGING ROCK ROAD	NO NAME BROOK	-125	Water	Problem	4.50	No	No	1,500	0.60	5.10



# Sea Level Rise Scenarios Affecting Roads

City of Newport

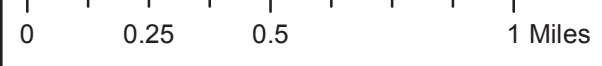
Map Created: 8/4/2016

## Map Legend

NOTES:  
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Includes Hillshade from USGS 2011 LiDAR

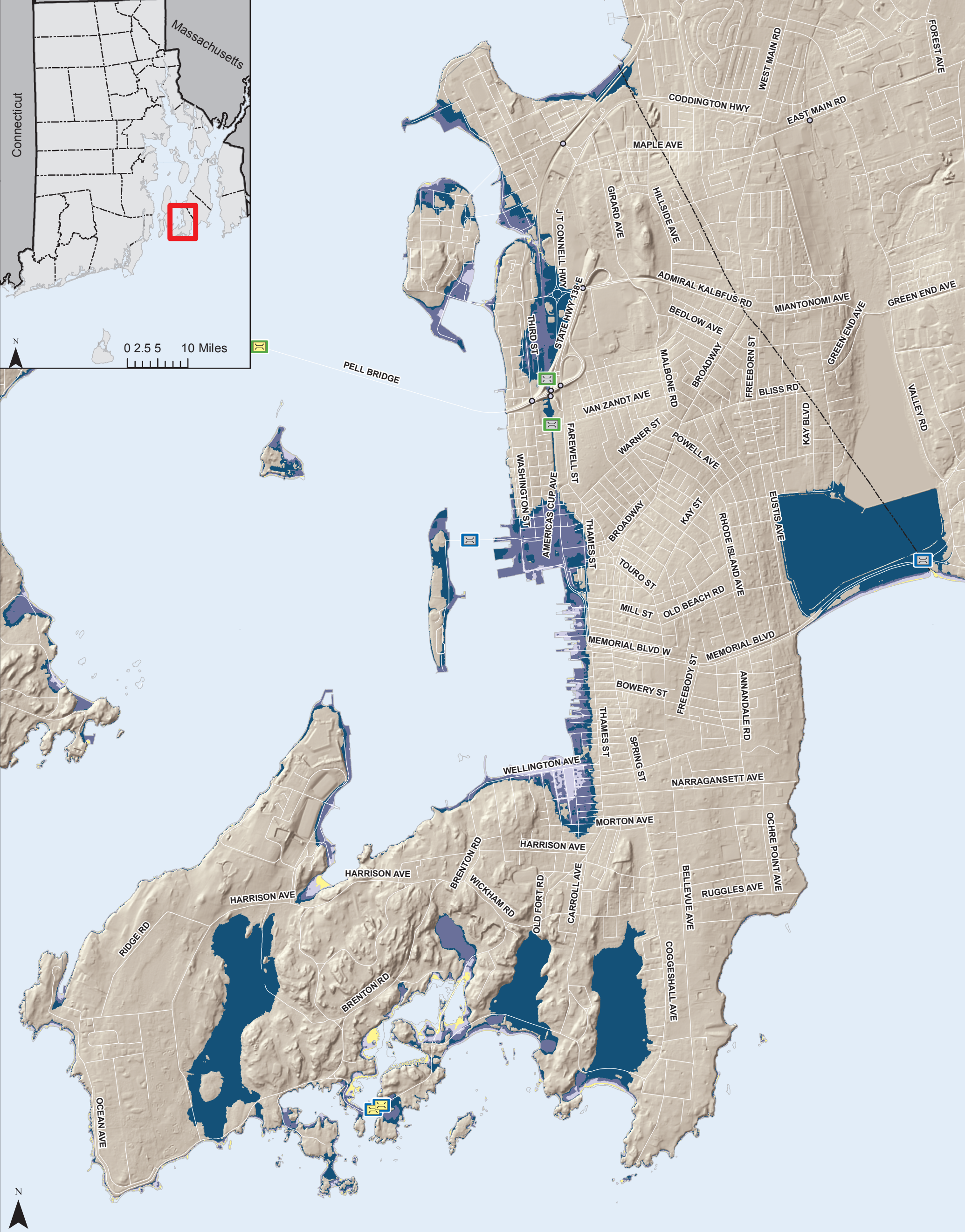
- Current Mean Higher High Water
- 1Ft Sea Level Rise
- 3Ft Sea Level Rise
- 5Ft Sea Level Rise
- 7Ft Sea Level Rise
- City and Town Boundaries
- Potentially Affected Roads
- Roads



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Relative Road Vulnerability to Sea Level Rise													
Newport			Linear Feet of Road Inundated At:										
Muni Rank	State Rank	Road Name	1 Foot of SLR	3 Feet of SLR	5 Feet of SLR	7 Feet of SLR	Total Linear Feet	Hazard Score	Evacuation Route	Intermodal Facility	Functional Classification	System Score	Vulnerability Score
1	2	MEMORIAL BLVD				5,426	5,426	4.97	No	Yes	Principal Art.	3.38	8.35
2	11	AMERICAS CUP AVE		18	2,594	2,718	5,330	3.42	No	Yes	Principal Art.	3.96	7.38
3	16	WEST MARLBOROUGH ST			513		513	3.50	No	Yes	Principal Art.	3.40	6.90
4	18	OCEAN AVE	25	348	1,890	3,338	5,601	4.55	Yes	No	Major Coll.	2.16	6.72
5	29	STATE HWY 138 W			10	64	74	1.50	Yes	Yes	Freeways	4.70	6.20
6	57	WELLINGTON AVE		1,377	1,135	656	3,167	3.74	No	No	Minor Art.	1.80	5.54
7	82	ON RAMP RI-138 W				484	484	1.50	Yes	Yes	Freeways	3.70	5.20
8	83	OFF RAMP RI-238				30	30	1.50	No	Yes	Freeways	3.70	5.20
9	84	STATE HWY 138 E				22	22	1.50	No	Yes	Freeways	3.70	5.20
10	101	CLINTON ST		1,086	229		1,315	4.39	No	No	Local	0.60	4.99
11	118	MARLBOROUGH ST			69	62	131	1.50	No	Yes	Principal Art.	3.40	4.90
12	121	THIRD ST	7	10	2,208	764	2,989	2.98	No	Yes	Minor Coll.	1.85	4.83
13	122	LONG WHARF		938	272		1,211	4.21	No	No	Local	0.60	4.81
14	125	GOAT ISLAND CONN	3	7	1,762	82	1,853	3.25	No	No	Major Coll.	1.55	4.80
15	127	SECOND ST			652	122	774	3.18	No	Yes	Local	1.60	4.78
16	135	J T CONNELL HWY			26	2,460	2,486	2.55	No	Yes	Major Coll.	2.10	4.64
17	138	HAZARD RD	1,219	786	244	87	2,336	4.00	No	No	Local	0.60	4.60
18	140	ADMIRAL KALBFUS RD			140	1,811	1,951	1.50	Yes	Yes	Minor Art.	3.05	4.55
19	162	FORT ADAMS DR			1,573	906	2,479	3.72	No	No	Local	0.60	4.32
20	167	TOURO ST			40	66	106	1.50	No	Yes	Minor Art.	2.80	4.30
21	168	WASHINGTON SQ			30	103	134	1.50	No	Yes	Minor Art.	2.80	4.30
22	177	PELL BRIDGE	4	7	3	7	21	1.50	No	No	Freeways	2.70	4.20
23	194	MARSH ST			511		511	3.50	No	No	Local	0.60	4.10
24	195	MOORLAND RD				1,278	1,278	3.50	No	No	Local	0.60	4.10
25	238	TRAINING STATION RD	59	49	1,007	66	1,181	3.30	No	No	Local	0.60	3.90
26	247	THAMES ST			645	1,435	2,079	1.50	No	No	Minor Art.	2.38	3.88
27	258	BRIDGE ST			1,133	112	1,244	3.07	No	No	Local	0.73	3.79
28	267	MARCHANT ST		662	734	286	1,682	3.16	No	No	Local	0.60	3.76
29	274	ELLIOT ST			788	182	970	3.13	No	No	Local	0.60	3.73
30	289	GOAT IS			318	1,234	1,552	3.09	No	No	Local	0.60	3.69
31	302	PERRY RD	7	649	1,420	711	2,787	2.98	No	No	Local	0.60	3.58
32	313	ELM ST		9	1,035	389	1,433	2.95	No	No	Local	0.60	3.55
33	338	POPLAR ST	3	20	537	254	813	2.82	No	No	Local	0.60	3.42
34	356	PERRY MILL WHARF		300	138	59	497	2.71	No	No	Local	0.60	3.31
35	363	BOWENS WHARF		614	369	41	1,024	2.70	No	No	Local	0.60	3.30
36	375	COMMERCIAL WHARF		413	220	82	716	2.66	No	No	Local	0.60	3.26
37	376	HOUSTON AVE		752	329	229	1,310	2.65	No	No	Local	0.60	3.25
38	390	SIMMONS ST		257	138	82	477	2.58	No	No	Local	0.60	3.18
39	394	BOSS CT		109	96		205	2.57	No	No	Local	0.60	3.17
40	418	PEARY ST				908	908	1.50	No	Yes	Local	1.60	3.10
41	445	GRAFTON ST		201	201	66	468	2.36	No	No	Local	0.60	2.96
42	450	WEST NARRAGANSETT AVE		443	474	128	1,045	2.35	No	No	Local	0.60	2.95
43	465	ROSENEATH AVE		146	156	83	385	2.26	No	No	Local	0.60	2.86
44	470	MONROE RD	4	108	112	71	295	2.23	No	No	Local	0.60	2.83
45	477	WASHINGTON ST		241	794	254	1,288	1.87	No	No	Minor Coll.	0.86	2.74
46	496	MARINA PLZ	3	3	3	72	82	1.50	No	No	Major Coll.	1.20	2.70
47	497	OLD BEACH RD				931	931	1.50	No	No	Major Coll.	1.20	2.70
48	498	VAN ZANDT AVE				43	43	1.50	No	No	Major Coll.	1.20	2.70
49	521	UNNAMED_172		135	404		539	2.00	No	No	Local	0.60	2.60
50	524	WEST EXTENSION ST		112	321	46	479	1.97	No	No	Local	0.60	2.57
51	554	UNNAMED_12			473	331	804	1.50	No	No	Local	0.60	2.10
52	834	AMERICA				39	39	1.50	No	No	Local	0.60	2.10
53	835	ATLANTIC ST				470	470	1.50	No	No	Local	0.60	2.10
54	836	AVENUE J				18	18	1.50	No	No	Local	0.60	2.10
55	837	BANNISTERS WHARF			345	51	396	1.50	No	No	Local	0.60	2.10
56	838	BIELLO RD	3	10	179	33	226	1.50	No	No	Local	0.60	2.10
57	839	BLISS MINE RD				197	197	1.50	No	No	Local	0.60	2.10
58	840	BROWN AND HOWARD WHARF		74	72	95	242	1.50	No	No	Local	0.60	2.10
59	841	CAPELLA ST S				51	51	1.50	No	No	Local	0.60	2.10
60	842	CHASTELLUX AVE				42	42	1.50	No	No	Local	0.60	2.10
61	843	CHRISTIES LNDG			325	102	428	1.50	No	No	Local	0.60	2.10
62	844	CODDINGTON ST				44	44	1.50	No	No	Local	0.60	2.10
63	845	CODDINGTON WHARF		32	312	85	430	1.50	No	No	Local	0.60	2.10
64	846	COLUMBUS AVE			22	40	62	1.50	No	No	Local	0.60	2.10
65	847	CONNECTION ST			349	452	801	1.50	No	No	Local	0.60	2.10
66	848	COPODANNO DR				167	167	1.50	No	No	Local	0.60	2.10
67	849	COTTON CT				18	18	1.50	No	No	Local	0.60	2.10
68	850	COURT ST				55	55	1.50	No	No	Local	0.60	2.10
69	851	CUSHING RD			279	295	575	1.50	No	No	Local	0.60	2.10
70	852	DONOVAN AVE				826	826	1.50	No	No	Local	0.60	2.10

Muni Rank	State Rank	Road Name	1 Foot of SLR	3 Feet of SLR	5 Feet of SLR	7 Feet of SLR	Total Linear Feet	Hazard Score	Evacuation Route	Intermodal Facility	Functional Classification	System Score	Vulnerability Score
71	853	DORSEY RD				95	95	1.50	No	No	Local	0.60	2.10
72	854	DUKE ST				321	321	1.50	No	No	Local	0.60	2.10
73	855	DYERS GATE			215		215	1.50	No	No	Local	0.60	2.10
74	856	EASTON ST			160	168	328	1.50	No	No	Local	0.60	2.10
75	857	ELLERY RD				600	600	1.50	No	No	Local	0.60	2.10
76	858	GODDARD ROW			10	166	176	1.50	No	No	Local	0.60	2.10
77	859	GOODWIN ST			160	109	268	1.50	No	No	Local	0.60	2.10
78	860	HAMPSHIRE RD				19	19	1.50	No	No	Local	0.60	2.10
79	861	HARRINGTON ST			150	102	252	1.50	No	No	Local	0.60	2.10
80	862	HARRISON AVE				412	412	1.50	No	No	Local	0.60	2.10
81	863	HOPKINS AVE			63	24	87	1.50	No	No	Local	0.60	2.10
82	864	JACKSON RD				62	62	1.50	No	No	Local	0.60	2.10
83	865	KAY BLVD				48	48	1.50	No	No	Local	0.60	2.10
84	866	KIRWINS FIFTH WARD LN			283		283	1.50	No	No	Local	0.60	2.10
85	867	LEDGE RD				0	0	1.50	No	No	Local	0.60	2.10
86	868	LEES WHARF			160	128	288	1.50	No	No	Local	0.60	2.10
87	869	LONG WHARF MALL			323	195	518	1.50	No	No	Local	0.60	2.10
88	870	LUCAS AVE			346	132	478	1.50	No	No	Local	0.60	2.10
89	871	LUCE AVE			453	48	501	1.50	No	No	Local	0.60	2.10
90	872	MARKET SQ				42	42	1.50	No	No	Local	0.60	2.10
91	873	MARY ST				43	43	1.50	No	No	Local	0.60	2.10
92	874	MAYBERRY CT				74	74	1.50	No	No	Local	0.60	2.10
93	875	MEYERKORD AVE			94	162	256	1.50	No	No	Local	0.60	2.10
94	876	MUNGER RD			33	92	125	1.50	No	No	Local	0.60	2.10
95	877	NORTH BAPTIST ST				13	13	1.50	No	No	Local	0.60	2.10
96	878	POTTER ST			323	178	500	1.50	No	No	Local	0.60	2.10
97	879	PRICES NCK			216	381	597	1.50	No	No	Local	0.60	2.10
98	880	ROCHAMBEAU ST				83	83	1.50	No	No	Local	0.60	2.10
99	881	ROLLING GREEN RD				325	325	1.50	No	No	Local	0.60	2.10
100	882	ROSSITER RD				52	52	1.50	No	No	Local	0.60	2.10
101	883	SCOTT WHARF		9	182	38	228	1.50	No	No	Local	0.60	2.10
102	884	SHARON CT				128	128	1.50	No	No	Local	0.60	2.10
103	885	SMITH RD			53	92	145	1.50	No	No	Local	0.60	2.10
104	886	SPRING WHARF			139	85	224	1.50	No	No	Local	0.60	2.10
105	887	STATE HWY 138A				114	114	1.50	No	No	Local	0.60	2.10
106	888	STODDARD CT			102		102	1.50	No	No	Local	0.60	2.10
107	889	SWANS WHARF ROW			337		337	1.50	No	No	Local	0.60	2.10
108	890	SWINBURNE ROW				68	68	1.50	No	No	Local	0.60	2.10
109	891	TAYLOR CT			194	108	302	1.50	No	No	Local	0.60	2.10
110	892	TAYLOR RD			452	187	639	1.50	No	No	Local	0.60	2.10
111	893	TOURO CT				37	37	1.50	No	No	Local	0.60	2.10
112	894	UNNAMED_10			370	325	695	1.50	No	No	Local	0.60	2.10
113	895	UNNAMED_11				103	103	1.50	No	No	Local	0.60	2.10
114	896	UNNAMED_154			430		430	1.50	No	No	Local	0.60	2.10
115	897	UNNAMED_155			21		21	1.50	No	No	Local	0.60	2.10
116	898	UNNAMED_163			84	62	146	1.50	No	No	Local	0.60	2.10
117	899	UNNAMED_23				122	122	1.50	No	No	Local	0.60	2.10
118	900	UNNAMED_4			135	118	253	1.50	No	No	Local	0.60	2.10
119	901	UNNAMED_7				71	71	1.50	No	No	Local	0.60	2.10
120	902	UTILITY RD			335	621	956	1.50	No	No	Local	0.60	2.10
121	903	VAUGHN ST				51	51	1.50	No	No	Local	0.60	2.10
122	904	WEST HOWARD ST			304	89	393	1.50	No	No	Local	0.60	2.10
123	905	WHIPPLE ST				381	381	1.50	No	No	Local	0.60	2.10
124	906	WILLOW ST		6	20	64	89	1.50	No	No	Local	0.60	2.10
125	1,358	BARSCHOW ST			175	912	1,087	1.50	No	No	Local	0.60	2.10
126	1,359	CHASE ST			83	157	240	1.50	No	No	Local	0.60	2.10
127	1,360	COZZENS CT			33	152	186	1.50	No	No	Local	0.60	2.10
128	1,361	DEFENDERS ROW			405	800	1,205	1.50	No	No	Local	0.60	2.10
129	1,362	FITZSIMMONS RD			210	615	825	1.50	No	No	Local	0.60	2.10
130	1,363	HARBORVIEW CT		70	90	50	210	1.50	No	No	Local	0.60	2.10
131	1,364	SAYERS WHARF		87	52	30	170	1.50	No	No	Local	0.60	2.10
132	1,365	STOCKHOLM ST			410	95	506	1.50	No	No	Local	0.60	2.10
133	1,366	UNNAMED_156			80	79	159	1.50	No	No	Local	0.60	2.10
134	1,367	WAITES WHARF			296	217	513	1.50	No	No	Local	0.60	2.10
135	1,368	WEENACHASETT ST	10	20	190	736	956	1.50	No	No	Local	0.60	2.10
		TOTAL LINEAR FEET	1,348	10,109	35,803	42,440	89,700						



# Sea Level Rise Scenarios Affecting Bridges

Map Created: 8/4/2016

## City of Newport

**Map Legend**

NOTES:  
 The Sea Level Rise (SLR) Inundation modified bathtub model does not take into consideration future erosion or storm surge.

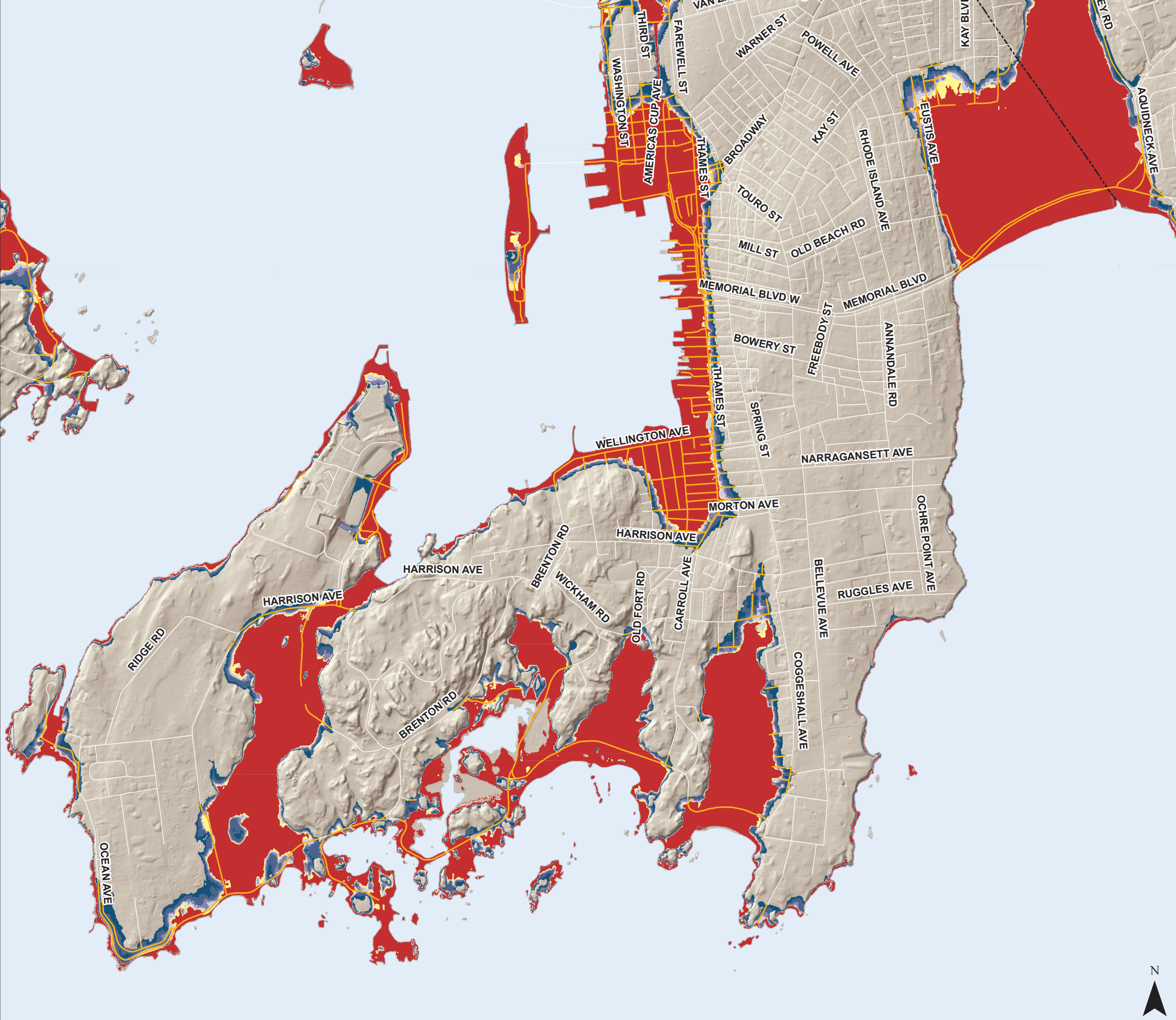
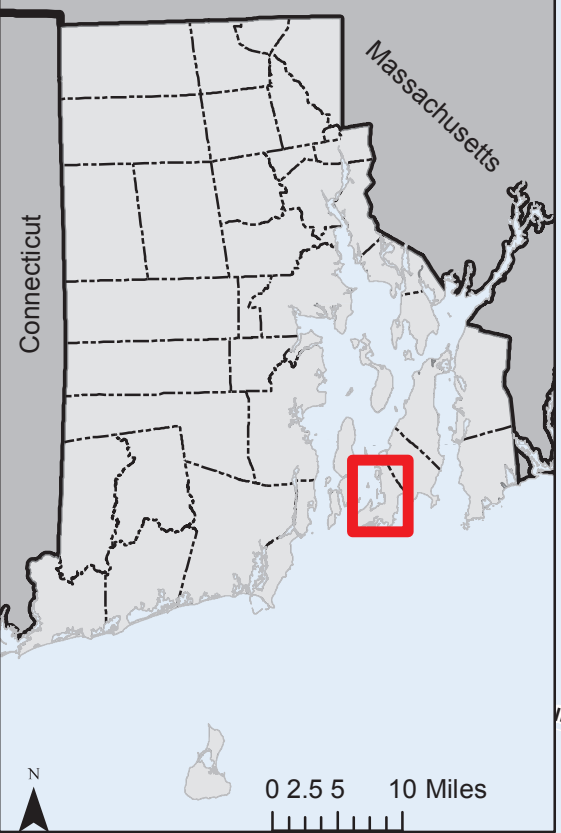
Includes Hillshade from USGS 2011 LiDAR

- Freeboard Potentially Affected by SLR
- Freeboard Unlikely to be Affected by SLR
- Not Exposed to SLR
- Bridge Accessible
- Possible Bridge Access Problem
- Current Mean Higher High Water
- 1Ft Sea Level Rise
- 3Ft Sea Level Rise
- 5Ft Sea Level Rise
- 7Ft Sea Level Rise
- City and Town Boundaries
- Roads

0 0.25 0.5 1 Miles

Map Disclaimer: This map is not the product of a Professional Land Survey. It was created by RI Statewide Planning Program for general reference, informational, planning and guidance use, and is not a legally authoritative source as to location of natural or manmade features. Proper interpretation of this map may require the assistance of appropriate professional services. RI Statewide Planning Program makes no warranty, express or implied, related to the spatial accuracy, reliability, completeness, or currentness of this map.

Bridges Possibly Affected by Sea Level Rise in the Town of Newport													
Mun. Rank	State Rank	Bridge Name	Facility Carried	Feature Intersected	Inches of Freeboard Relative to 7FtSLR	Terrain Crossed	Landing Access	Haz. Score	Intermodal Facility	Evacuation Route	AADT	Sys. Score	Vulnerability Score
1	26	Ocean Avenue Anna1	OCEAN AVENUE	GOOSE NECK COVE	-3	Water	Problem	4.50	No	Yes	2,000	2.50	7.00
2	27	Ocean Avenue Anna2	OCEAN AVENUE	GOOSE NECK COVE	-55	Water	Problem	4.50	No	Yes	2,000	2.50	7.00
3	77	Goat Island Causeway	GOAT ISL CAUSEWAY	NEWPORT HARBOR	108	MHHW	Problem	3.00	No	No	1,919	1.50	4.50



# 100 Year Storm Surge Event Plus Sea Level Rise Scenarios Affecting Roads

City of Newport

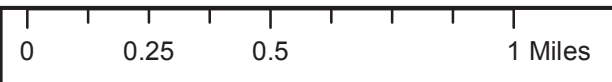
Map Created: 8/4/2016

**Map Legend**

NOTES:  
The Sea Level Rise (SLR) Inundation modified bathtub model does not take into consideration future erosion or storm surge.

Includes Hillshade from USGS 2011 LiDAR

- Current Ponds & Mean Higher High Water
- 100-Year Storm Event
- 100-Year Plus 1 ft. of SLR
- 100-Year Plus 2 ft. of SLR
- 100-Year Plus 3 ft. of SLR
- 100-Year Plus 5 ft. of SLR
- 100-Year Plus 7 ft. of SLR
- City and Town Boundaries
- Potentially Affected Roads
- Roads



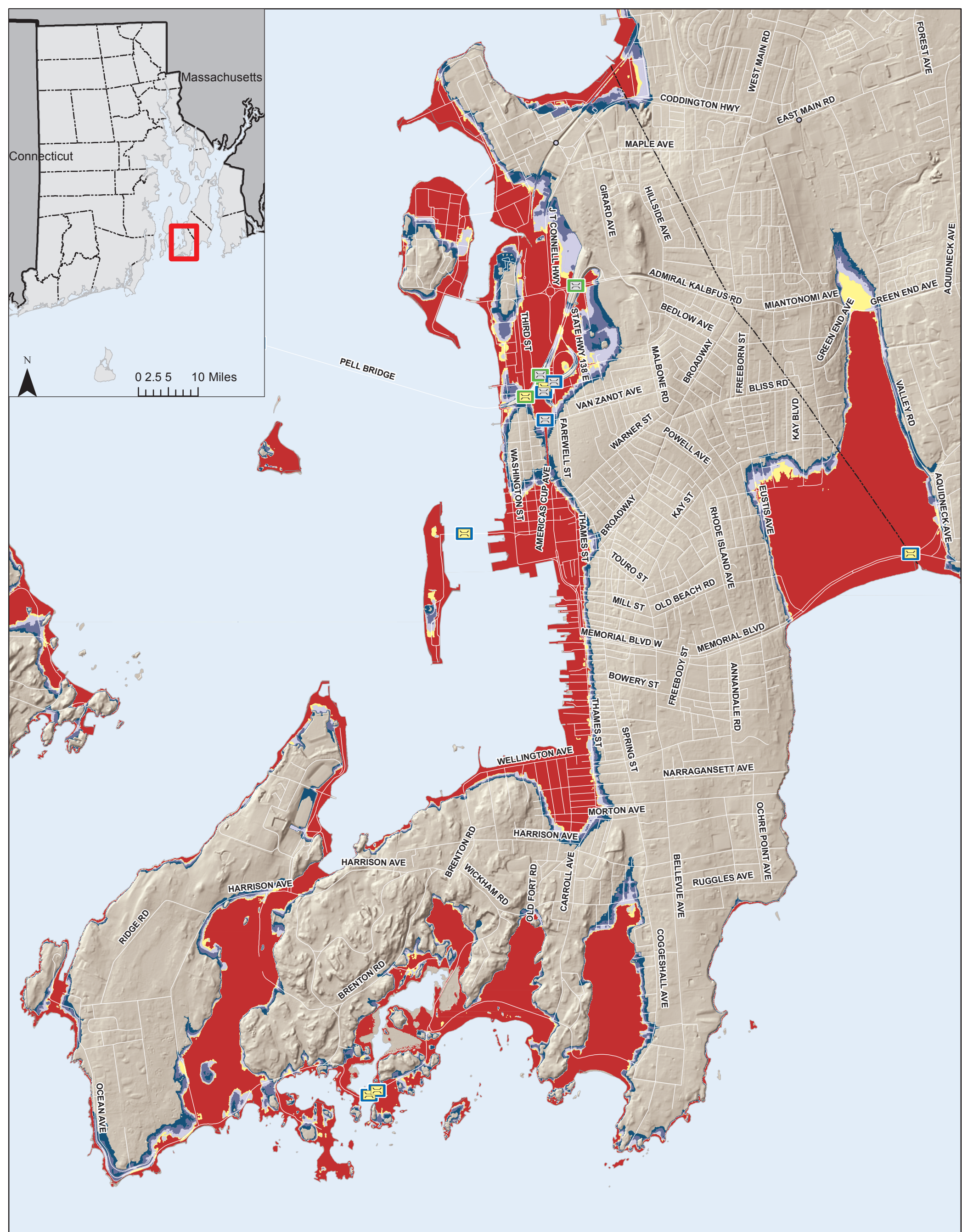
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Relative Road Vulnerability to 100-Year Storm Surge Event Plus Sea Level Rise														
Newport			Linear Feet Inundated During 100 Year Surge Event Plus:											
Muni. Rank	State Rank	NAME	No SLR	1 Foot of SLR	3 Feet of SLR	5 Feet of SLR	7 Feet of SLR	Total Linear Feet	Haz. Score	Evac. Route	Intermodal Facility	Functional Classification	Sys. Score	Vulnerability Score
1	3	AMERICAS CUP AVE	6,219	26	47	47	86	6,426	4.90	Yes	Yes	Principal Art.	4.04	8.93
2	4	ON RAMP RI-138 W	1,647	217	151	131	114	2,259	4.39	Yes	Yes	Freeways	4.39	8.78
3	12	WEST MARLBOROUGH ST	513					513	5.00	No	Yes	Principal Art.	3.40	8.40
4	16	MEMORIAL BLVD	6,460	49	93	77	66	6,746	4.87	No	Yes	Principal Art.	3.44	8.31
5	32	CONNELL HWY	1,170	451	392	92	83	2,188	4.30	Yes	Yes	Principal Art.	3.65	7.95
6	33	ADMIRAL KALBFUS RD	2,847	131	178	148	143	3,447	4.47	No	Yes	Minor Art.	3.35	7.82
7	45	J T CONNELL HWY	3,206	158	286	185	142	3,977	4.60	Yes	Yes	Major Coll.	2.96	7.56
8	60	STATE HWY 138 E	601	519	415	322	402	2,258	3.60	No	Yes	Freeways	3.70	7.30
9	95	OCEAN AVE	9,686	1,648	2,980	3,033	1,001	18,347	4.71	Yes	No	Major Coll.	2.06	6.77
10	105	WELLINGTON AVE	3,453	76	105	22		3,656	4.85	No	No	Minor Art.	1.80	6.65
11	107	THAMES ST	6,105	918	929	93	83	8,127	4.75	No	No	Minor Art.	1.88	6.63
12	108	OFF RAMP RI-238	124	49	52	89	62	376	2.92	No	Yes	Freeways	3.70	6.62
13	120	GOAT ISLAND CONN	1,853					1,853	5.00	No	No	Major Coll.	1.55	6.55
14	126	MARLBOROUGH ST	248	34	80	69	161	593	3.08	No	Yes	Principal Art.	3.40	6.48
15	130	WASHINGTON SQ	291	33	63	60	58	506	3.64	No	Yes	Minor Art.	2.80	6.44
16	142	STATE HWY 138 W	443	335	848	584	284	2,494	3.21	Yes	Yes	Minor Art.	3.11	6.32
17	151	TOURO ST	205	26	50	56	53	390	3.48	No	Yes	Minor Art.	2.80	6.28
18	163	MARINA PLZ	99					99	5.00	No	No	Major Coll.	1.20	6.20
19	167	PELL BRIDGE	22					22	3.50	No	No	Freeways	2.70	6.20
20	190	THIRD ST	4,139	172	490	467	834	6,101	4.02	No	Yes	Minor Coll.	1.97	6.00
21	195	MEMORIAL BLVD W	21	65	76	82	76	320	2.04	Yes	Yes	Principal Art.	3.91	5.95
22	198	OLD BEACH RD	1,133	20	23	27	23	1,227	4.77	No	No	Major Coll.	1.17	5.93
23	216	EUSTIS AVE	340	233	380	623	300	1,875	3.64	Yes	No	Major Coll.	2.20	5.84
24	235	BRIDGE ST	1,259					1,259	5.00	No	No	Local	0.73	5.73
25	551	BANNISTERS WHARF	396					396	5.00	No	No	Local	0.60	5.60
26	552	BOSS CT	205					205	5.00	No	No	Local	0.60	5.60
27	553	BOWENS WHARF	1,024					1,024	5.00	No	No	Local	0.60	5.60
28	554	BROWN AND HOWARD WHARF	385					385	5.00	No	No	Local	0.60	5.60
29	555	CHARLES ST	813					813	5.00	No	No	Local	0.60	5.60
30	556	CHASE ST	240					240	5.00	No	No	Local	0.60	5.60
31	557	CHRISTIES LNDG	500					500	5.00	No	No	Local	0.60	5.60
32	558	CLINTON ST	1,315					1,315	5.00	No	No	Local	0.60	5.60
33	559	COMMERCIAL WHARF	716					716	5.00	No	No	Local	0.60	5.60
34	560	COURT ST	264					264	5.00	No	No	Local	0.60	5.60
35	561	COZZENS CT	186					186	5.00	No	No	Local	0.60	5.60
36	562	DEFENDERS ROW	1,582					1,582	5.00	No	No	Local	0.60	5.60
37	563	DONOVAN AVE	1,312					1,312	5.00	No	No	Local	0.60	5.60
38	564	DORSEY RD	246					246	5.00	No	No	Local	0.60	5.60
39	565	DUKE ST	321					321	5.00	No	No	Local	0.60	5.60
40	566	DYERS GATE	215					215	5.00	No	No	Local	0.60	5.60
41	567	ELM ST	1,461					1,461	5.00	No	No	Local	0.60	5.60
42	568	GOAT IS	1,576					1,576	5.00	No	No	Local	0.60	5.60
43	569	GODDARD ROW	398					398	5.00	No	No	Local	0.60	5.60
44	570	GOODWIN ST	375					375	5.00	No	No	Local	0.60	5.60
45	571	HARRINGTON ST	374					374	5.00	No	No	Local	0.60	5.60
46	572	KIRWINS FIFTH WARD LN	283					283	5.00	No	No	Local	0.60	5.60
47	573	LEES WHARF	414					414	5.00	No	No	Local	0.60	5.60
48	574	LONG WHARF	1,211					1,211	5.00	No	No	Local	0.60	5.60
49	575	LONG WHARF MALL	518					518	5.00	No	No	Local	0.60	5.60
50	576	LUCAS AVE	594					594	5.00	No	No	Local	0.60	5.60
51	577	MARSH ST	511					511	5.00	No	No	Local	0.60	5.60
52	578	MAYBERRY CT	243					243	5.00	No	No	Local	0.60	5.60
53	579	POTTER ST	595					595	5.00	No	No	Local	0.60	5.60
54	580	ROLLING GREEN RD	1,349					1,349	5.00	No	No	Local	0.60	5.60
55	581	ROSSITER RD	352	109				460	5.00	No	No	Local	0.60	5.60
56	582	SAYERS WHARF	170					170	5.00	No	No	Local	0.60	5.60
57	583	SCOTT WHARF	228					228	5.00	No	No	Local	0.60	5.60
58	584	SMITH RD	782	264				1,046	5.00	No	No	Local	0.60	5.60
59	585	STATE HWY 138A	170					170	5.00	No	No	Local	0.60	5.60
60	586	STOCKHOLM ST	595					595	5.00	No	No	Local	0.60	5.60
61	587	STODDARD CT	102					102	5.00	No	No	Local	0.60	5.60
62	588	SWANS WHARF ROW	337					337	5.00	No	No	Local	0.60	5.60
63	589	SWINBURNE ROW	379					379	5.00	No	No	Local	0.60	5.60
64	590	TAYLOR CT	423					423	5.00	No	No	Local	0.60	5.60
65	591	TAYLOR RD	1,093					1,093	5.00	No	No	Local	0.60	5.60
66	592	TOURO CT	81					81	5.00	No	No	Local	0.60	5.60
67	593	UNNAMED_10	922					922	5.00	No	No	Local	0.60	5.60
68	594	UNNAMED_11	182					182	5.00	No	No	Local	0.60	5.60
69	595	UNNAMED_12	804					804	5.00	No	No	Local	0.60	5.60
70	596	UNNAMED_154	430					430	5.00	No	No	Local	0.60	5.60
71	597	UNNAMED_172	539					539	5.00	No	No	Local	0.60	5.60

Muni. Rank	State Rank	NAME	No SLR	1 Foot of SLR	3 Feet of SLR	5 Feet of SLR	7 Feet of SLR	Total Linear Feet	Haz. Score	Evac. Route	Intermodal Facility	Functional Classification	Sys. Score	Vulnerability Score
72	598	UNNAMED_23	217					217	5.00	No	No	Local	0.60	5.60
73	599	UNNAMED_6	163	175				337	5.00	No	No	Local	0.60	5.60
74	600	UNNAMED_7	442					442	5.00	No	No	Local	0.60	5.60
75	601	UNNAMED_9	662					662	5.00	No	No	Local	0.60	5.60
76	602	UTILITY RD	956					956	5.00	No	No	Local	0.60	5.60
77	603	WAITES WHARF	621					621	5.00	No	No	Local	0.60	5.60
78	604	WEENACHASETT ST	1,361					1,361	5.00	No	No	Local	0.60	5.60
79	605	WEST EXTENSION ST	564					564	5.00	No	No	Local	0.60	5.60
80	606	WEST HOWARD ST	483					483	5.00	No	No	Local	0.60	5.60
81	1,033	PERRY MILL WHARF	621	6				627	4.97	No	No	Local	0.60	5.57
82	1,048	MUNGER RD	286	5				291	4.94	No	No	Local	0.60	5.54
83	1,059	GRAFTON ST	579	29				608	4.93	No	No	Local	0.60	5.53
84	1,071	CODDINGTON WHARF	532	13				544	4.92	No	No	Local	0.60	5.52
85	1,086	SPRING WHARF	289	22				312	4.89	No	No	Local	0.60	5.49
86	1,090	WEST NARRAGANSETT AVE	1,254	23	32			1,309	4.89	No	No	Local	0.60	5.49
87	1,097	KNIGHT RD	1,071	13	25			1,109	4.88	No	No	Local	0.60	5.48
88	1,100	SIMMONS ST	579	26	11			616	4.87	No	No	Local	0.60	5.47
89	1,114	CROSS ST	448	54				502	4.84	No	No	Local	0.60	5.44
90	1,115	PERRY RD	3,598	78	210			3,886	4.84	No	No	Local	0.60	5.44
91	1,142	UNNAMED_4	431	399	55			884	4.78	No	No	Local	0.60	5.38
92	1,149	MARCHANT ST	1,876	30	53	49	20	2,028	4.77	No	No	Local	0.60	5.37
93	1,150	UNNAMED_156	281	30	9			319	4.77	No	No	Local	0.60	5.37
94	1,152	HAZARD RD	2,458	31	100	33	32	2,654	4.76	No	No	Local	0.60	5.36
95	1,154	CHERRY CREEK RD	725	302	141	10		1,178	4.76	No	No	Local	0.60	5.36
96	1,171	HOUSTON AVE	1,504	46	95	17		1,663	4.72	No	No	Local	0.60	5.32
97	1,182	BARSCHOW ST	1,219	18	37	37	31	1,341	4.71	No	No	Local	0.60	5.31
98	1,218	PRICES NCK	1,337	152	257	41	34	1,821	4.64	No	No	Local	0.60	5.24
99	1,226	SECOND ST	972	53	212	150	201	1,588	3.71	No	Yes	Local	1.52	5.23
100	1,228	MOORLAND RD	1,756	190	168	69	72	2,255	4.63	No	No	Local	0.60	5.23
101	1,231	POPLAR ST	1,400	36	53	56	49	1,594	4.62	No	No	Local	0.60	5.22
102	1,237	EASTON ST	662	83	52			798	4.61	No	No	Local	0.60	5.21
103	1,238	ELLERY RD	1,370	50	60	47	48	1,574	4.61	No	No	Local	0.60	5.21
104	1,240	TRAINING STATION RD	1,260	20	43	52	57	1,431	4.61	No	No	Local	0.60	5.21
105	1,261	ATLANTIC ST	741	26	89	6		862	4.57	No	No	Local	0.60	5.17
106	1,268	CONNECTION ST	1,083	38	46	46	49	1,263	4.56	No	No	Local	0.60	5.16
107	1,287	FITZSIMMONS RD	1,368	49	89	96	9	1,611	4.53	No	No	Local	0.60	5.13
108	1,303	MADISON CT	76	26	4			106	4.50	No	No	Local	0.60	5.10
109	1,305	AMERICA	385	140	266			792	4.50	No	No	Local	0.60	5.10
110	1,328	FORT ADAMS DR	2,966	106	170	209	204	3,656	4.44	No	No	Local	0.60	5.04
111	1,374	PEARY ST	1,057	44	82	74	69	1,325	4.36	No	No	Local	0.60	4.96
112	1,376	SHARON CT	198	16	40			254	4.35	No	No	Local	0.60	4.95
113	1,414	CODDINGTON HWY				227	387	613	1.50	No	Yes	Principal Art.	3.40	4.90
114	1,425	WHIPPLE ST	1,252	58	131	80	96	1,617	4.28	No	No	Local	0.60	4.88
115	1,437	HARRISON AVE	1,541	501	521	810	1,472	4,846	3.39	No	No	Minor Coll.	1.48	4.87
116	1,446	LUCE AVE	571	16	51	50	49	738	4.25	No	No	Local	0.60	4.85
117	1,448	ELLIOT ST	1,963	47	171	162	187	2,530	4.25	No	No	Local	0.60	4.85
118	1,449	COTTON CT	100	23	21			144	4.25	No	No	Local	0.60	4.85
119	1,494	PATRICK	185	128	94			407	4.19	No	No	Local	0.60	4.79
120	1,495	WASHINGTON ST	2,015	138	223	305	838	3,519	3.77	No	No	Minor Coll.	1.02	4.79
121	1,508	BIELLO RD	272	13	43	29		358	4.16	No	No	Local	0.60	4.76
122	1,521	NARRAGANSETT AVE	25	23	49	56	62	216	1.95	Yes	No	Minor Art.	2.80	4.75
123	1,529	MONROE RD	389	26	40	42	39	536	4.14	No	No	Local	0.60	4.74
124	1,549	MEYERKORD AVE	849	140	134	105	102	1,329	4.10	No	No	Local	0.60	4.70
125	1,620	HARBORVIEW CT	272	17	33	34	39	395	4.00	No	No	Local	0.60	4.60
126	1,642	EASTNOR RD	358	112	250	93	56	869	3.97	No	No	Local	0.60	4.57
127	1,703	DANIEL ST	288	99	121			508	3.87	No	No	Local	0.60	4.47
128	1,706	UNNAMED_163	205	16	30	31	35	317	3.86	No	No	Local	0.60	4.46
129	1,730	WILLOW ST	536	115	178	152		981	3.82	No	No	Local	0.60	4.42
130	1,746	HALSEY ST	174	333	223	126	71	928	3.80	No	No	Local	0.60	4.40
131	1,755	RUGGLES AVE			346	370	290	1,006	2.19	Yes	No	Major Coll.	2.20	4.39
132	1,759	CUSHING RD	702	33	62	174	135	1,106	3.78	No	No	Local	0.60	4.38
133	1,779	HOPKINS AVE	132	9	21	21	23	206	3.74	No	No	Local	0.60	4.34
134	1,785	NORTH HALSEY ST	501	123	335	266	53	1,277	3.73	No	No	Local	0.60	4.33
135	1,796	JACKSON RD	174	13	28	29	29	274	3.72	No	No	Local	0.60	4.32
136	1,800	COPODANNO DR	639	51	132	113	121	1,055	3.71	No	No	Local	0.60	4.31
137	1,801	UNNAMED_24	100	25	56			180	3.71	No	No	Local	0.60	4.31
138	1,807	COLUMBUS AVE	121	17	27	23	20	208	3.70	No	No	Local	0.60	4.30
139	1,842	RIGGS RD	214	426	205	294	40	1,179	3.65	No	No	Local	0.60	4.25
140	1,863	BLISS MINE RD	361	39	89	72	75	637	3.61	No	No	Local	0.60	4.21
141	1,870	CODDINGTON ST	183	22	28	49	44	327	3.60	No	No	Local	0.60	4.20
142	1,876	BUTLER ST	233	31	58	51	44	417	3.60	No	No	Local	0.60	4.20
143	1,898	NORTH BAPTIST ST	125	20	36	28	24	233	3.54	No	No	Local	0.60	4.14
144	1,920	AVENUE J	147	22	33	37	39	278	3.51	No	No	Local	0.60	4.11

Muni. Rank	State Rank	NAME	No SLR	1 Foot of SLR	3 Feet of SLR	5 Feet of SLR	7 Feet of SLR	Total Linear Feet	Haz. Score	Evac. Route	Intermodal Facility	Functional Classification	Sys. Score	Vulnerability Score
145	1,954	MARKET SQ	42					42	3.50	No	No	Local	0.60	4.10
146	1,955	UNNAMED_155	21					21	3.50	No	No	Local	0.60	4.10
147	1,956	UNNAMED_8		36	485			521	3.50	No	No	Local	0.60	4.10
148	1,965	MILL ST	61	17	33	30	36	177	2.89	No	No	Major Coll.	1.20	4.09
149	1,966	BELL RD	64	104	227	128		524	3.49	No	No	Local	0.60	4.09
150	1,982	GARFIELD ST	450	102	166	139	126	984	3.47	No	No	Local	0.60	4.07
151	2,006	UNNAMED_5		9	249			258	3.43	No	No	Local	0.60	4.03
152	2,021	HAMPSHIRE RD	555	3	75	380		1,014	3.42	No	No	Local	0.60	4.02
153	2,043	UNNAMED_20	125	38	58	29	25	275	3.37	No	No	Local	0.60	3.97
154	2,060	UNNAMED_1	354	66	90	72	167	748	3.33	No	No	Local	0.60	3.93
155	2,062	CHASTELLUX AVE	116	21	41	41	26	245	3.33	No	No	Local	0.60	3.93
156	2,079	ROSENEATH AVE	518	54	132	146	218	1,068	3.30	No	No	Local	0.60	3.90
157	2,083	KAY BLVD	189	26	49	62	72	399	3.29	No	No	Local	0.60	3.89
158	2,091	HOMER ST		201	322	92	86	701	3.28	No	No	Local	0.60	3.88
159	2,096	SYCAMORE ST	205	43	73	87	171	579	2.89	No	No	Local	0.99	3.87
160	2,110	PRESCOTT HALL RD	185	71	83	60	51	450	3.26	No	No	Local	0.60	3.86
161	2,115	COLONIAL ST		9	217			226	3.24	No	No	Local	0.60	3.84
162	2,129	MARY ST	109	20	37	49	33	248	3.20	No	No	Local	0.60	3.80
163	2,134	ROCHAMBEAU ST	204	25	76	58	87	451	3.20	No	No	Local	0.60	3.80
164	2,145	VAN ZANDT AVE	180	53	99	154	189	674	2.59	No	No	Major Coll.	1.20	3.79
165	2,147	CYPRESS ST	258	103	135	184	69	750	3.19	No	No	Local	0.60	3.79
166	2,155	DYERS GATE ST	62	74	83			219	3.16	No	No	Local	0.60	3.76
167	2,164	LONG LANE CT	54	20	30	35		137	3.15	No	No	Local	0.60	3.75
168	2,172	GREENLAW BLVD		13	159			172	3.12	No	No	Local	0.60	3.72
169	2,186	CASTLE HILL AVE					53	53	1.50	Yes	No	Major Coll.	2.20	3.70
170	2,189	STATE HWY 138	364	97	243	405		1,109	3.09	No	No	Local	0.60	3.69
171	2,194	CHURCH ST	72	20	33	26	33	184	3.09	No	No	Local	0.60	3.69
172	2,202	SAMPSON	101	126	122	89	69	508	3.07	No	No	Local	0.60	3.67
173	2,265	QUEEN ANNE SQ	60	16	30	36	33	176	2.89	No	No	Local	0.60	3.49
174	2,274	WEBSTER ST	139	56	99	79	66	439	2.87	No	No	Local	0.60	3.47
175	2,282	BRENTON POINT PARKING	19	47	325	1,188	652	2,231	2.85	No	No	Local	0.60	3.45
176	2,298	ABORN ST	212	63	107	151	134	667	2.80	No	No	Local	0.60	3.40
177	2,303	VAUGHN ST	127	22	51	65	116	380	2.78	No	No	Local	0.60	3.38
178	2,304	DAUSER CIR	132	46	61	196		435	2.78	No	No	Local	0.60	3.38
179	2,322	SOUTHMAYD ST	282	79	161	266	146	934	2.73	No	No	Local	0.60	3.33
180	2,340	HALIDON AVE				15	31	46	1.50	No	No	Minor Art.	1.80	3.30
181	2,341	MORTON AVE				160	175	334	1.50	No	No	Minor Art.	1.80	3.30
182	2,349	CARROLL AVE			181	554	253	988	1.80	No	No	Major Coll.	1.50	3.30
183	2,352	FRANKLIN ST	54	20	40	37	40	191	2.70	No	No	Local	0.60	3.30
184	2,356	MURRAY PL	54	23	40	43	38	198	2.68	No	No	Local	0.60	3.28
185	2,397	YOUNG ST	28	23	49	59	46	205	2.00	No	No	Major Coll.	1.20	3.20
186	2,407	CLOYNE CT			297	156	105	557	2.56	No	No	Local	0.60	3.16
187	2,408	CAPELLA ST S	135	24	135	194		488	2.56	No	No	Local	0.60	3.16
188	2,463	CAREY ST	66	46	79	76	86	353	2.42	No	No	Local	0.60	3.02
189	2,478	ELLA TER	48	31	31	28	44	182	2.37	No	No	Local	0.60	2.97
190	2,480	UNNAMED_25	39	29	203	99	98	468	2.36	No	No	Local	0.60	2.96
191	2,492	PROSPECT HILL ST	49	20	33	33	33	168	2.32	No	No	Local	0.60	2.92
192	2,501	FAREWELL ST					367	367	1.50	No	No	Minor Coll.	1.39	2.89
193	2,519	BAYSIDE AVE	89	79	118	148	203	638	2.24	No	No	Local	0.60	2.84
194	2,543	HOWARD ST	48	23	49	49	46	215	2.16	No	No	Local	0.60	2.76
195	2,546	MAHER CT	56	14	71	53	109	304	2.15	No	No	Local	0.60	2.75
196	2,547	BRENTON RD			189	128	273	590	2.14	No	No	Minor Coll.	0.60	2.74
197	2,559	DENNISON ST	37	20	49	36	46	188	2.11	No	No	Local	0.60	2.71
198	2,560	PELHAM ST	22	20	33	30	33	138	2.10	No	No	Minor Coll.	0.60	2.70
199	2,571	KAY ST					386	386	1.50	No	No	Major Coll.	1.20	2.70
200	2,572	OLD FORT RD					122	122	1.50	No	No	Major Coll.	1.20	2.70
201	2,593	DEAN AVE	31	16	33	36	46	162	2.08	No	No	Local	0.60	2.68
202	2,598	MCCORMICK RD		2	300	275	364	942	2.07	No	No	Local	0.60	2.67
203	2,600	ANN ST	37	20	46	53	46	201	2.06	No	No	Local	0.60	2.66
204	2,607	CHERRY ST	24	13	10	13	30	90	2.04	No	No	Local	0.60	2.64
205	2,608	GIDLEY ST	9	46	23	46	46	170	2.04	No	No	Local	0.60	2.64
206	2,613	SOUTH BAPTIST ST	18	23	36	39	36	152	2.03	No	No	Local	0.60	2.63
207	2,619	BREWER ST	23	23	39	43	49	178	2.02	No	No	Local	0.60	2.62
208	2,629	HOLLAND ST	17	20	36	33	39	145	2.00	No	No	Local	0.60	2.60
209	2,643	GREEN ST	17	20	37	40	43	157	1.97	No	No	Local	0.60	2.57
210	2,674	BRAMAN ST	26	20	53	69	63	231	1.90	No	No	Local	0.60	2.50
211	2,689	UNDERWOOD CT		21	33	26	43	123	1.85	No	No	Local	0.60	2.45
212	2,691	UNNAMED_3	27	13	30	43	46	158	1.84	No	No	Local	0.60	2.44
213	2,693	RIVER LN	32	30	158	67	83	370	1.84	No	No	Local	0.60	2.44
214	2,694	FAIR ST		29	49	46	53	177	1.83	No	No	Local	0.60	2.43
215	2,695	MILBURN CT	11	20	56	46	53	185	1.83	No	No	Local	0.60	2.43
216	2,701	PINE ST	20	10	26	30	46	132	1.80	No	No	Local	0.60	2.40
217	2,702	DEARBORN ST		21	39	43	36	139	1.80	No	No	Local	0.60	2.40

Muni. Rank	State Rank	NAME	No SLR	1 Foot of SLR	3 Feet of SLR	5 Feet of SLR	7 Feet of SLR	Total Linear Feet	Haz. Score	Evac. Route	Intermodal Facility	Functional Classification	Sys. Score	Vulnerability Score
218	2,704	POPE ST		27	51	57	53	188	1.79	No	No	Local	0.60	2.39
219	2,712	HAMMOND ST		21	49	43	56	169	1.75	No	No	Local	0.60	2.35
220	2,716	EXTENSION ST	10	20	46	46	43	164	1.74	No	No	Local	0.60	2.34
221	2,717	LEDGE RD	9	47	148	100	91	395	1.74	No	No	Local	0.60	2.34
222	2,728	COGGESHALL AVE				162	416	578	1.50	No	No	Minor Coll.	0.76	2.26
223	2,747	ATLANTIC AVE			17	77	56	150	1.50	No	No	Local	0.60	2.10
224	2,962	ALMY CT			30	46	56	132	1.50	No	No	Local	0.60	2.10
225	2,963	ALPOND DR					142	142	1.50	No	No	Local	0.60	2.10
226	2,964	BATEMAN AVE					139	139	1.50	No	No	Local	0.60	2.10
227	2,965	BATTERY ST					55	55	1.50	No	No	Local	0.60	2.10
228	2,966	BIRCKHEAD PL				22	171	194	1.50	No	No	Local	0.60	2.10
229	2,967	BRANDT ST					77	77	1.50	No	No	Local	0.60	2.10
230	2,968	CHAMPLIN PL					87	87	1.50	No	No	Local	0.60	2.10
231	2,969	CHAMPLIN PL N					282	282	1.50	No	No	Local	0.60	2.10
232	2,970	CHAMPLIN ST				62	30	91	1.50	No	No	Local	0.60	2.10
233	2,971	CHESTNUT ST					47	47	1.50	No	No	Local	0.60	2.10
234	2,972	COURTHOUSE SQUARE					12	12	1.50	No	No	Local	0.60	2.10
235	2,973	DIXON ST			67	66	60	193	1.50	No	No	Local	0.60	2.10
236	2,974	EARL AVE					43	43	1.50	No	No	Local	0.60	2.10
237	2,975	ENTERPRISE CT					508	508	1.50	No	No	Local	0.60	2.10
238	2,976	EVARTS ST					89	89	1.50	No	No	Local	0.60	2.10
239	2,977	FRIENDS DR				261	123	383	1.50	No	No	Local	0.60	2.10
240	2,978	GEORGE ST			46	192	41	279	1.50	No	No	Local	0.60	2.10
241	2,979	GILLIES CT					23	23	1.50	No	No	Local	0.60	2.10
242	2,980	GOOSE NECK COVE LN				27	116	144	1.50	No	No	Local	0.60	2.10
243	2,981	GREENLAUGH BLVD			34	177		212	1.50	No	No	Local	0.60	2.10
244	2,982	HACKER ST					42	42	1.50	No	No	Local	0.60	2.10
245	2,983	HOLTEN AVE					59	59	1.50	No	No	Local	0.60	2.10
246	2,984	KATZMAN PL					269	269	1.50	No	No	Local	0.60	2.10
247	2,985	KERINS TER					213	213	1.50	No	No	Local	0.60	2.10
248	2,986	KEY CT			22	110	100	232	1.50	No	No	Local	0.60	2.10
249	2,987	LASALLE PL				86	119	205	1.50	No	No	Local	0.60	2.10
250	2,988	MAITLAND CT			84	87	54	224	1.50	No	No	Local	0.60	2.10
251	2,989	MARION ST					4	4	1.50	No	No	Local	0.60	2.10
252	2,990	MCALLISTER ST			60	63	69	193	1.50	No	No	Local	0.60	2.10
253	2,991	MEETING ST			30	261	63	354	1.50	No	No	Local	0.60	2.10
254	2,992	RECREATIONAL DR					64	64	1.50	No	No	Local	0.60	2.10
255	2,993	RECREATIONAL LN				138	23	161	1.50	No	No	Local	0.60	2.10
256	2,994	RELIANCE ROW				174	198	372	1.50	No	No	Local	0.60	2.10
257	2,995	RESOLUTE RD					900	900	1.50	No	No	Local	0.60	2.10
258	2,996	ROVENSKY AVE					119	119	1.50	No	No	Local	0.60	2.10
259	2,997	SUNSHINE CT					93	93	1.50	No	No	Local	0.60	2.10
260	2,998	TOPPA BLVD					75	75	1.50	No	No	Local	0.60	2.10
261	2,999	UNNAMED_22			13	87	43	142	1.50	No	No	Local	0.60	2.10
262	3,000	VANDERBILT AVE				5	158	163	1.50	No	No	Local	0.60	2.10
263	3,001	WALNUT ST		13	145	195	293	646	1.50	No	No	Local	0.60	2.10
264	3,002	WEATHERLY AVE					185	185	1.50	No	No	Local	0.60	2.10
265	3,314	ANDREW ST			162	290		452	1.50	No	No	Local	0.60	2.10
266	3,315	CASEY CT		5	56	66	89	217	1.50	No	No	Local	0.60	2.10
267	3,316	HAMMET PL				171	54	225	1.50	No	No	Local	0.60	2.10
268	3,317	LEE AVE			2	69	56	127	1.50	No	No	Local	0.60	2.10
269	3,318	LINCOLN DR				115	408	523	1.50	No	No	Local	0.60	2.10
270	3,319	SANFORD ST		15	33	30	33	110	1.50	No	No	Local	0.60	2.10
271	3,320	UNNAMED_15			11	152	44	207	1.50	No	No	Local	0.60	2.10
272	3,321	VAUGHAN AVE				120	130	250	1.50	No	No	Local	0.60	2.10
273	3,322	WHEATLAND CT			134	69		202	1.50	No	No	Local	0.60	2.10
		Total Linear Feet	140,074	13,042	21,661	21,682	22,305	218,764						



# 100 Year Storm Surge Event Plus Sea Level Rise Scenarios Affecting Bridges

Town of Newport

Map Created: 8/4/2016

## Map Legend

### NOTES:

The Sea Level Rise (SLR) Inundation modified bathtub model does not take into consideration future erosion or storm surge.

Includes Hillshade from USGS 2011 LiDAR

- |  |                            |                          |
|--|----------------------------|--------------------------|
| Freeboard Potentially Affected by Surge    | 100-Year Storm Event       | City and Town Boundaries |
| Freeboard Unlikely to be Affected by Surge | 100-Year Plus 1 ft. of SLR | Roads                    |
| Not Exposed to Surge                       | 100-Year Plus 3 ft. of SLR |                          |
| Bridge Accessible                          | 100-Year Plus 5 ft. of SLR |                          |
| Possible Bridge Access Problem             | 100-Year Plus 7 ft. of SLR |                          |

0 0.25 0.5 1 Miles



Map Disclaimer: This map is not the product of a Professional Land Survey. It was created by RI Statewide Planning Program for general reference, informational, planning and guidance use, and is not a legally authoritative source as to location of natural or manmade features. Proper interpretation of this map may require the assistance of appropriate professional services. RI Statewide Planning Program makes no warranty, express or implied, related to the spatial accuracy, reliability, completeness, or currentness of this map.

Relative Bridge Vulnerability to 100-Year Storm Surge Event Plus Sea Level Rise in the City of Newport

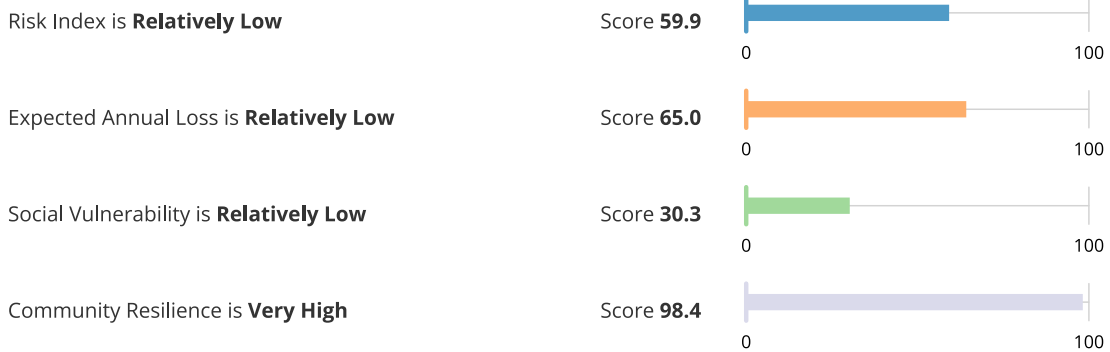
Mun. Rank	State Rank	Bridge Name	Facility Carried	Feature Intersected	Inches of Freeboard Relative to 7FtSLR	Terrain Crossed	Landing Access	Haz. Score	Intermodal Facility	Evac. Route	AADT	Sys. Score	Vuln. Score
1	16	Connell Highway	RI 138	RI 238 JT CONNELL HWY	57	Land	Problem	3.60	Yes	Yes	26,700	5.00	8.60
2	43	Third Street	RI 138	THIRD ST	-60	Land	Access	2.00	Yes	Yes	28,743	5.00	7.00
3	44	Old Colony	RI 138	NEWPORT SEC RR	-111	Land	Access	2.00	Yes	Yes	26,700	5.00	7.00
4	66	Ocean Avenue Anna1	OCEAN AVENUE	GOOSE NECK COVE	-129	Water	Problem	4.50	No	Yes	2,000	1.60	6.10
5	67	Ocean Avenue Anna2	OCEAN AVENUE	GOOSE NECK COVE	-181	Water	Problem	4.50	No	Yes	2,000	1.60	6.10
6	91	Old Colony Ramp South	RI 138 EB	NEWPORT SEC RR	115	Land	Problem	2.80	Yes	No	10,000	2.80	5.60
7	92	Goat Island Causeway	GOAT ISL CAUSEWAY	NEWPORT HARBOR	-12	MHHW	Problem	5.00	No	No	1,919	0.60	5.60
8	129	Van Zandt Ave RR	VAN ZANDT AV	NEWPORT SEC RR	86	Land	Problem	2.80	Yes	No	3,030	1.60	4.40

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## Appendix D: National Risk Index

## Newport County, Rhode Island

### Summary

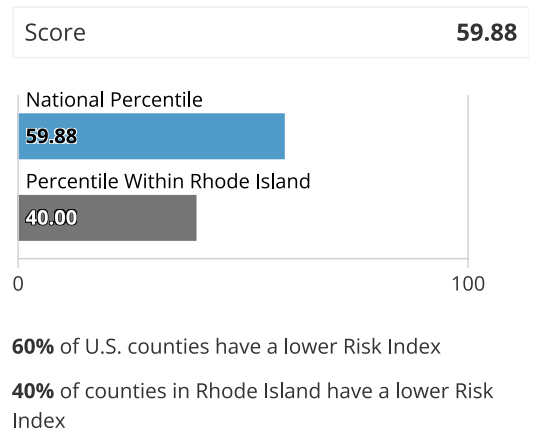
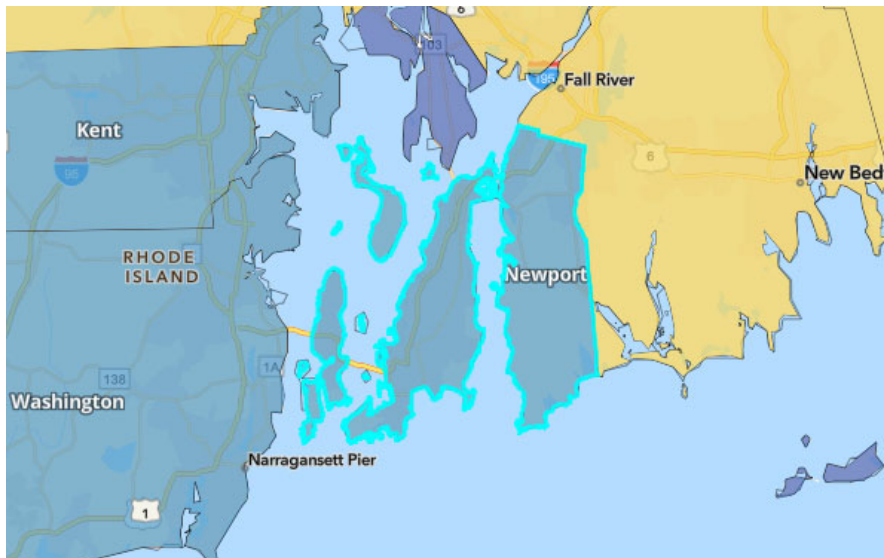


While reviewing this report, keep in mind that low risk is driven by lower loss due to natural hazards, lower social vulnerability, and higher community resilience.

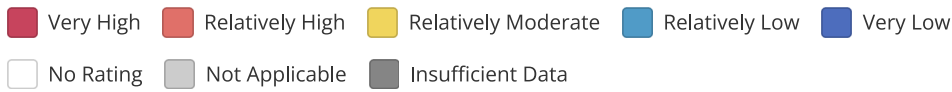
For more information about the National Risk Index, its data, and how to interpret the information it provides, please review the **About the National Risk Index** and **How to Take Action** sections at the end of this report. Or, visit the National Risk Index website at [hazards.fema.gov/nri/learn-more](https://hazards.fema.gov/nri/learn-more) to access supporting documentation and links.

### Risk Index

The Risk Index rating is **Relatively Low** for **Newport County, RI** when compared to the rest of the U.S.



### Risk Index Legend



## Hazard Type Risk Index

Hazard type Risk Index scores are calculated using data for only a single hazard type, and reflect a community's Expected Annual Loss value, community risk factors, and the adjustment factor used to calculate the risk value.

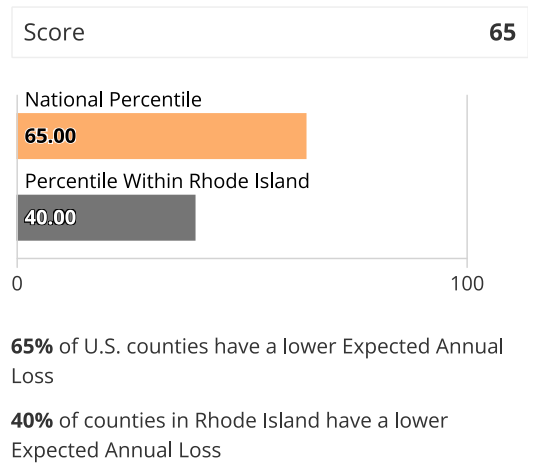
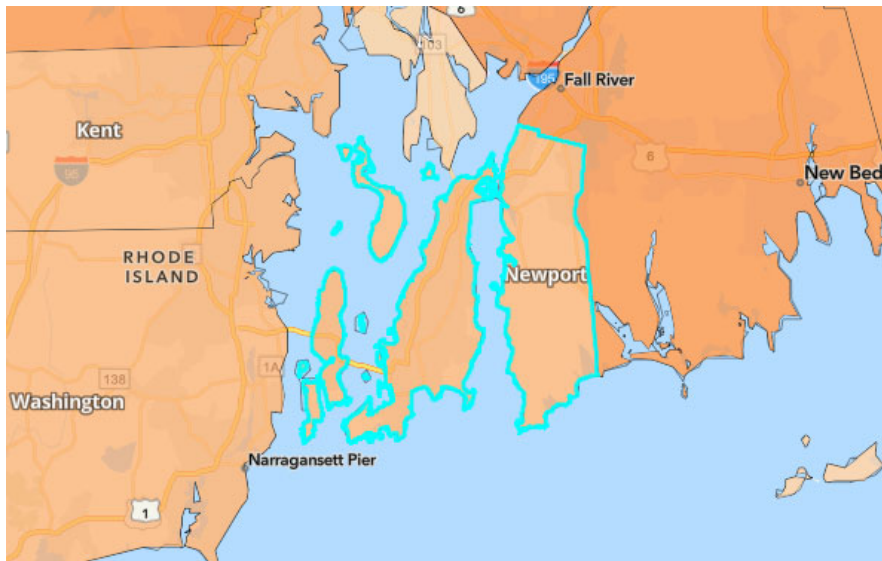
Hazard Type	Risk Index Rating	Risk Index Score	National Percentile
<b>Avalanche</b>	Not Applicable	--	
<b>Coastal Flooding</b>	Relatively Low	66.4	0  100
<b>Cold Wave</b>	Very Low	31.5	0  100
<b>Drought</b>	Relatively Low	68.7	0  100
<b>Earthquake</b>	Very Low	47.7	0  100
<b>Hail</b>	Very Low	4	0  100
<b>Heat Wave</b>	Very Low	23	0  100
<b>Hurricane</b>	Relatively Low	84.3	0  100
<b>Ice Storm</b>	Relatively Low	37.6	0  100
<b>Landslide</b>	Relatively Low	19.9	0  100
<b>Lightning</b>	Relatively Low	47	0  100
<b>Riverine Flooding</b>	Relatively Low	50.9	0  100
<b>Strong Wind</b>	Very Low	18.1	0  100
<b>Tornado</b>	Very Low	17.5	0  100
<b>Tsunami</b>	Insufficient Data	--	
<b>Volcanic Activity</b>	Not Applicable	--	
<b>Wildfire</b>	Very Low	31.8	0  100
<b>Winter Weather</b>	Very Low	4.7	0  100

## Risk Factor Breakdown

Hazard Type	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
<b>Hurricane</b>	\$7,138,906	Relatively Low	Very High	0.94	\$6,727,371	84.3
<b>Coastal Flooding</b>	\$597,490	Relatively Low	Very High	0.94	\$548,242	66.4
<b>Riverine Flooding</b>	\$517,979	Relatively Low	Very High	0.94	\$487,728	50.9
<b>Tornado</b>	\$188,414	Relatively Low	Very High	0.94	\$178,287	17.5
<b>Earthquake</b>	\$139,298	Relatively Low	Very High	0.94	\$135,099	47.7
<b>Drought</b>	\$144,915	Relatively Low	Very High	0.94	\$121,228	68.7
<b>Lightning</b>	\$100,642	Relatively Low	Very High	0.94	\$96,153	47
<b>Strong Wind</b>	\$97,501	Relatively Low	Very High	0.94	\$93,205	18.1
<b>Ice Storm</b>	\$36,786	Relatively Low	Very High	0.94	\$34,800	37.6
<b>Landslide</b>	\$21,900	Relatively Low	Very High	0.94	\$20,034	19.9
<b>Wildfire</b>	\$15,492	Relatively Low	Very High	0.94	\$13,819	31.8
<b>Heat Wave</b>	\$8,442	Relatively Low	Very High	0.94	\$8,043	23
<b>Cold Wave</b>	\$5,366	Relatively Low	Very High	0.94	\$5,088	31.5
<b>Winter Weather</b>	\$3,124	Relatively Low	Very High	0.94	\$2,952	4.7
<b>Hail</b>	\$3,079	Relatively Low	Very High	0.94	\$2,739	4
<b>Avalanche</b>	--	Relatively Low	Very High	0.94	--	--
<b>Tsunami</b>	--	Relatively Low	Very High	0.94	--	--
<b>Volcanic Activity</b>	--	Relatively Low	Very High	0.94	--	--

# Expected Annual Loss

In **Newport County, RI**, expected loss each year due to natural hazards is **Relatively Low** when compared to the rest of the U.S.



**Expected Annual Loss Legend**

- Very High
- Relatively High
- Relatively Moderate
- Relatively Low
- Very Low
- No Expected Annual Losses
- Not Applicable
- Insufficient Data

<b>Composite Expected Annual Loss</b>		<b>\$9,019,334.12</b>	
<b>Composite Expected Annual Loss Rate National Percentile</b>		<b>30.9</b>	
Building EAL	<b>\$8,217,069.16</b>	Population EAL	<b>0.05 fatalities</b>
Building EAL Rate	<b>\$1 per \$2.30K of building value</b>	Population EAL Rate	<b>1 per 1.71M people</b>
Agriculture EAL	<b>\$223,190.07</b>	Population Equivalence EAL	<b>\$579,074.89</b>
Agriculture EAL Rate	<b>\$1 per \$99.08 of agriculture value</b>		

## Expected Annual Loss for Hazard Types

Expected Annual Loss scores for hazard types are calculated using data for only a single hazard type, and reflect a community's relative expected annual loss for only that hazard type.

**15 of 18** hazard types contribute to the expected annual loss for **Newport County, RI**.

Hazard Type	Expected Annual Loss Rating	EAL Value	Score
<b>Hurricane</b>	Relatively Low	\$7,138,907	83.5
<b>Coastal Flooding</b>	Relatively Low	\$597,490	69.4

Hazard Type	Expected Annual Loss Rating	EAL Value	Score
<b>Riverine Flooding</b>	Relatively Low	\$517,979	55.7
<b>Tornado</b>	Very Low	\$188,414	22.1
<b>Drought</b>	Relatively Low	\$144,916	73.6
<b>Earthquake</b>	Very Low	\$139,298	50.7
<b>Lightning</b>	Relatively Low	\$100,642	53.9
<b>Strong Wind</b>	Relatively Low	\$97,501	23.6
<b>Ice Storm</b>	Relatively Low	\$36,786	41.8
<b>Landslide</b>	Relatively Low	\$21,900	50.5
<b>Wildfire</b>	Very Low	\$15,492	35.3
<b>Heat Wave</b>	Very Low	\$8,442	26.0
<b>Cold Wave</b>	Relatively Low	\$5,366	33.5
<b>Winter Weather</b>	Very Low	\$3,124	8.9
<b>Hail</b>	Very Low	\$3,079	7.2
<b>Avalanche</b>	Not Applicable	--	--
<b>Tsunami</b>	Insufficient Data	--	--
<b>Volcanic Activity</b>	Not Applicable	--	--

## Expected Annual Loss Values

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
<b>Avalanche</b>	--	--	--	--	--
<b>Coastal Flooding</b>	\$597,490	\$595,226	\$2,264	0.00	n/a
<b>Cold Wave</b>	\$5,366	\$187	\$4,706	0.00	\$473
<b>Drought</b>	\$144,915	n/a	n/a	n/a	\$144,915
<b>Earthquake</b>	\$139,298	\$118,531	\$20,767	0.00	n/a
<b>Hail</b>	\$3,079	\$676	\$762	0.00	\$1,641
<b>Heat Wave</b>	\$8,442	\$0	\$7,962	0.00	\$481
<b>Hurricane</b>	\$7,138,906	\$6,938,856	\$125,778	0.01	\$74,273
<b>Ice Storm</b>	\$36,786	\$33,665	\$3,121	0.00	n/a
<b>Landslide</b>	\$21,900	\$4,500	\$17,400	0.00	n/a
<b>Lightning</b>	\$100,642	\$6,012	\$94,630	0.01	n/a
<b>Riverine Flooding</b>	\$517,979	\$327,965	\$188,734	0.02	\$1,280

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
<b>Strong Wind</b>	\$97,501	\$21,494	\$76,004	0.01	\$2
<b>Tornado</b>	\$188,414	\$152,661	\$35,634	0.00	\$120
<b>Tsunami</b>	n/a	n/a	n/a	n/a	n/a
<b>Volcanic Activity</b>	--	--	--	--	--
<b>Wildfire</b>	\$15,492	\$14,509	\$982	0.00	\$1
<b>Winter Weather</b>	\$3,124	\$2,786	\$333	0.00	\$5

## Exposure Values

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
<b>Avalanche</b>	--	--	--	--	--
<b>Coastal Flooding</b>	\$107,340,795,197	\$2,686,877,360	\$104,653,917,837	9,021.89	n/a
<b>Cold Wave</b>	\$1,011,125,379,918	\$18,919,891,305	\$992,183,374,985	85,533.05	\$22,113,628
<b>Drought</b>	\$12,460,782	n/a	n/a	n/a	\$12,460,782
<b>Earthquake</b>	\$1,012,384,742,000	\$18,925,942,000	\$993,458,800,000	85,643.00	n/a
<b>Hail</b>	\$1,011,490,745,620	\$18,926,231,992	\$992,542,400,000	85,564.00	\$22,113,628
<b>Heat Wave</b>	\$1,011,490,565,703	\$18,926,229,312	\$992,542,222,763	85,563.98	\$22,113,628
<b>Hurricane</b>	\$1,011,099,475,660	\$18,922,448,624	\$992,154,913,408	85,530.60	\$22,113,628
<b>Ice Storm</b>	\$1,005,095,914,881	\$18,738,391,725	\$986,357,523,156	85,030.82	n/a
<b>Landslide</b>	\$262,941,054,340	\$4,512,746,641	\$258,428,307,700	22,278.30	n/a
<b>Lightning</b>	\$1,011,468,631,992	\$18,926,231,992	\$992,542,400,000	85,564.00	n/a
<b>Riverine Flooding</b>	\$59,147,649,459	\$1,585,613,166	\$57,561,319,981	4,962.18	\$716,312
<b>Strong Wind</b>	\$1,011,490,745,620	\$18,926,231,992	\$992,542,400,000	85,564.00	\$22,113,628
<b>Tornado</b>	\$1,011,490,745,620	\$18,926,231,992	\$992,542,400,000	85,564.00	\$22,113,628
<b>Tsunami</b>	n/a	n/a	n/a	n/a	n/a
<b>Volcanic Activity</b>	--	--	--	--	--
<b>Wildfire</b>	\$165,455,636,622	\$3,616,085,945	\$161,832,377,351	13,951.07	\$7,173,327
<b>Winter Weather</b>	\$1,011,490,565,703	\$18,926,229,312	\$992,542,222,763	85,563.98	\$22,113,628

## Annualized Frequency Values

Hazard Type	Annualized Frequency	Events on Record	Period of Record
<b>Avalanche</b>	--	--	--

Hazard Type	Annualized Frequency	Events on Record	Period of Record
<b>Coastal Flooding</b>	3.7 events per year	n/a	Various (see documentation)
<b>Cold Wave</b>	0.1 events per year	1	2005-2021 (16 years)
<b>Drought</b>	1 event per year	49	2000-2021 (22 years)
<b>Earthquake</b>	0.058% chance per year	n/a	2021 dataset
<b>Hail</b>	1.4 events per year	17	1986-2021 (34 years)
<b>Heat Wave</b>	0.4 events per year	2	2005-2021 (16 years)
<b>Hurricane</b>	0.2 events per year	25	East 1851-2021 (171 years) / West 1949-2021 (73 years)
<b>Ice Storm</b>	0.3 events per year	7	1946-2014 (67 years)
<b>Landslide</b>	0 events per year	0	2010-2021 (12 years)
<b>Lightning</b>	13.6 events per year	105	1991-2012 (22 years)
<b>Riverine Flooding</b>	0.5 events per year	11	1996-2019 (24 years)
<b>Strong Wind</b>	0.9 events per year	11	1986-2021 (34 years)
<b>Tornado</b>	0 events per year	1	1950-2021 (72 years)
<b>Tsunami</b>	n/a	n/a	1800-2021 (222 years)
<b>Volcanic Activity</b>	--	--	--
<b>Wildfire</b>	0.001% chance per year	n/a	2021 dataset
<b>Winter Weather</b>	3.6 events per year	20	2005-2021 (16 years)

## Historic Loss Ratios

Hazard Type	Overall Rating
<b>Avalanche</b>	--
<b>Coastal Flooding</b>	Very Low
<b>Cold Wave</b>	Very Low
<b>Drought</b>	Very High
<b>Earthquake</b>	Very Low
<b>Hail</b>	Very Low
<b>Heat Wave</b>	Very Low
<b>Hurricane</b>	Relatively Moderate
<b>Ice Storm</b>	Very Low
<b>Landslide</b>	Very Low
<b>Lightning</b>	Relatively Moderate

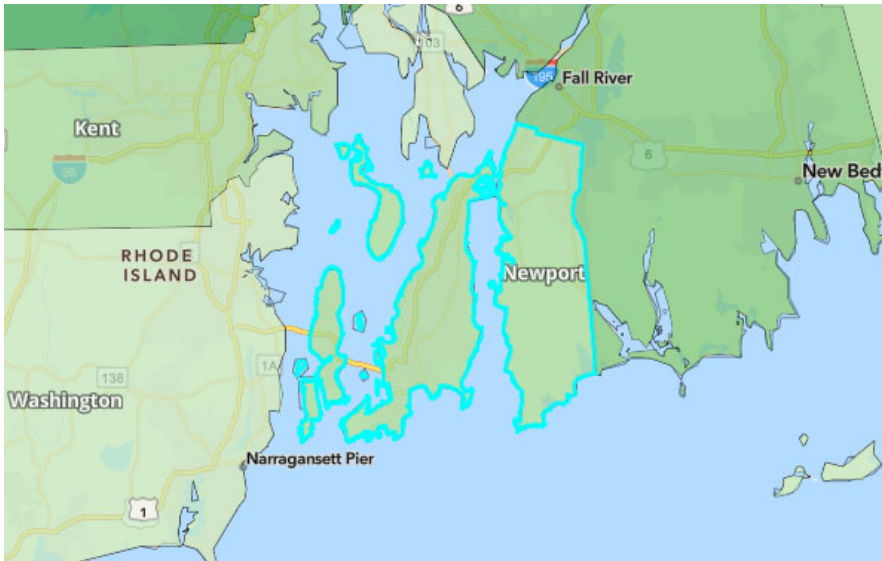
Hazard Type	Overall Rating
<b>Riverine Flooding</b>	Very Low
<b>Strong Wind</b>	Very Low
<b>Tornado</b>	Relatively Moderate
<b>Tsunami</b>	Insufficient Data
<b>Volcanic Activity</b>	--
<b>Wildfire</b>	Relatively Moderate
<b>Winter Weather</b>	Very Low

## Expected Annual Loss Rate

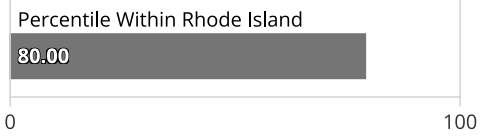
Hazard Type	Building EAL Rate (per building value)	Population EAL Rate (per population)	Agriculture EAL Rate (per agriculture value)
<b>Avalanche</b>	--	--	--
<b>Coastal Flooding</b>	\$1 per \$31.80K	1 per 438.40M	--
<b>Cold Wave</b>	\$1 per \$101.29M	1 per 210.90M	\$1 per \$46.79K
<b>Drought</b>	--	--	\$1 per \$152.60
<b>Earthquake</b>	\$1 per \$159.67K	1 per 47.80M	--
<b>Hail</b>	\$1 per \$27.98M	1 per 1.30B	\$1 per \$13.47K
<b>Heat Wave</b>	\$1 per \$132.80B	1 per 124.67M	\$1 per \$46.01K
<b>Hurricane</b>	\$1 per \$2.73K	1 per 7.89M	\$1 per \$297.73
<b>Ice Storm</b>	\$1 per \$562.19K	1 per 318.06M	--
<b>Landslide</b>	\$1 per \$4.21M	1 per 57.04M	--
<b>Lightning</b>	\$1 per \$3.15M	1 per 10.49M	--
<b>Riverine Flooding</b>	\$1 per \$57.71K	1 per 5.26M	\$1 per \$17.28K
<b>Strong Wind</b>	\$1 per \$880.52K	1 per 13.06M	\$1 per \$12.10M
<b>Tornado</b>	\$1 per \$123.98K	1 per 27.85M	\$1 per \$184.93K
<b>Tsunami</b>	--	--	--
<b>Volcanic Activity</b>	--	--	--
<b>Wildfire</b>	\$1 per \$1.30M	1 per 1.01B	\$1 per \$22.66M
<b>Winter Weather</b>	\$1 per \$6.79M	1 per 2.98B	\$1 per \$4.32M

# Social Vulnerability

Social groups in **Newport County, RI** have a **Relatively Low** susceptibility to the adverse impacts of natural hazards when compared to the rest of the U.S.



Score **30.27**



**30%** of U.S. counties have a lower Social Vulnerability

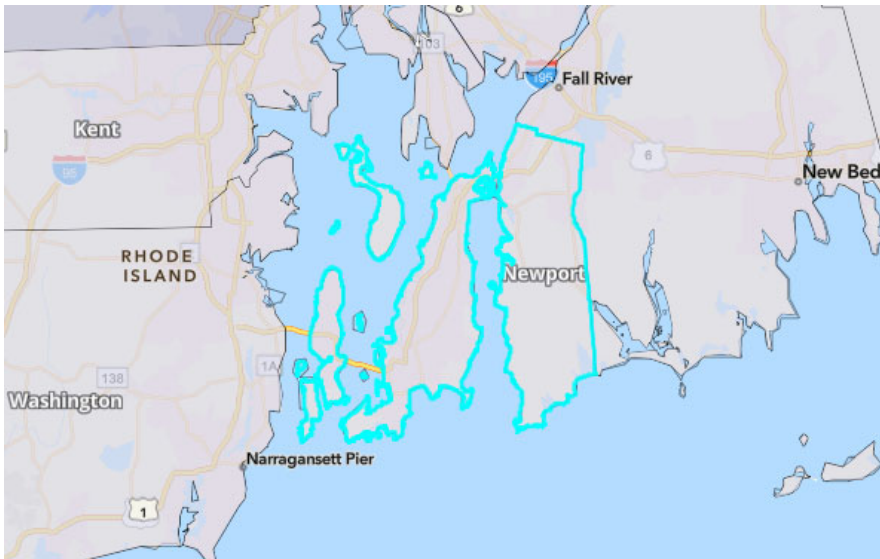
**80%** of counties in Rhode Island have a lower Social Vulnerability

**Social Vulnerability Legend**

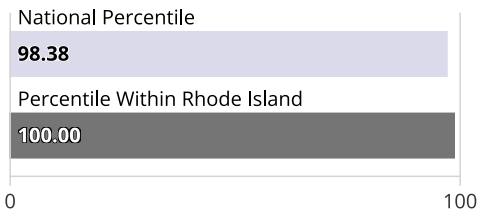
- Very High
- Relatively High
- Relatively Moderate
- Relatively Low
- Very Low
- Data Unavailable

# Community Resilience

Communities in **Newport County, RI** have a **Very High** ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions when compared to the rest of the U.S.



Score **98.38**



**2%** of U.S. counties have a higher Community Resilience

**0%** of counties in Rhode Island have a higher Community Resilience

## Community Resilience Legend

- Very High
- Relatively High
- Relatively Moderate
- Relatively Low
- Very Low
- Data Unavailable

## About the National Risk Index

The National Risk Index is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter Weather.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability, and Community Resilience to develop a baseline relative risk measurement for each United States county and Census tract. These measurements are calculated using average past conditions, but they cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision makers as they develop risk reduction strategies.

Explore the National Risk Index Map at [hazards.fema.gov/nri/map](https://hazards.fema.gov/nri/map).

Visit the National Risk Index website at [hazards.fema.gov/nri/learn-more](https://hazards.fema.gov/nri/learn-more) to access supporting documentation and links.

## Calculating the Risk Index

Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability and Community Resilience:

---

$$\text{Risk Index} = \text{Expected Annual Loss} \times \text{Social Vulnerability} \div \text{Community Resilience}$$

Risk Index scores are presented as a composite score for all 18 hazard types, as well as individual scores for each hazard type.

For more information, visit [hazards.fema.gov/nri/determining-risk](https://hazards.fema.gov/nri/determining-risk).

## Calculating Expected Annual Loss

Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios for 18 hazard types:

$$\text{Expected Annual Loss} = \text{Exposure} \times \text{Annualized Frequency} \times \text{Historic Loss Ratio}$$

Expected Annual Loss scores are presented as a composite score for all 18 hazard types, as well as individual scores for each hazard type.

For more information, visit [hazards.fema.gov/nri/expected-annual-loss](https://hazards.fema.gov/nri/expected-annual-loss).

## Calculating Social Vulnerability

Social Vulnerability is measured using the Social Vulnerability Index (SVI) published by the Centers for Disease Control and Prevention (CDC).

For more information, visit [hazards.fema.gov/nri/social-vulnerability](https://hazards.fema.gov/nri/social-vulnerability).

## Calculating Community Resilience

Community Resilience is measured at the County level using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).

For more information, visit [hazards.fema.gov/nri/community-resilience](https://hazards.fema.gov/nri/community-resilience).

## How to Take Action

There are many ways to reduce natural hazard risk through mitigation. Communities with high National Risk Index scores can take action to reduce risk by decreasing Expected Annual Loss due to natural hazards, decreasing Social Vulnerability, and increasing Community Resilience.

For information about how to take action and reduce your risk, visit [hazards.fema.gov/nri/take-action](https://hazards.fema.gov/nri/take-action).

## Disclaimer

The National Risk Index (the Risk Index or the Index) and its associated data are meant for planning purposes only. This tool was created for broad nationwide comparisons and is not a substitute for localized risk assessment analysis. Nationwide datasets used as inputs for the National Risk Index are, in many cases, not as accurate as available local data. Users with access to local data for each National Risk Index risk factor should consider substituting

the Risk Index data with local data to recalculate a more accurate risk index. If you decide to download the National Risk Index data and substitute it with local data, you assume responsibility for the accuracy of the data and any resulting data index. Please visit the [Contact Us](#) page if you would like to discuss this process further.

The methodology used by the National Risk Index has been reviewed by subject matter experts in the fields of natural hazard risk research, risk analysis, mitigation planning, and emergency management. The processing methods used to create the National Risk Index have produced results similar to those from other natural hazard risk analyses conducted on a smaller scale. The breadth and combination of geographic information systems (GIS) and data processing techniques leveraged by the National Risk Index enable it to incorporate multiple hazard types and risk factors, manage its nationwide scope, and capture what might have been missed using other methods.

The National Risk Index does not consider the intricate economic and physical interdependencies that exist across geographic regions. Keep in mind that hazard impacts in surrounding counties or Census tracts can cause indirect losses in your community regardless of your community's risk profile.

Nationwide data available for some risk factors are rudimentary at this time. The National Risk Index will be continuously updated as new data become available and improved methodologies are identified.

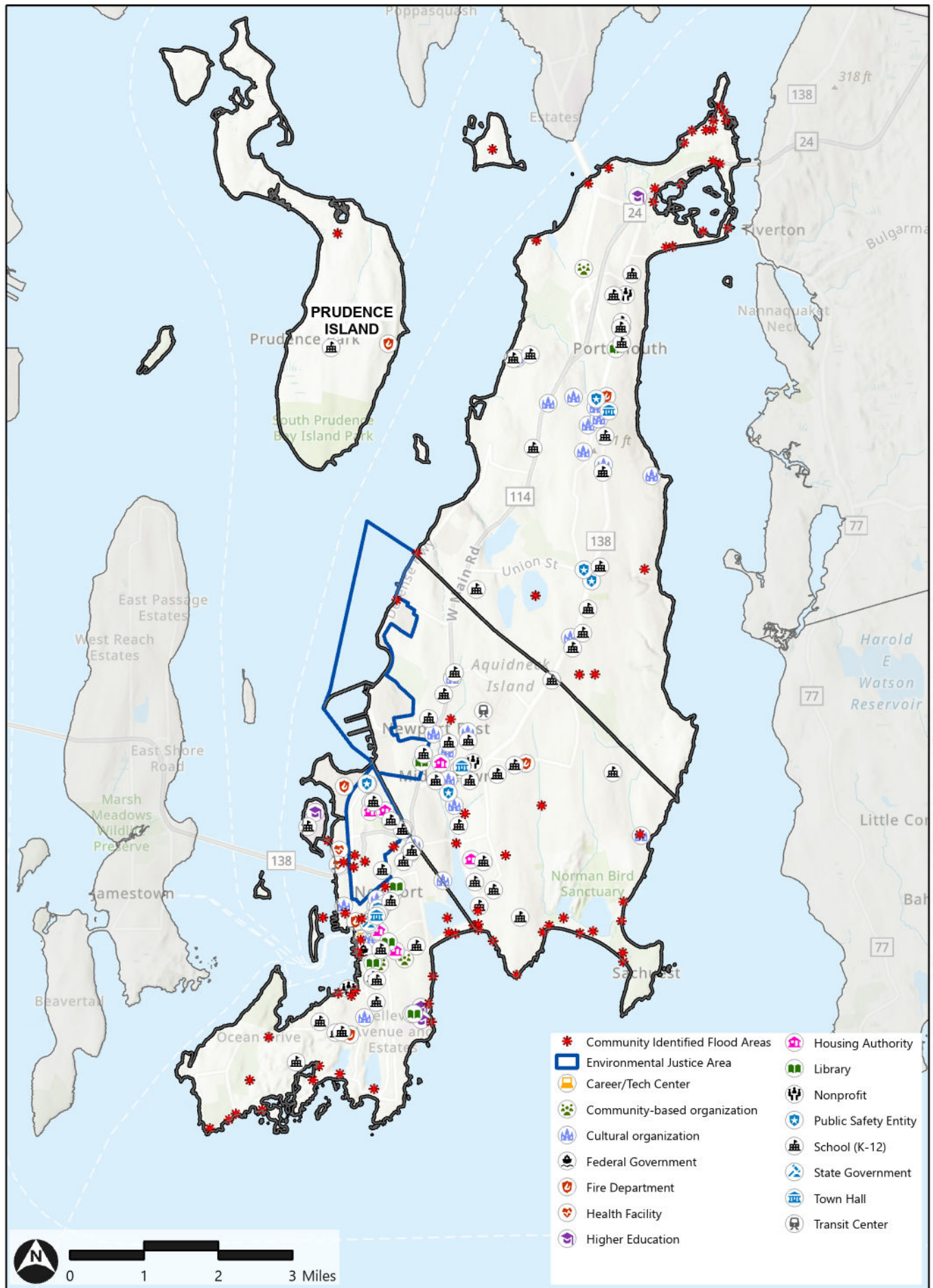
The National Risk Index Contact Us page is available at [hazards.fema.gov/nri/contact-us](https://hazards.fema.gov/nri/contact-us).

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## Appendix E: Community Assets Map

# Figure 5: Appendix E Community Assets

Aquidneck Island Risk Maps



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## Appendix F: HAZUS Reports

# Hazus: Hurricane Global Risk Report

**Region Name:** Aquidneck

**Hurricane Scenario:** 1954-CAROL

**Print Date:** Tuesday, November 5, 2024

**Disclaimer:**

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

*The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.*

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## General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Rhode Island

**Note:**

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 42.47 square miles and contains 17 census tracts. There are over 25 thousand households in the region and a total population of 60,109 people. The distribution of population by State and County is provided in Appendix B.

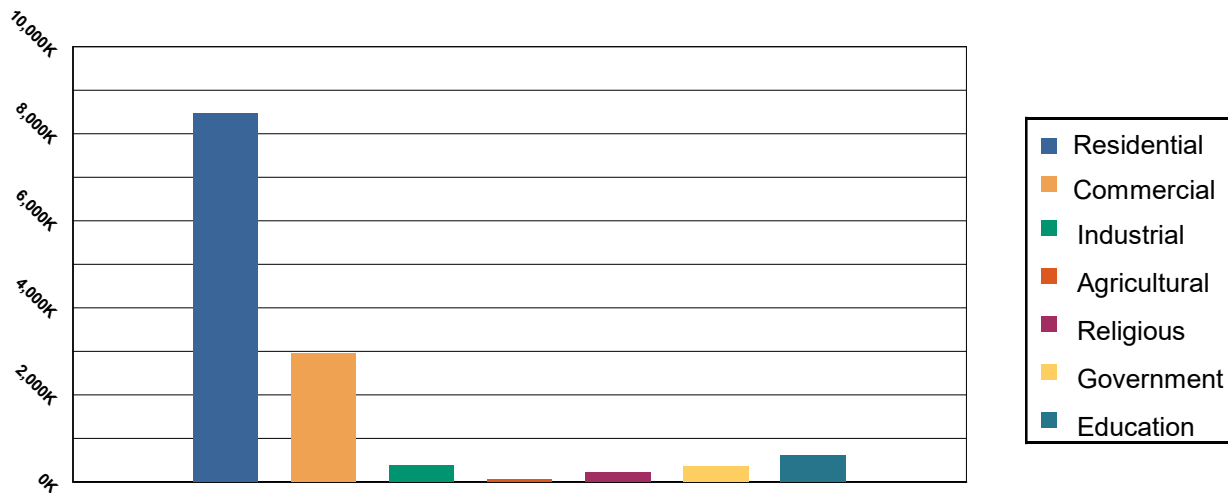
There are an estimated 23 thousand buildings in the region with a total building replacement value (excluding contents) of 13,030 million dollars. Approximately 85% of the buildings (and 65% of the building value) are associated with residential housing.

## Building Inventory

### General Building Stock

Hazus estimates that there are 23,242 buildings in the region which have an aggregate total replacement value of Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides distribution of the building value by State and County.

**Building Exposure by Occupancy Type**



**Table 1: Building Exposure by Occupancy Type**

Occupancy	Exposure (\$1000)	Percent of Tot
Residential	8,454,070	64.88 %
Commercial	2,947,216	22.62%
Industrial	388,590	2.98%
Agricultural	56,088	0.43%
Religious	225,310	1.73%
Government	348,109	2.67%
Education	610,807	4.69%
<b>Total</b>	<b>13,030,190</b>	<b>100.00%</b>

### Essential Facility Inventory

For essential facilities, there are 3 hospitals in the region with a total bed capacity of 129 beds. There are 23 schools, 6 fire stations, 5 police stations and 4 emergency operation facilities.

## Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

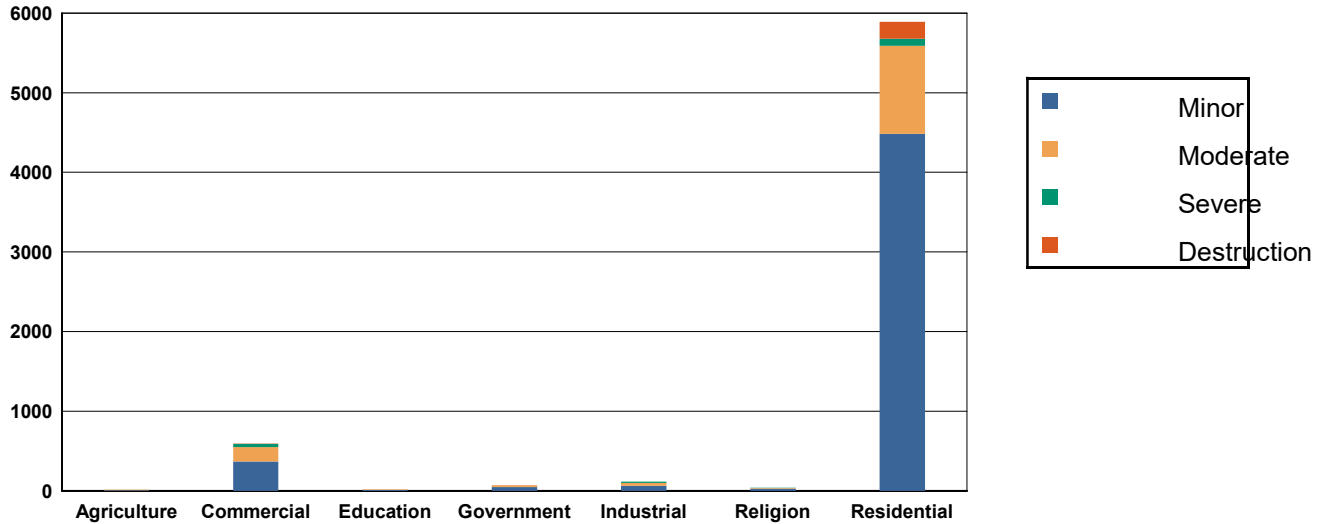
<b>Scenario Name:</b>	1954-CAROL
<b>Type:</b>	Historic
<b>Max Peak Gust in Study Region:</b>	110 mph

## Building Damage

### General Building Stock Damage

Hazus estimates that about 1,735 buildings will be at least moderately damaged. This is over 7% of the total number of buildings in the region. There are an estimated 214 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

### Expected Building Damage by Occupancy



**Table 2: Expected Building Damage by Occupancy**

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	47	74.88	8	13.25	4	6.76	3	4.55	0	0.56
Commercial	1,817	75.44	370	15.34	180	7.48	41	1.72	1	0.02
Education	43	68.74	11	17.59	8	12.84	1	0.83	0	0.00
Government	182	71.49	46	17.99	23	9.18	3	1.34	0	0.00
Industrial	332	74.45	64	14.29	35	7.94	14	3.22	0	0.10
Religion	119	76.10	25	15.97	11	6.89	2	1.04	0	0.00
Residential	13,958	70.32	4,484	22.59	1,105	5.57	90	0.45	213	1.07
<b>Total</b>	<b>16,499</b>		<b>5,008</b>		<b>1,367</b>		<b>154</b>		<b>214</b>	

**Table 3: Expected Building Damage by Building Type**

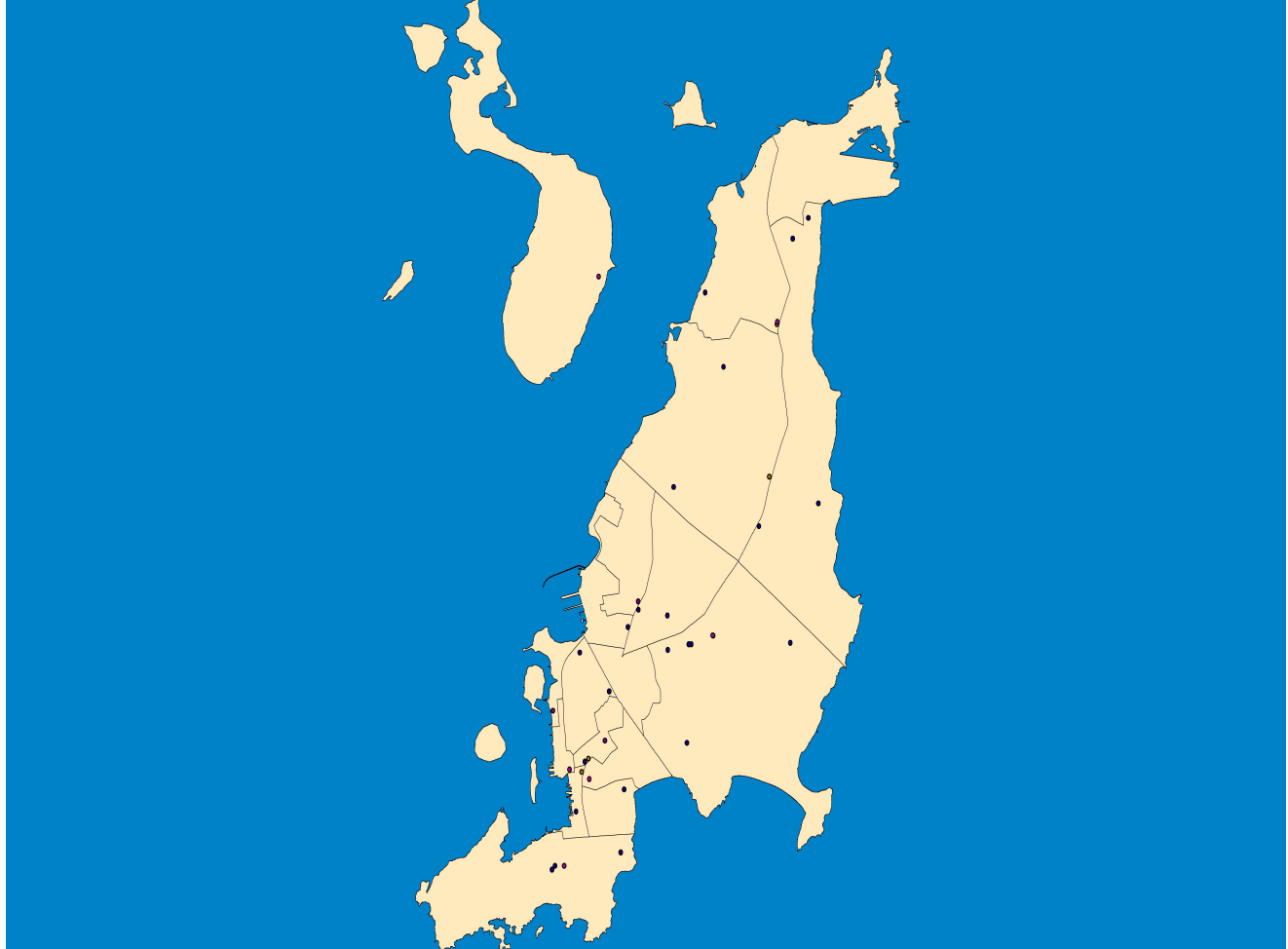
Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	111	70.51	29	18.41	15	9.58	2	1.51	0	0.00
Masonry	1,028	70.14	280	19.08	131	8.93	22	1.50	5	0.35
MH	60	85.44	5	6.63	3	4.84	0	0.19	2	2.90
Steel	821	61.89	232	17.48	230	17.32	44	3.28	0	0.02
Wood	14,895	73.67	4,247	21.00	812	4.02	76	0.37	189	0.93

---

## **Essential Facility Damage**

Before the hurricane, the region had 129 hospital beds available for use. On the day of the hurricane, the model estimates that 129 hospital beds (100%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, 100% of the beds will be in service. By 30 days, 100% will be operational.

### Thematic Map of Essential Facilities

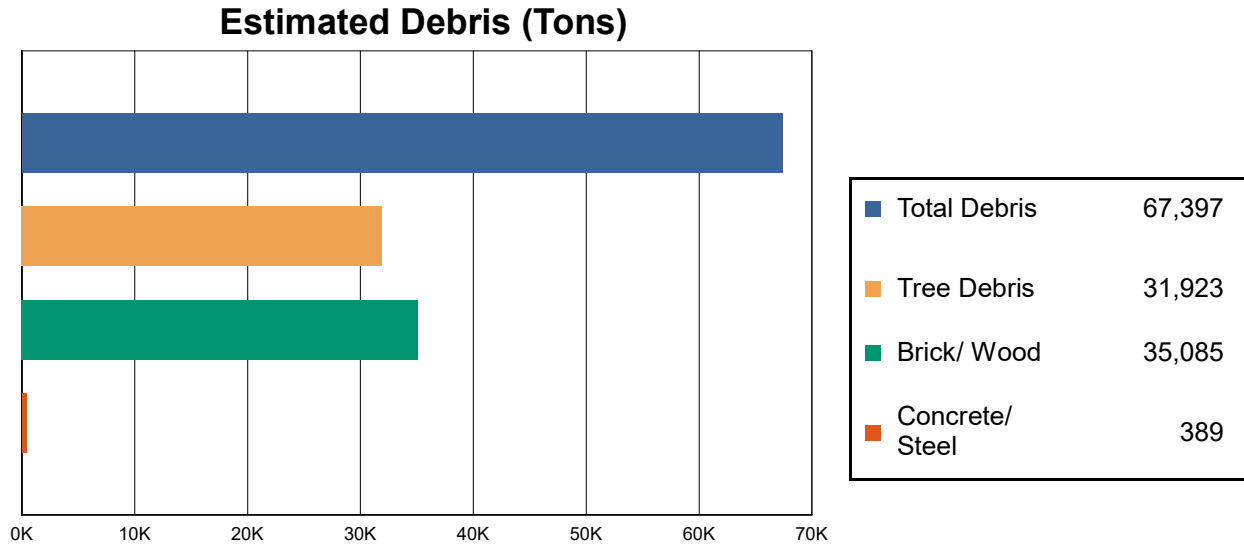


**Table 4: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
EOCs	4	0	0	4
Fire Stations	6	0	0	6
Hospitals	3	0	0	2
Police Stations	5	0	0	5
Schools	23	1	0	0

## Induced Hurricane Damage

### Debris Generation

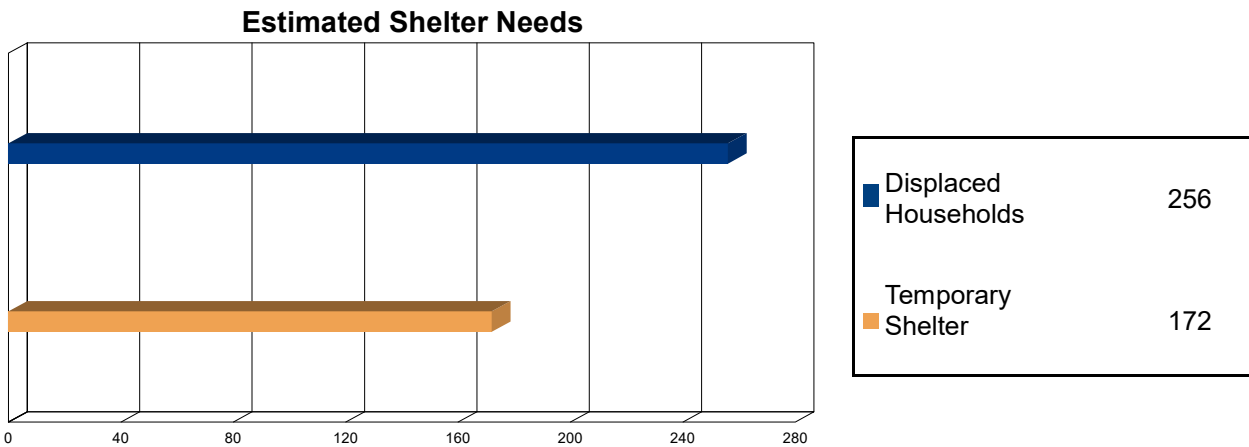


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 67,397 tons of debris will be generated. Of the total amount, 13,981 tons (21%) is Other Tree Debris. Of the remaining 53,416 tons, Brick/Wood comprises 66% of the total, Reinforced Concrete/Steel comprises of 1% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 1419 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 17,942 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

## Social Impact

### Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 256 households to be displaced due to the hurricane. Of these, 172 people (out of a total population of 60,109) will seek temporary shelter in public shelters.

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## Economic Loss

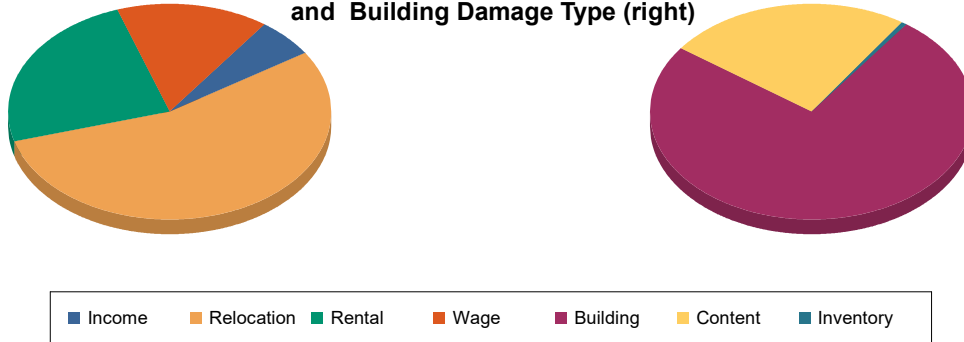
The total economic loss estimated for the hurricane is 503.1 million dollars, which represents 3.86 % of the total replacement value of the region's buildings.

### **Building-Related Losses**

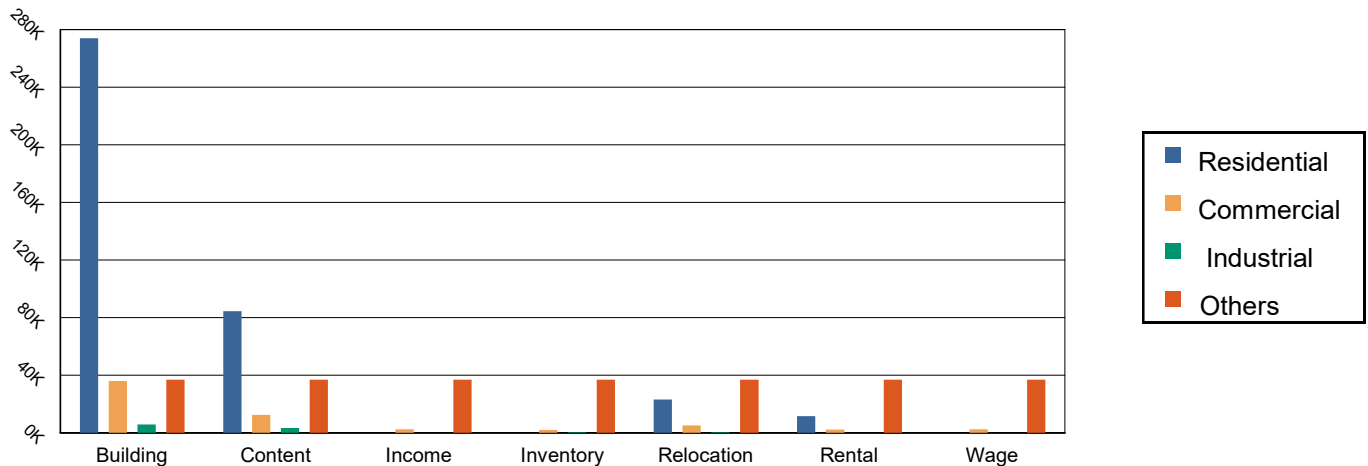
The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 503 million dollars. 12% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 78% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

Loss by Business Interruption Type (left) and Building Damage Type (right)



Loss Type by General Occupancy



**Table 5: Building-Related Economic Loss Estimates**  
(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<b>Property Damage</b>						
	Building	273,953.09	35,940.65	5,763.24	17,690.59	333,347.57
	Content	84,559.49	12,426.34	3,295.49	7,453.81	107,735.13
	Inventory	0.00	2,123.35	441.89	486.83	3,052.08
	<b>Subtotal</b>	<b>358,512.59</b>	<b>50,490.34</b>	<b>9,500.62</b>	<b>25,631.23</b>	<b>444,134.79</b>
<b>Business Interruption Loss</b>						
	Income	6.27	2,478.31	53.45	961.58	3,499.61
	Relocation	23,075.08	5,046.50	431.58	3,597.05	32,150.20
	Rental	11,544.22	2,241.38	48.92	416.25	14,250.77
	Wage	14.77	2,567.82	90.18	6,367.75	9,040.52
	<b>Subtotal</b>	<b>34,640.33</b>	<b>12,334.02</b>	<b>624.12</b>	<b>11,342.63</b>	<b>58,941.10</b>

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Total

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<b>Total</b>	<b>393,152.92</b>	<b>62,824.37</b>	<b>10,124.74</b>	<b>36,973.86</b>	<b>503,075.89</b>
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## Appendix A: County Listing for the Region

Rhode Island  
- Newport

## Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
<b>Rhode Island</b>				
Newport	60,109	8,454,070	4,576,120	13,030,190
<b>Total</b>	<b>60,109</b>	<b>8,454,070</b>	<b>4,576,120</b>	<b>13,030,190</b>
<b>Study Region Total</b>	<b>60,109</b>	<b>8,454,070</b>	<b>4,576,120</b>	<b>13,030,190</b>

# Hazus: Hurricane Global Risk Report

**Region Name:** Aquid

**Hurricane Scenario:** Probabilistic 100-year Return Period

**Print Date:** Thursday, November 7, 2024

**Disclaimer:**

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

*The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.*

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## General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Rhode Island

**Note:**

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 42.47 square miles and contains 17 census tracts. There are over 25 thousand households in the region and a total population of 60,109 people. The distribution of population by State and County is provided in Appendix B.

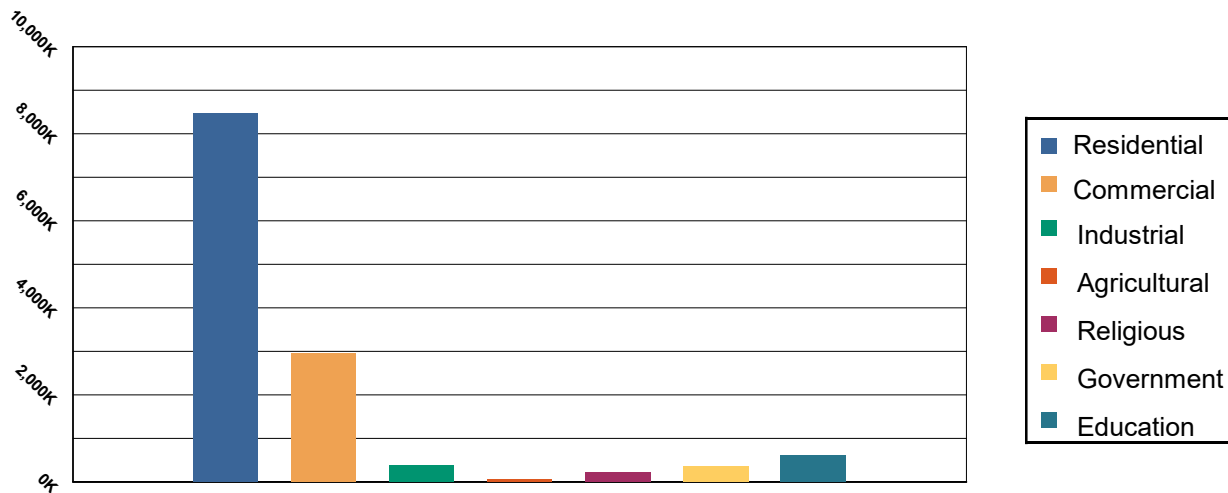
There are an estimated 23 thousand buildings in the region with a total building replacement value (excluding contents) of 13,030 million dollars. Approximately 85% of the buildings (and 65% of the building value) are associated with residential housing.

## Building Inventory

### General Building Stock

Hazus estimates that there are 23,242 buildings in the region which have an aggregate total replacement value of Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides distribution of the building value by State and County.

**Building Exposure by Occupancy Type**



**Table 1: Building Exposure by Occupancy Type**

Occupancy	Exposure (\$1000)	Percent of Tot
Residential	8,454,070	64.88 %
Commercial	2,947,216	22.62%
Industrial	388,590	2.98%
Agricultural	56,088	0.43%
Religious	225,310	1.73%
Government	348,109	2.67%
Education	610,807	4.69%
<b>Total</b>	<b>13,030,190</b>	<b>100.00%</b>

### Essential Facility Inventory

For essential facilities, there are 3 hospitals in the region with a total bed capacity of 129 beds. There are 23 schools, 6 fire stations, 5 police stations and 4 emergency operation facilities.

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## Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

**Scenario Name:** Probabilistic

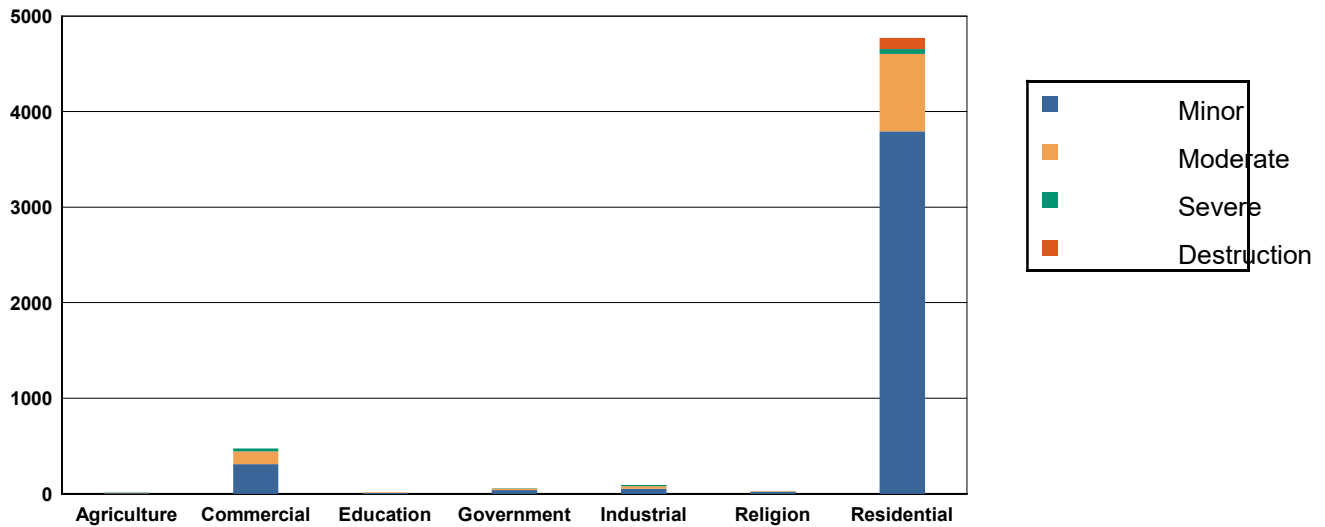
**Type:** Probabilistic

## Building Damage

### General Building Stock Damage

Hazus estimates that about 1,221 buildings will be at least moderately damaged. This is over 5% of the total number of buildings in the region. There are an estimated 121 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

### Expected Building Damage by Occupancy



**Table 2: Expected Building Damage by Occupancy : 100 - year Event**

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	50	80.14	7	10.84	3	5.31	2	3.35	0	0.36
Commercial	1,936	80.35	310	12.87	135	5.59	28	1.18	0	0.01
Education	46	74.29	10	15.46	6	9.80	0	0.46	0	0.00
Government	197	77.18	39	15.43	17	6.58	2	0.81	0	0.00
Industrial	355	79.54	53	11.94	27	6.10	10	2.35	0	0.06
Religion	127	80.76	21	13.44	8	5.14	1	0.66	0	0.00
Residential	15,077	75.96	3,793	19.11	809	4.08	50	0.25	120	0.60
<b>Total</b>	<b>17,788</b>		<b>4,233</b>		<b>1,005</b>		<b>95</b>		<b>121</b>	

**Table 3: Expected Building Damage by Building Type : 100 - year Event**

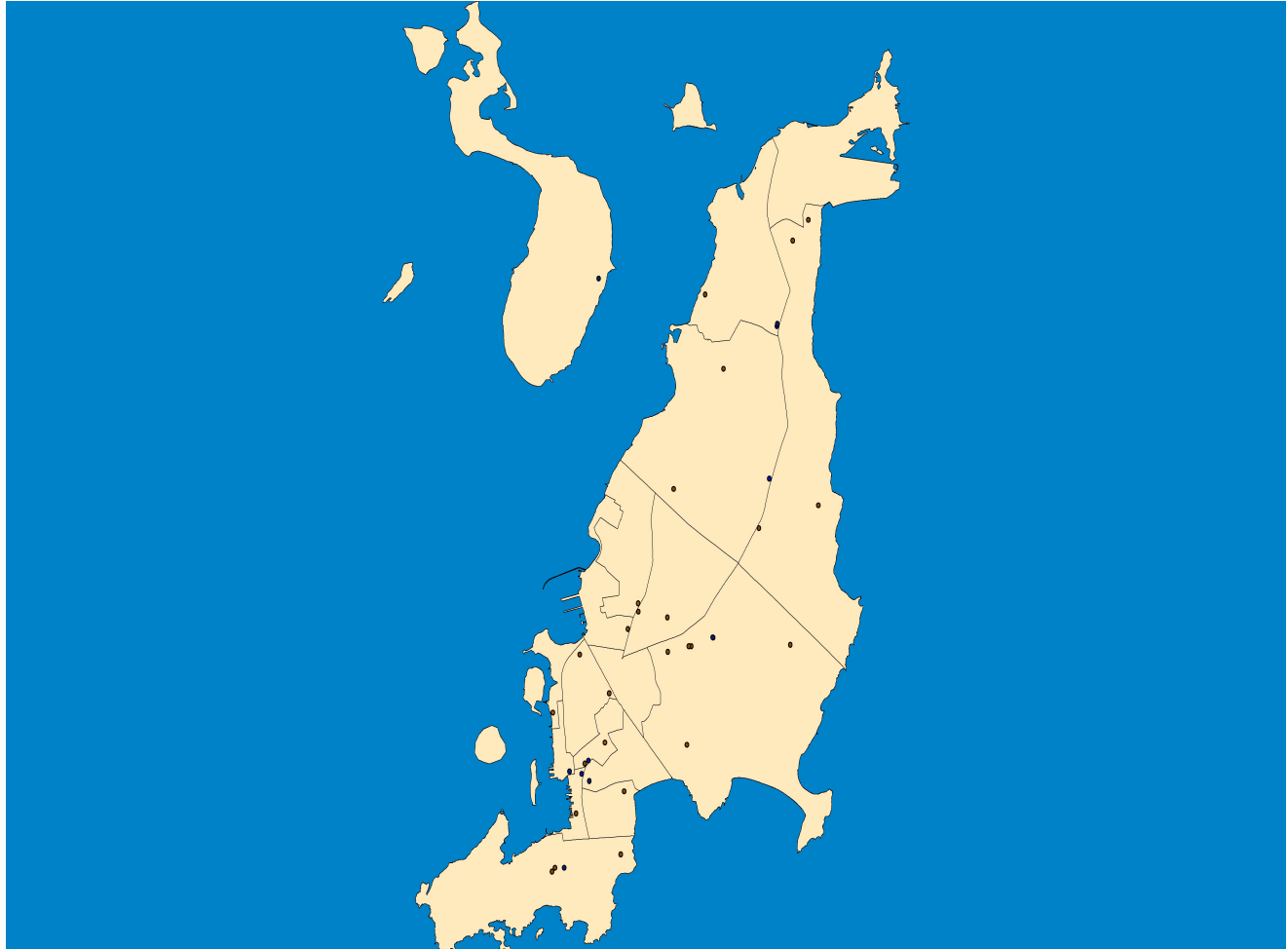
Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	121	76.29	25	15.96	11	6.85	1	0.90	0	0.00
Masonry	1,114	75.96	243	16.55	94	6.39	13	0.90	3	0.20
MH	63	89.96	4	5.02	2	3.12	0	0.09	1	1.80
Steel	904	68.19	208	15.69	183	13.79	31	2.31	0	0.01
Wood	15,948	78.88	3,546	17.54	574	2.84	44	0.22	106	0.53

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## **Essential Facility Damage**

Before the hurricane, the region had 129 hospital beds available for use. On the day of the hurricane, the model estimates that 129 hospital beds (100%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, 100% of the beds will be in service. By 30 days, 100% will be operational.

### Thematic Map of Essential Facilities

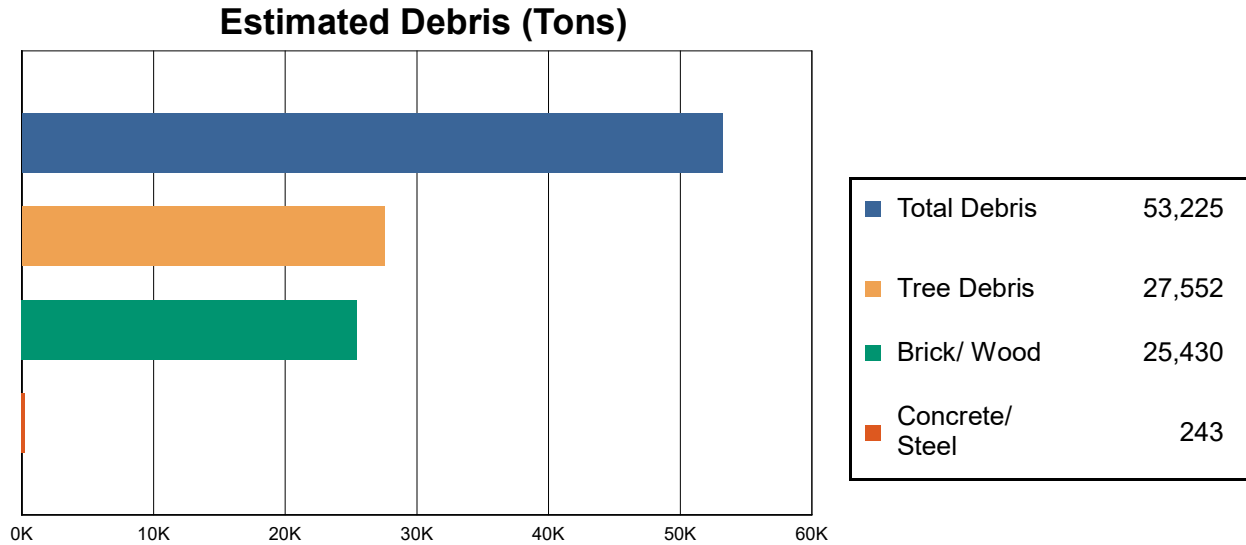


**Table 4: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
EOCs	4	0	0	4
Fire Stations	6	0	0	6
Hospitals	3	0	0	2
Police Stations	5	0	0	5
Schools	23	1	0	0

## Induced Hurricane Damage

### Debris Generation

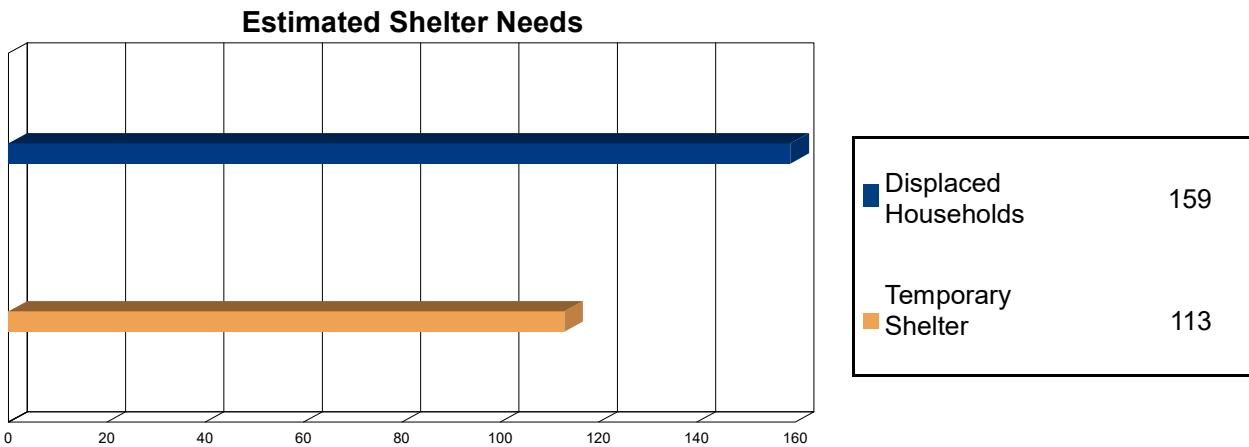


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 53,225 tons of debris will be generated. Of the total amount, 12,173 tons (23%) is Other Tree Debris. Of the remaining 41,052 tons, Brick/Wood comprises 62% of the total, Reinforced Concrete/Steel comprises of 1% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 1027 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 15,379 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

## Social Impact

### Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 159 households to be displaced due to the hurricane. Of these, 113 people (out of a total population of 60,109) will seek temporary shelter in public shelters.

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## Economic Loss

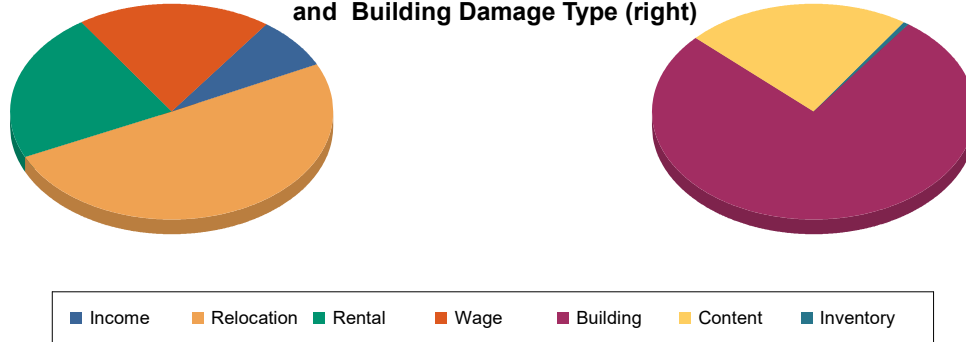
The total economic loss estimated for the hurricane is 352.0 million dollars, which represents 2.70 % of the total replacement value of the region's buildings.

### **Building-Related Losses**

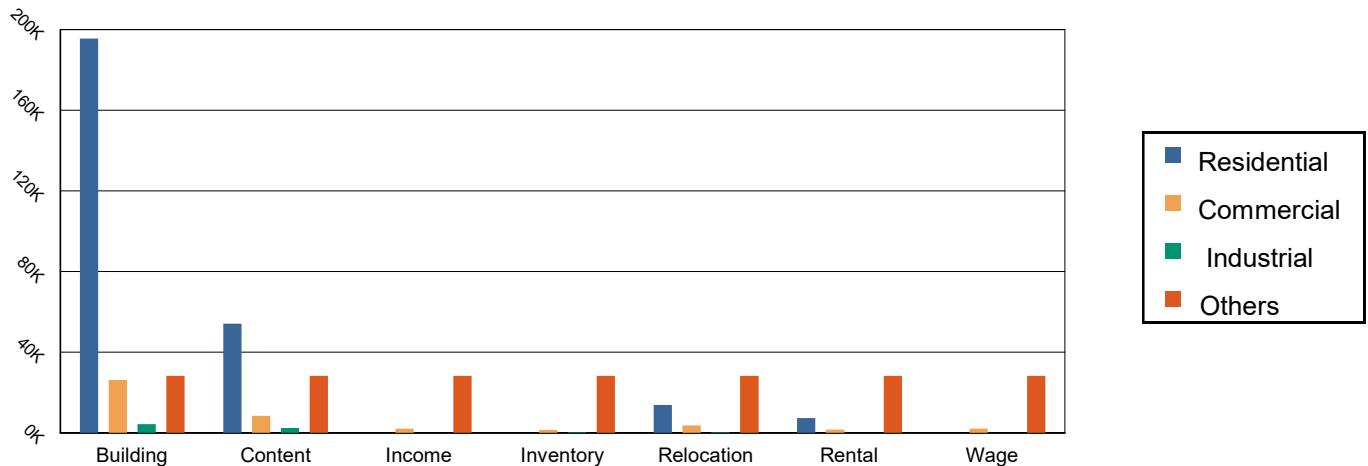
The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 352 million dollars. 12% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 77% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

Loss by Business Interruption Type (left) and Building Damage Type (right)



Loss Type by General Occupancy



**Table 5: Building-Related Economic Loss Estimates**  
(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<b>Property Damage</b>						
	Building	195,512.91	26,283.37	4,322.87	13,159.77	239,278.92
	Content	54,102.62	8,425.72	2,367.60	5,128.46	70,024.40
	Inventory	0.00	1,416.04	316.60	325.12	2,057.76
	<b>Subtotal</b>	<b>249,615.53</b>	<b>36,125.12</b>	<b>7,007.07</b>	<b>18,613.35</b>	<b>311,361.07</b>
<b>Business Interruption Loss</b>						
	Income	1.67	2,081.61	41.07	999.99	3,124.33
	Relocation	13,824.70	3,605.46	328.71	2,666.24	20,425.11
	Rental	7,290.03	1,534.77	35.19	298.31	9,158.30
	Wage	3.92	2,133.20	69.48	5,723.35	7,929.96
	<b>Subtotal</b>	<b>21,120.32</b>	<b>9,355.05</b>	<b>474.45</b>	<b>9,687.89</b>	<b>40,637.70</b>

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Total

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<b>Total</b>	<b>270,735.84</b>	<b>45,480.17</b>	<b>7,481.52</b>	<b>28,301.24</b>	<b>351,998.78</b>
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## Appendix A: County Listing for the Region

Rhode Island  
- Newport

## Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
<b>Rhode Island</b>				
Newport	60,109	8,454,070	4,576,120	13,030,190
<b>Total</b>	<b>60,109</b>	<b>8,454,070</b>	<b>4,576,120</b>	<b>13,030,190</b>
<b>Study Region Total</b>	<b>60,109</b>	<b>8,454,070</b>	<b>4,576,120</b>	<b>13,030,190</b>

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## **Appendix G: Municipal Hazard Mitigation Action Plans**

**G1: Portsmouth, RI**

**G2: Middletown, RI**

**G3: Newport, RI**



# G

## Appendix G1 Portsmouth, Rhode Island

## Community Infrastructure/Assets Matrix

The matrix below, 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.

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
<b>Flood Prone Streets and Infrastructure</b>	Park Avenue Seawall- protects evacuation route Park Avenue Boyd's Lane Old Colony Railroad underpass Bramans Lane Defense Highway West end of Cedar Avenue West Shore Road/Hall Road Mussel Bed Shoal Road Riverside Street- at hollow at end of Morgan Frank Coello at Glen Road McCory at Windstone Glen Road at Glen Farm Road Common Fence Blvd Berkley Avenue/Attleboro Avenue Island Road Sakonnet Drive Mill Creek Narragansett Road Nagg's Pond on Prudence Island Neck Farm Road Old Mill Lane Melville neighborhood Point Road Boyds Lane Narragansett Ave. Neck Farm Road Park Avenue State Highway 24N (and on-ramp) State Highway 24S Exit 2 Railroad Ave.	Flooding due to ground saturation, and coastal flooding. Storm surge and SLR.	Maintain stormwater conveyance systems. Maintain Soil and Sediment Control Ordinance.	<ol style="list-style-type: none"> <li>1. Consider open space acquisition program.                             <ol style="list-style-type: none"> <li>a. Create and prioritize an internal list of vacant or underdeveloped parcels in flood-prone areas for the town to consider purchasing as open space.</li> <li>b. Explore resident interest in voluntary home acquisition program.</li> <li>c. Acquire priority properties.</li> </ol> </li> <li>2. Install signage showing the high-water line from past storm surge events along Park Avenue.</li> <li>3. Park Avenue seawall evaluation.</li> <li>4. Create resiliency guidelines or ordinances for development, incorporating green infrastructure, stormwater infrastructure, protect environmental assets, and promote low impact development.</li> <li>5. Participate in the Community Rating System (CRS) Program.</li> <li>6. Assess risk of debris (fallen trees) and ice from storms which may impact the natural drainage of local streams.</li> </ol>

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
	Anthony Road			
<b>Bridges</b>	Sakonnet River Bridge (operated by RITBA) Hummocks Escape Bridge to/from Island Park  Mount Hope Bridge (operated by RITBA)  Boyds Lane NB and SB The Cove/ Escape Bridge Bradford Ave. RR	High wind  Storm surge and SLR		7. Secure the structural evaluation of the Stone Bridge abutment owned by RIDOT.
<b>Wastewater</b>	On-site septic (ISDS) Sewer lines from Newport that service the west side (Melville and Navy housing) go to the sewage treatment plant in Newport.  Carnegie Abbey has own sewage treatment plant.  Navy wants to self-sustain. Sewer line on Jefferson Lane from Lawton Valley water treatment plant to Middletown, RI	Loss of power from severe storms	Distribute information regarding proper management of ISDS systems.	No new actions at this time.
<b>Water Supply Systems</b>	Main water source from Newport Emergency main line over Sakonnet River Bridge Portsmouth Water and Fire Lawton Valley Water Treatment Plant in Portsmouth, jurisdiction of Newport.  Water lines for Navy in same area as sewer. Prudence Island Water District- 4 public wells, 2 are functioning, 2 are emergency  Hog Island private wells and septic systems	Drought, Hazardous material contamination, Loss of power from other hazards, Extreme Temperatures		No new actions at this time.

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
<b>Services/Utilities</b>	Transfer Station- 305 Hedly Street Transfer station on Prudence Streetlights (not town owned yet) Turbine safety- next to water department, owned by Green Energy, feeds into the Town, on Town land Tank farms on Navy property Gas mains Electric power lines Portsmouth Water- 4 water tanks (1 is in Newport)	High winds, hurricane	Maintain all town-owned facilities and infrastructure.	8. Purchase and install generators for trash at Prudence Island and Hedley Street trash transfer station. 9. Promote coastal resilience considerations for offshore wind transmission projects.
<b>Communication Facilities</b>	Police/Fire Station- Town Access Crown Castle State Police Barracks (800Mhz) Cell Towers- town wide	Wind Lightning	Maintain equipment and redundancy.	No new actions at this time.
<b>Dams</b>	Lawton Valley (High)- owned by City of Newport Sisson (High)- owned by City of Newport St. Mary's (High)- owned by City of Newport Melville #1 (Significant)- owned by Town of Portsmouth Four low hazard dams	Severe storms- flooding upstream and downstream	Continue to update dam hazard mitigation plans and review annually with emergency management staff from Portsmouth and adjoining municipalities.  Recent action at Melville: trees removed which could cause structural damage.	No new actions at this time.
<b>Marinas/Docks</b>	Ferry Docks (2 for Prudence) Brewer Sakonnet Marina New England Boatworks Pirate Cove Marina Hinckley Yacht Services  Public Safety vessels at Carnegie Abbey	Storm surge, coastal flooding and erosion	Stage boats/docks pre-storm as necessary.	No new actions at this time.
<b>Critical Municipal Hazard Response Facilities</b>	Police Station <ul style="list-style-type: none"> <li>• 2270 East Main Road</li> <li>• 838 East Main Road (State Police)</li> </ul> Fire Station	All hazards.	Annual inspection of all town-owned, non-school buildings.	10. Assess sheltering need/capacity on Prudence Island.

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
	<ul style="list-style-type: none"> <li>• 2300 East Main Road</li> <li>• 0292 Narragansett Avenue, Prudence Island (volunteer)</li> </ul> Town Hall- 2200 E. Main Road Public Works- 143 Hedley Street Prudence Island 01351 Narragansett Ave. Portsmouth Canvassing Authority 2200 E. Main Road		Promoting participation in Code Red.	
<b>Populations</b>	All residents Elderly and infants  Island Park Common Fence Point  <u>Assisted Living</u> Atria Aquidneck Place- 125 Quaker Hill Lane Anthony House  <u>Public Housing</u> Quaker Estates Anthony House (or Assisted Living)- highest fire calls locations  <u>Mobile Homes</u> Melville Trailer Park Melville Campground Sunny Acres Davey Lane  <u>Education</u> Roger Williams dormitories Portsmouth Abbey resident students  <u>Shelters</u> Portsmouth High School (primary local, secondary regional)- 120 Education Lane Portsmouth Middle School (secondary local)- 120 Jepson Lane No designated Prudence Island Shelter	All hazards	Fire department does wellness checks before and after a destructive event.  Provide public information regarding post-disaster rebuilding regulations.  Distribute information regarding proper management of ISDS systems.	11. Inspect all senior housing facilities for compliance with building code. 12. Verify all senior housing facilities have up-to-date emergency evacuation /response plans. 13. Map the RI special needs emergency registry (RISNER) of known elderly living alone in Portsmouth that may need assistance during an emergency. 14. Improve public education on the town's website. <ol style="list-style-type: none"> <li>a. Preparation for extreme weather events and climate change.</li> <li>b. Stormwater runoff</li> <li>c. Evacuation vs shelter in place, heating and cooling centers</li> <li>d. Tie-down methods for mobile homes.</li> <li>e. Special needs registry promotion.</li> </ol> 15. Developed guidelines for managed retreat.

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
	<p>Gaudet Middle School (primary Red Cross Regional Shelter)- 113 Aquidneck Avenue, Middletown, RI</p> <p><u>Special Needs Registry</u> 100 people on the registry</p>			
<b>Businesses</b>	<p>Raytheon- Defense Marina District Melville Clements Market CVS Pharmacy Town gas stations State highway garage- fuel facility for this section of the state. Private farms</p>	<p>Severe Storms Blizzards Wind</p>		<p>16. Develop guidelines for businesses to help with continuity post-disaster. (CRB)</p>
<b>Schools</b>	<p>Portsmouth High School (primary shelter)- 120 Education Lane Portsmouth Middle School (secondary shelter)- 120 Jepson Lane Hathaway Elementary Melville Elementary Penn Field St. Philomena’s Portsmouth Abby Bradley School School Administration Building</p>	<p>Severe Storms Blizzards Wind Extreme Heat</p>	<p>Verify all public and private schools have up to date emergency response plans.</p>	<p>17. Complete structural improvements to High School Gymnasium and get it certified as a Red Cross shelter. 18. Coordinate with Roger Williams university to repurpose the former university dorms at Baypoint facility (AE flood zone).</p>
<b>Recreation Facilities</b>	<p>Island Park beach (Teddy’s Beach, State Beach) Town Beach at Sandy Point Sand Point beach on Prudence Island McCorrie Point Glen Farm Stables Glen Park Melville Ponds Campground Portsmouth Senior Center- 110 Bristol Ferry Road Founders Brook Dog park on Smith Road Common Fence Point Community Center</p>	<p>Erosion Severe storms</p>	<p>Install sand fencing annually at Town Beach.</p>	<p>No new actions at this time.</p>

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
	Elmhurst Park Bristol Ferry Town Commons Gardner Seventy Sports Complex Brown House Library Newport National Golf Greenvalley Montaup Sandy Point Stables Carnegie Abby Golf Club			
<b>Natural Resources</b>	Salt marshes Tidal marshes Coastal waters Fresh water Groundwater Wildlife and habitat areas National estuarine sanctuary Open space	Erosion	CFP salt marsh being restored.  Ferry Landing purchased by Aquidneck Land trust and given to town, now a park, shored up the seawall.  Continue to support Prudence Island Community Wildfire Protection Plan.	19. Conduct salt marsh restoration projects in priority areas (i.e. between Ferry Landing and northern extent of Common Fence Point) to ensure current and future ecosystem are resilient and serving to reduce risk to people and property. (CRB)  20. Explore the benefit and risks of reopening the salt marsh along Boyds Lane to flushing from the Sakonnet River.
<b>Historic/Cultural Resources</b>	Battle of Rhode Island Historic District Fort Butts Prudence Island Lighthouse Portsmouth Friends Meeting house Lawton-Almy-Hall Farm Greenvale Farm Hog Island Lighthouse Pine Hill Archeological Site Christian Union Church (Portsmouth Historic Society) Southernmost Schoolhouse Julia Ward Howe's Oak Glen Glen Manor House Green Animals Red Cross House (Phelps house) Library Sandy Point Stables	Wind, Severe Storms	Continue to support historical society.	21. Work with the local Historical Society on pre-storm preparedness throughout the town.

## Mission Statement

The Town of Portsmouth is building a disaster resistant community and achieving sustainable development through the commitment of state and local government and its policymakers to mitigate hazard impacts before disaster strikes. By doing so, local leaders aim to preserve and enhance the quality of life, property, and resources.

## Mitigation Goals

To effectuate the mission statement, the Town of Portsmouth establishes the following hazard mitigation goals, toward which all action must reach:

1. Protect public health, safety and welfare; minimize social dislocation and distress due to impacts from natural hazards.
2. Prioritize underserved and disadvantaged communities, especially those in high-risk areas.
3. Reduce property damages caused by natural hazards.
4. Reduce economic loss and minimize disruption to local business due to natural hazards.
5. Implement actions which protect Aquidneck Island's cultural, historic, and natural environments.
6. Protect the ongoing operations of critical facilities and infrastructure during and after a storm/event.
7. Expedite post-disaster mitigation efforts during the recovery phase.
8. Promote non-structural flood and coastal erosion measures to reduce the risk of damage to the surrounding properties and environmental habitats.

## Status of Prior Actions

Action	Status	Notes
Create and prioritize an INTERNAL list of vacant or under developed parcels in flood-prone areas for the town to consider purchasing as open space.	Not Complete	Continue with action but also seek to buyout parcels who deal with repeated flooding with an option to take part in a voluntary buyout program with a floodplain easement.  <i>Move to 2025 Plan.</i>
Explore interest in voluntary acquisition program.	Not Complete	Continue to explore.  <i>Move to 2025 Plan.</i>
Acquire vacant or underdeveloped properties.	Not Complete	Continue to explore.  <i>Move to 2025 Plan.</i>
Amend zoning ordinance to incorporate multiple hazards.	Completed	Zoning Ordinances have already been amended for the purposes of floodplain management and state building code compliance. Continue to monitor proposed changes and implement as necessary.
Distribute National Flood Insurance Program information to all households in the floodplain area.	Move to Ongoing Actions.	FEMA and Homeowners coverage presentations and handouts have been provided to Prudence Island, Common Fence Point, Island Park and Hummocks at least once or more over the past two years and mentioned in local newspaper as well as on Town TV.
Public outreach to residents and business owners in the most vulnerable areas: -Island Park -Common Fence Point -Melville business district	Move to Ongoing Actions.	PEMA has established three Neighborhood Preparedness Committees (Common Fence Point, Prudence Island, and Island Park and Hummocks), each meeting monthly and engaged in disaster resiliency, to include mitigation projects.
Develop signage showing the high- water line from past storm surge events along Park Avenue. This signage should include information about past storm damage in the area, as it has been some time since significant damage has been recorded.	Not Complete	Continue to pursue. Seems like it could be an Eagle Scout project.  <i>Move to 2025 Plan.</i>
Park Avenue seawall: structural evaluation	Not Complete	<i>Move to 2025 Plan.</i>
Park Avenue seawall: beach nourishment	Not Complete	<i>Move to 2025 Plan.</i>
Park Avenue seawall: culvert replacement	Not Complete	<i>Move to 2025 Plan.</i>

<b>Action</b>	<b>Status</b>	<b>Notes</b>
Stone Bridge abutments: Ask RIDOT who owns it.	Completed	Currently state-owned.
Stone Bridge abutments: Ask RIDOT to do a structural evaluation	Not Complete	<i>Move to 2025 Plan.</i>
Ask RIDOT, to do a structural evaluation on the Common Fence Point railroad underpass.	Completed	Conducted July 2024. Fair condition.
Install an inground stormwater injection system along Riverside Street.	N/A	No longer relevant due to green infrastructure at Riverside Street.
Install riprap on the North side of Common Fence Point Boulevard.	Completed	
Repair cement roadway on Prudence Island that leads to the dock.	Completed	
Communicate with RI Turnpike and Bridge Authority about storm-time operations of Sakonnet River Bridge and Mount Hope Bridge	Completed	PEMA has this information for all bridges, and it is part of our public communications plan for severe weather events.
Purchase a second generator for Prudence Island pump stations.	Completed	
Improve communications with Newport Water	Move to Ongoing Actions.	This can always be improved but isn't an action with a start and finish point.
Conduct power assessment for Prudence Island and Hedley Street Transfer Stations.	Completed	
Purchase and install generators for Prudence Island and Hedley Street Transfer Stations.	Not Complete	<i>Move to 2025 Plan.</i>
Have all dam emergency action plans on file.	Completed	
Codify orders of succession during an emergency.	Completed	
Adopt Continuity of Operations Plan (COOP) for each Town agency.	Not Complete	Currently underway.
Participate in the Community Rating System (CRS) program	Not Complete	Continue to explore. Capacity issue. <i>Move to 2025 Plan.</i>
Prudence Island: Explore funding opportunities to build a public safety complex.	Not Complete	Continue to explore. <i>Move to 2025 Plan.</i>
Prudence Island: Consider including sheltering capacity as part of the plans to build a new public safety complex	Not Complete	Continue to explore. <i>Move to 2025 Plan.</i>
Inspect all senior housing facilities for compliance with building code.	Not Complete	Capacity issue. <i>Move to 2025 Plan.</i>

Action	Status	Notes
Verify all senior housing facilities have up-to-date emergency response plans	Not Complete	<i>Move to 2025 Plan.</i>
Create an inventory of known elderly living alone that may need assistance during an emergency.	Complete.	List is available, add a new action in 2025 to map the locations.
Provide information online for improved tie-down methods for mobile homes.	Not Complete	Enhance and <i>move to 2025 Plan.</i>
Back-up power for pharmacy, grocery, and north and south gas stations. Conduct a power needs assessment (generator needs study) for each site.	Complete	
Dredge Founders' Brook near Old Boyd's Lane to reduce flooding at Founders' Brook Park and Boyd's Lane.	Not Complete	<i>Move to 2025 Plan. Part of Regional Actions.</i>

## Mitigation Actions

The RHMC decided to propose actions that addressed certain vulnerabilities that were identified earlier in the planning process. See Chapter 4.

The worksheets below summarize the specific problem and proposed possible solution, details the primary tasks to be undertaken, identifies an appropriate lead and anticipates financing options.

After all the Portsmouth action details were completed, the representatives from Portsmouth were given an anonymous survey to rank the priority of each action on the city. Each action was rated a high, medium, or low priority for the city as a whole. This helps to generally prioritize needs when funding becomes available or budgeted. In the case where the survey results showed a tie, the higher priority was assigned. When an equal number of respondents prioritized an action as low and high, the medium priority was assigned. All rankings were reviewed by the Portsmouth representatives during the draft plan review stage.

The Portsmouth group was encouraged to propose a range of mitigation actions regardless of project costs. Some of the less expensive action items such as assessing the sheltering needs/capacity on Prudence Island is a low-cost item but can still provide a lot of benefit to the town. Improvements to state-owned structures such as Park Avenue seawall and Stone Bridge carry the additional burden of requiring coordination with State agencies which may have competing interests. If costs have already been set aside for a particular mitigation action, the Portsmouth group prioritized that action to ensure that it was completed, and funds were spent in a timely manner.

Funding and staff time will be the determining factors on when various actions are completed. The Portsmouth group understands that implementation of many of these proposed actions requires the securing external funding.

These actions include wants to prevent or reduce the consequences of disaster (mitigation), planning and education (preparedness), improved response in the immediate aftermath of an event (response), and improved restoration efforts (recovery). Those which are true mitigation actions are noted as such.

There are necessary planning elements that need to be completed before additional mitigation actions can be considered. The Portsmouth group has identified a range of actions below, some of which are planning activities. However, there is a mitigation action identified for each vulnerable area where applicable.

### Priority Level

- › **High:** Reduces the greatest risks, is important to accomplish first, funding has already been secured.
- › **Medium:** May need other actions to be completed first, funding may need to be identified.
- › **Low:** Less of an impact on safety and property.

### Time Frame (from date of plan adoption)

- › **Short Term:** less than 2 years
- › **Medium Term:** 2-3 years
- › **Long Term:** 3-5 years

### Mitigation Actions

## VULNERABILITY: Flood Prone Streets and Infrastructure

<b>MITIGATION ACTION:</b> 1. Consider open space acquisition program. a. Create and prioritize an internal list of vacant or underdeveloped parcels in flood-prone areas for the town to consider purchasing as open space. b. Explore resident interest in voluntary home acquisition program. c. Acquire priority properties.	<b>ACTION PRIORITY</b>	
	<input type="checkbox"/> High	<input checked="" type="checkbox"/> Medium
	<input type="checkbox"/> Low	
	<b>Action Status</b>	
	2018	

### Rationale

One of the best ways to prevent flood damage is to keep flood-prone areas undeveloped. The town needs to develop a process to maintain open space and to create more open floodplain.

### Benefits

Enhanced natural floodplain may lessen flooding of the built infrastructure. Fewer flood insurance claims.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input checked="" type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Support from Town Council.

If there is strong interest from residents, the Town may need additional Technical Assistance to manage a robust program.

Lead/Champion	Support
Planning Department	Town Planning Board, Town Council, Aquidneck Land Trust, RIEMA and FEMA

Potential Funding Sources	Estimated Cost	Timeline
RI Municipal Resiliency Program (MRP) action grants	<input type="checkbox"/> less than \$10,000	<input checked="" type="checkbox"/> Short Term (less than 2 years)
FEMA BRIC grants	<input type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)
FEMA FMA grants	<input checked="" type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

### Other Notes

Special consideration should be given to parcels that experience repeated flooding and those that provide public access to the shoreline. With assistance from the MRP action grant, the town was recently able to acquire a property on Riverside Street and install green infrastructure to alleviate drainage flooding.

## VULNERABILITY: Flood Prone Streets and Infrastructure

<b>MITIGATION ACTION:</b> 2. Install signage showing the high-water line from past storm surge events along Park Avenue.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2018

### Rationale

Public awareness of past storm damage is important in guiding future mitigation activities.

### Benefits

More informed decision making by residents and visitors.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input checked="" type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Accurately calculating the high-water mark.

Lead/Champion	Support
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Planning Department      Portsmouth DPW

Potential Funding Sources	Estimated Cost	Timeline
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Aquidneck Land Trust	<input checked="" type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)
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### Other Notes

This signage should include information about past storm damage in the area, as it has been some time since significant damage has been recorded.

Common Fence Point and Island Park/Hummocks are already designing signage for their neighborhoods.

See Nantucket example here: <https://coastalengineeringcompany.com/portfolio/easy-street-park>



## VULNERABILITY: Flood Prone Streets and Infrastructure

<b>MITIGATION ACTION:</b> 3. Park Avenue seawall evaluation.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2018

### Rationale

The over 60-year-old seawall has exceeded its anticipated useful life and needs a structural evaluation before repairs can be made. At normal high tides, portions of the beach are submerged, and seawater reaches the base of the seawall, severely compromising its integrity.

### Benefits

The seawall protects a critical evacuation route for the Park Avenue neighborhood and as such is a paramount safety concern.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input checked="" type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

This is owned by RIDOT. Costs to repair the seawall would be borne by the State.

<b>Lead/Champion</b> Portsmouth DPW	<b>Support</b> RIDOT, RI CRMC				
<b>Potential Funding Sources</b> RIDOT	<table border="1"> <tr> <td> <b>Estimated Cost</b> </td> <td> <b>Timeline</b> </td> </tr> <tr> <td> <input type="checkbox"/> less than \$10,000  <input type="checkbox"/> \$10,000 to \$100,000  <input checked="" type="checkbox"/> Over \$100,000                 </td> <td> <input checked="" type="checkbox"/> Short Term (less than 2 years)  <input type="checkbox"/> Medium Term (2-3 years)  <input type="checkbox"/> Long Term (3-5 years)                 </td> </tr> </table>	<b>Estimated Cost</b>	<b>Timeline</b>	<input type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input checked="" type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)
<b>Estimated Cost</b>	<b>Timeline</b>				
<input type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input checked="" type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)				

### Other Notes

Some residents are currently trying to have discussions with RIDEM and RIDOT. Portsmouth DPW to follow up with those residents.

## VULNERABILITY: Flood Prone Streets and Infrastructure

<b>MITIGATION ACTION:</b> 4. Create resiliency guidelines or ordinances for development, incorporating green infrastructure, stormwater infrastructure, protect environmental assets, and promote low impact development.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	New

### Rationale

The Town wants to ensure that projects are in line with climate change projections and municipal goals. The Atlantic Beach District, which is the main commercial area in Portsmouth, may benefit from elevation guidelines.

### Benefits

Improve capacity to convey and retain/store stormwater runoff. Improve water quality. Reduce floods caused by heavy rains.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Legal.

Lead/Champion	Support
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Planning Department      Town Council, Town Administration

Potential Funding Sources	Estimated Cost	Timeline
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Planning Department operating budget Technical Assistance Grants	<input type="checkbox"/> less than \$10,000	<input checked="" type="checkbox"/> Short Term (less than 2 years)
	<input checked="" type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)
	<input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

### Other Notes

Build on 2021 SNEP Resilience Capital Improvement Plan to create resiliency guidelines for development that can be turned into regional resilience municipal policies.

## VULNERABILITY: Flood Prone Streets and Infrastructure

<b>MITIGATION ACTION:</b> 5. Participate in the Community Rating System (CRS) program.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2018

### Rationale

Going above and beyond the standard flood insurance program requirements may improve the town’s resilience to recover from a disaster.

### Benefits

Lower flood insurance premiums for residents, reduced disaster costs, and improved post-disaster recovery.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input checked="" type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

The Town does not currently have the capacity to manage this program or participate in it. Would appreciate Technical Assistance from RIEMA.

Lead/Champion	Support
Planning Department	Building Official, RIEMA

Potential Funding Sources	Estimated Cost	Timeline
FEMA BRIC grant	<input checked="" type="checkbox"/> less than \$10,000	<input type="checkbox"/> Short Term (less than 2 years)
Technical Assistance grants	<input type="checkbox"/> \$10,000 to \$100,000	<input checked="" type="checkbox"/> Medium Term (2-3 years)
	<input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

### Other Notes

Planning Department is currently exploring program feasibility and will be reporting progress and recommendations to Town Administrator. There are over 1,000 structures in the SFHA and 521 flood insurance policies in town.

## VULNERABILITY: Flood Prone Streets and Infrastructure

<b>MITIGATION ACTION:</b> 6. Assess risk of debris (fallen trees) and ice from storms which may impact the natural drainage of local streams.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	New

### Rationale

Although natural woody debris may stabilize stream beds and reduce flooding, large obstructions such as storm-generated tree debris or ice in culverts and streams can cause localized flooding. The Town is proposing to assess the potential for ice to build up narrow stretches of streams and remove potentially hazardous branches near areas that are prone to flooding.

### Benefits

Reduce local flood risk.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input checked="" type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Other town priorities.

<b>Lead/Champion</b> Portsmouth DPW	<b>Support</b> Portsmouth EMA		
<b>Potential Funding Sources</b> DPW Department funding	<table border="1"> <tr> <td> <b>Estimated Cost</b>  <input checked="" type="checkbox"/> less than \$10,000  <input type="checkbox"/> \$10,000 to \$100,000  <input type="checkbox"/> Over \$100,000                 </td> <td> <b>Timeline</b>  <input type="checkbox"/> Short Term (less than 2 years)  <input checked="" type="checkbox"/> Medium Term (2-3 years)  <input type="checkbox"/> Long Term (3-5 years)                 </td> </tr> </table>	<b>Estimated Cost</b> <input checked="" type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<b>Timeline</b> <input type="checkbox"/> Short Term (less than 2 years) <input checked="" type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)
<b>Estimated Cost</b> <input checked="" type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<b>Timeline</b> <input type="checkbox"/> Short Term (less than 2 years) <input checked="" type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)		

### Other Notes

## VULNERABILITY: Bridges

<b>MITIGATION ACTION:</b> 7. Secure the structural evaluation of the Stone Bridge abutment owned by RIDOT.	<b>ACTION PRIORITY</b> <input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b> 2018

### Rationale

Stone Bridge was destroyed in 1954 by Hurricane Carol. The remaining stone abutments are important for flood control on both sides of the bridge. The Tiverton side of Stone Bridge has already undergone evaluation and improvements. Serves as a breakwater for the marina and State boat ramp. Portsmouth is interested in acquiring the area but not before a structural evaluation is either done by RIDOT (current owner) or allowed to be done by the Town.

### Benefits

Without proper maintenance, the abutments could collapse creating large debris in the waterway.

### Hazard Addressed

Storm surge

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Cooperation from RIDOT. They have not allowed access to conduct an evaluation.

<b>Lead/Champion</b> Town Administrator	<b>Support</b> Planning Department		
<b>Potential Funding Sources</b> ARPA (American Rescue Plan Act), funds already allocated.	<table border="1"> <tr> <td> <b>Estimated Cost</b>  <input type="checkbox"/> less than \$10,000  <input checked="" type="checkbox"/> \$10,000 to \$100,000  <input type="checkbox"/> Over \$100,000                 </td> <td> <b>Timeline</b>  <input type="checkbox"/> Short Term (less than 2 years)  <input checked="" type="checkbox"/> Medium Term (2-3 years)  <input type="checkbox"/> Long Term (3-5 years)                 </td> </tr> </table>	<b>Estimated Cost</b> <input type="checkbox"/> less than \$10,000 <input checked="" type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<b>Timeline</b> <input type="checkbox"/> Short Term (less than 2 years) <input checked="" type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)
<b>Estimated Cost</b> <input type="checkbox"/> less than \$10,000 <input checked="" type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<b>Timeline</b> <input type="checkbox"/> Short Term (less than 2 years) <input checked="" type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)		

### Other Notes

In 2019, the State repaired a collapsed section of the structure.



**VULNERABILITY: Services/Utilities**

<b>MITIGATION ACTION:</b> 8. Purchase and install generators for trash at Prudence Island and Hedley Street trash transfer stations.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2018

**Rationale**

During a long-term power outage, back-up power will be necessary at the two transfer stations to maintain Town operations. Run compactors on Prudence Island. Transfer Station in Portsmouth requires a larger generator.

**Benefits**

Business continuity

**Hazard Addressed**

Extreme storms, wind

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input checked="" type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input checked="" type="checkbox"/> Emergency Services	<input checked="" type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

**Obstacles**

Installation on Prudence Island

Lead/Champion	Support
---------------	---------

Prudence Island DPW and Portsmouth DPW

Potential Funding Sources	Estimated Cost	Timeline
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FEMA BRIC grant

- less than \$10,000
- \$10,000 to \$100,000
- Over \$100,000

- Short Term (less than 2 years)
- Medium Term (2-3 years)
- Long Term (3-5 years)

**Other Notes**

CIP estimated cost is \$54,322

**VULNERABILITY: Services/Utilities**

<b>MITIGATION ACTION:</b> 9. Promote coastal resilience considerations for offshore wind transmission projects.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High
	<input checked="" type="checkbox"/> Medium
	<input type="checkbox"/> Low
	<b>Action Status</b>
	New

**Rationale**

Offshore wind power is becoming increasingly more feasible along the East Coast. Developers need to comply with local and state regulations at the cable landfall location. Should Portsmouth be identified as such a location, the Town would work with the developers to promote actions which reduce erosion and accommodate sea level rise.

**Benefits**

Activities which are in line with municipal goals.

**Hazard Addressed**

Storm surge, extreme storms

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input checked="" type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

**Obstacles**

<b>Lead/Champion</b>	<b>Support</b>
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Town Administration      Planning

<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
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Town Administration staff time.	<input checked="" type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)
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**Other Notes**

As needed.

## VULNERABILITY: Critical Municipal Hazard Response Facilities

<b>MITIGATION ACTION:</b> 10. Assess sheltering need/capacity on Prudence Island.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High
	<input type="checkbox"/> Medium
	<input type="checkbox"/> Low
	<b>Action Status</b>
	2018

### Rationale

The current fire station on Prudence Island is not equipped to act as a shelter and has limited space to store vehicles year-round. The town is planning to add a new police substation on Prudence Island.

### Benefits

A safe place for those that have not left the island ahead of a storm and can act as a Point of Distribution post-storm.

### Hazard Addressed

Extreme storms

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input checked="" type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Funding.

<b>Lead/Champion</b>	<b>Support</b>	
Prudence Island Fire District	Portsmouth EMA, Portsmouth Fire Departments	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
Portsmouth EMA operating budget	<input checked="" type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Short Term (less than 2 years) <input checked="" type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

### Other Notes

Building a new public safety complex on this rural island may not be feasible. Understanding the needs of the residents is critical.

## VULNERABILITY: Populations

<b>MITIGATION ACTION:</b> 11. Inspect all senior housing facilities for compliance with building code.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2018

### Rationale

All buildings must meet certain standards to maintain safety.

### Benefits

Improved safety for the older population.

### Hazard Addressed

All hazards.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Staff time, permission to enter private buildings.

Lead/Champion	Support
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Building Department and Fire Department

Potential Funding Sources	Estimated Cost	Timeline
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Building Department and Fire Department Operating budgets

- less than \$10,000  
 \$10,000 to \$100,000  
 Over \$100,000

- Short Term (less than 2 years)  
 Medium Term (2-3 years)  
 Long Term (3-5 years)

### Other Notes

Portsmouth Housing Authority runs Quaker Manor.

Atria Aquidneck Place is privately run.

## VULNERABILITY: Populations

<b>MITIGATION ACTION:</b> 12. Verify all senior housing facilities have up-to-date emergency evacuation /response plans.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2018

### Rationale

All facilities should have a plan of action during an emergency.

### Benefits

Improved safety for the older population.

### Hazard Addressed

All hazards.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Staff time, permission to enter private buildings.

Lead/Champion	Support
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Emergency Management and Fire Department

Potential Funding Sources	Estimated Cost	Timeline
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Emergency Management and Fire Department Operating budgets

- less than \$10,000
- \$10,000 to \$100,000
- Over \$100,000

- Short Term (less than 2 years)
- Medium Term (2-3 years)
- Long Term (3-5 years)

### Other Notes

Portsmouth Housing Authority runs Quaker Manor.  
 Atria Aquidneck Place is privately run.

## VULNERABILITY: Populations

<b>MITIGATION ACTION:</b> 13. Map the RI special needs emergency registry (RISNER) of known elderly living alone in Portsmouth that may need assistance during an emergency.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2018

### Rationale

Many people may need extra help during a time of emergency, including those which use life support systems, have chronic conditions which require treatment, are visually or hearing impaired, have behavioral health disabilities, or use assistive animals a prothesis.

### Benefits

Improved safety for the older population. More efficient emergency preparedness and response.

### Hazard Addressed

All hazards.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Staff time, permission to enter private buildings.

Lead/Champion	Support
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Emergency Management	Planning Department, Portsmouth Senior Center
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Potential Funding Sources	Estimated Cost	Timeline
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Emergency Management Operating budgets	<input checked="" type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)
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### Other Notes

## VULNERABILITY: Populations

<b>MITIGATION ACTION:</b> 14. Improve public education on the Town’s website. a. Preparation for extreme weather events and climate change. b. Stormwater runoff. c. Evacuation vs shelter in place, heating and cooling centers. d. Tie-down methods for mobile homes. e. Special needs registry promotion.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2018

### Rationale

Education can encourage changes in behavior and help people make informed decisions.

### Benefits

Fewer drivers getting stranded in floodwaters, more informed building decisions, reducing damages from rising sea levels.

### Hazard Addressed

All hazards.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input checked="" type="checkbox"/> Education and Awareness			

### Obstacles

Funding

Lead/Champion	Support
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Emergency Management      Planning Department

Potential Funding Sources	Estimated Cost	Timeline
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Emergency Management Operating budgets	<input type="checkbox"/> less than \$10,000 <input checked="" type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)
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### Other Notes

The town is currently updating the website with new topics of interest for residents and business communities.

## VULNERABILITY: Populations/Businesses

<b>MITIGATION ACTION:</b> 15. Develop guidelines for managed retreat.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High
	<input type="checkbox"/> Medium
	<input type="checkbox"/> Low
	<b>Action Status</b>
	New

### Rationale

The Town of Portsmouth has assets and neighborhoods that are vulnerable to future sea level rise conditions if left alone. A managed retreat approach can mitigate the immediate damages from storm surge and sea level rise.

### Benefits

Reduction in property damages.

### Hazard Addressed

All hazards.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Funding

<b>Lead/Champion</b>	<b>Support</b>	
Town Administrator, Town Council	Planning Department	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
FEMA BRIC Technical Assistance grants.	<input type="checkbox"/> less than \$10,000 <input checked="" type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

### Other Notes

Coordinate efforts with voluntary home acquisition program.

## VULNERABILITY: Businesses

<b>MITIGATION ACTION:</b> 16. Develop guidelines for critical businesses to remain operational to help with post-disaster resource distribution.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	New

### Rationale

Portsmouth’s commercial districts are largely along W. Main Road (Route 114) and E. Main Road (Route 138) which are centrally located, away from the coast. Pockets of more industrial areas are located on the western coast. Examples of critical businesses include Clements Market, gas stations, and pharmacies.

### Benefits

Business continuity. Resource distribution.

### Hazard Addressed

Hurricanes, flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Funding

Lead/Champion	Support
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Portsmouth EMA      Town Administrator, Town Council

Potential Funding Sources	Estimated Cost	Timeline
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Portsmouth EMA operating budget	<input type="checkbox"/> less than \$10,000	<input checked="" type="checkbox"/> Short Term (less than 2 years)
FEMA BRIC Technical Assistance grants.	<input checked="" type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)
	<input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

### Other Notes

## VULNERABILITY: Schools

<b>MITIGATION ACTION:</b> 17. Complete structural improvements to (old) high school gymnasium and get it certified as a Red Cross Shelter.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	New

### Rationale

The town is interested in having a certified Red Cross shelter. Resiliency actions which mitigate wind damage to the roof were not incorporated into the new high school gym. The old high school gym is better equipped to withstand high winds but improvements and re-certification needs to occur.

### Benefits

Safe shelter capabilities.

### Hazard Addressed

Extreme storms

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Funding

<b>Lead/Champion</b>	<b>Support</b>	
Emergency Management	School Department	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
Town Capital funds.	<input type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input checked="" type="checkbox"/> Over \$100,000	<input type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input checked="" type="checkbox"/> Long Term (3-5 years)

### Other Notes

Improvements include re-assessing the location of the generator which currently does not reach either gym.

This action is being included in the updated Capital Improvement Plan.

## VULNERABILITY: Schools

<b>MITIGATION ACTION:</b> 18. Coordinate with Roger Williams university to repurpose the former university dorms at Baypoint facility (AE flood zone).	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	New

### Rationale

As of Spring 2024, Roger Williams University has discontinued using the Baypoint building as an option for student housing. This aligns better with the University master plan goal to house all undergraduates at the main campus in Bristol, RI.

### Benefits

Students are no longer living in a floodplain.

### Hazard Addressed

Flooding.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input checked="" type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

University goals may not be clear.

Lead/Champion	Support
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Roger Williams University      Town Administration

Potential Funding Sources	Estimated Cost	Timeline
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Staff time for Town Administration.	<input type="checkbox"/> less than \$10,000	<input checked="" type="checkbox"/> Short Term (less than 2 years)
	<input type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)
	<input checked="" type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

### Other Notes

Baypoint may still be used for university office space. The Town may be able to influence the University's decision. Good opportunity for partnering.

## VULNERABILITY: Natural Resources

<b>MITIGATION ACTION:</b> 19. Conduct salt marsh restoration projects in priority areas (Bertha K. Russel preserve, between Ferry Landing and northern extent of Common Fence Point, and between Park Avenue and the beach, and NBNERR property on Prudence Island, among others) to ensure current and future ecosystem are resilient and serving to reduce risk to people and property. a. Synthesize and consider current studies and efforts b. Develop a longer-term salt marsh restoration plan	<b>ACTION PRIORITY</b> <input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b> New

**Rationale**

High tides are leaving more salt water stranded in the marsh and killing vegetation. In addition to providing critical habitat, salt marshes play an important role in buffering wave action.

**Benefits**

Natural resource protection.

**Hazard Addressed**

Flooding.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input checked="" type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

**Obstacles**

Coordination among all involved parties. Funding.

<b>Lead/Champion</b>	<b>Support</b>	
Planning Department	Eastern Rhode Island Conservation District (ERICD), RIDEM, CRMC, ALT	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
RIDEM Narragansett Bay Research Reserve	<input type="checkbox"/> less than \$10,000	<input checked="" type="checkbox"/> Short Term (less than 2 years)
FEMA BRIC	<input type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)
<ul style="list-style-type: none"> <li>Natural resilience grants</li> <li>Technical Assistance grants</li> </ul>	<input checked="" type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

**Other Notes**

See Martha’s Vineyard dune planting project at South Beach.

Salt marsh has been restored and maintained at Common Fence Point. Additional improvements need to be made to resolve water flow issues.

Narragansett Bay National Estuarine Research Reserve is beginning a salt marsh restoration project on some of their land on Prudence Island. The salt marshes within the Reserve are still exhibiting signs of degradation due to increased rates of sea level rise, such as accelerated creek bank erosion, vegetation die-off, and expansion of surface water areas on the marsh platform.

**VULNERABILITY: Natural Resources**

<b>MITIGATION ACTION:</b> 20. Explore the benefit and risks of reopening the salt marsh along Boyds Lane to flushing from the Sakonnet River.	<b>ACTION PRIORITY</b> <input type="checkbox"/> High <input type="checkbox"/> Medium <input checked="" type="checkbox"/> Low
	<b>Action Status</b> New

**Rationale**

These water bodies were once connected. Since it was closed off with the construction of Park Avenue, the water behind Park Avenue has become stagnant and a breeding ground for mosquitoes.

**Benefits**

Saltwater marsh restoration. Allow for natural removal of sediment. Improve coastal wetland function as a buffer to storm surge.

**Hazard Addressed**

Flooding.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input checked="" type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

**Obstacles**

Neighborhood support.

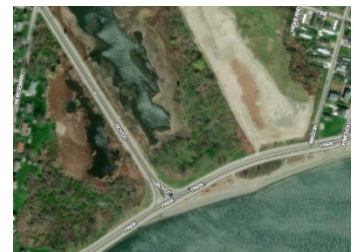
Lead/Champion	Support
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Planning Department | Portsmouth Conservation Commission

Potential Funding Sources	Estimated Cost	Timeline
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R.I. Coastal and Estuarine Habitat Restoration Program and Trust Fund (CRMC/NBNERR)  National Resources Conservation Services (NRCS)	<input type="checkbox"/> less than \$10,000	<input checked="" type="checkbox"/> Short Term (less than 2 years)
	<input checked="" type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)
	<input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

**Other Notes**



## VULNERABILITY: Historic and Cultural Resources

<b>MITIGATION ACTION:</b> 21. Work with Historical Society on pre-storm preparedness throughout the town.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	New

### Rationale

The historical society’s museum is located at the NW corner of East Main Road (Route 138) and Union Street. This building is not located in an area prone to flooding but may be susceptible to high wind damage. It houses rare collections and documents. There are various historic properties throughout town that should also be prepared for extreme weather.

### Benefits

Protecting history.

### Hazard Addressed

Rain, high wind.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input checked="" type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Lead/Champion	Support
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Portsmouth EMA

Potential Funding Sources	Estimated Cost	Timeline
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Portsmouth EMA staff time.

- less than \$10,000
- \$10,000 to \$100,000
- Over \$100,000

- Short Term (less than 2 years)
- Medium Term (2-3 years)
- Long Term (3-5 years)

### Other Notes

<https://portsmouthhistorical.org/#:~:text=Welcome%20to%20the%20Society.%20The%20Portsmouth%20Historical%20Society%20is>



# Appendix G2 Middletown, Rhode Island

## Community Infrastructure/Assets Matrix

The matrix below, 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.

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
<b>Flood Prone Streets and Infrastructure</b>	<p><b>Flood Prone Areas</b></p> <ul style="list-style-type: none"> <li>• Berkely Ave.</li> <li>• Birchwood Rd.</li> <li>• Champlin Terrace</li> <li>• Forest Ave.</li> <li>• Green End Ave.</li> <li>• Oliphant Ln.</li> <li>• Third Beach Rd.</li> <li>• Wave Ave.</li> <li>• Wood Rd.</li> <li>• E. Main Rd./Bailey Brook (State)</li> <li>• E. Main/Wyatt Rd. (State)</li> <li>• Sachuest Pt. Rd. (State)</li> <li>• Atlantic Beach District: South of Newport Ave. and Aquidneck Ave.</li> </ul> <p><b>Evacuation Route Intersections</b></p> <ul style="list-style-type: none"> <li>• East Main Rd. at Forest Ave., Valley Rd.</li> <li>• West Main Rd. at Forest Ave., Valley Rd., Admiral Kalbfus, Coddington Hwy, and East Main Rd.</li> <li>• Green End Ave at Valley Rd., Aquidneck Ave.</li> </ul> <p><b>Recent Development Project Stormwater BMP's</b></p> <ul style="list-style-type: none"> <li>• Island Drive</li> <li>• Overlea Farm</li> <li>• Valley View</li> <li>• Windover Farm</li> <li>• Wave Ave</li> <li>• Aquidneck</li> <li>• Highlands (Julie Ct.)</li> <li>• Saltwood Farm</li> <li>• Bay Ridge</li> </ul> <p><b>Shoreline Property</b></p> <p>All shoreline property along the Atlantic Ocean and Narragansett Bay</p>	<p><b>Hazards:</b> Hurricanes/Nor'easters Storm Surge Erosion Flooding</p> <p><b>Problems:</b> Property damage.</p> <p>Economic and tourism disruption.</p> <p>Evacuation and emergency services hindered.</p> <p>Property, infrastructure and lives at risk.</p> <p>Potential loss of traffic signals.</p> <p>Overtopping of runoff storage areas.</p> <p>Property loss due to shoreline erosion</p>	<p>Maintain safe roads.</p> <p>Regulate development in the Maidford River and Bailey Brook Watersheds. Supported through Watershed Protection Ordinance, SFHA Building Code requirements, plan reviews and compliance w SWWP.</p> <p>Clear debris from Maidford River.</p> <p>Open Space Preservation.</p> <p>Enforce property owners/homeowners associations to maintain drainage features.</p>	<ol style="list-style-type: none"> <li>1. Increase culvert size, raise roadbeds, clear brooks, add guiderails, and make stormwater and drainage improvements to Town roads.             <ol style="list-style-type: none"> <li>a. Maidford River/Berkley Avenue culverts</li> <li>b. Bailey Brook/Green End Avenue culverts</li> </ol> </li> <li>2. Retrofit roadside swales focusing on Bailey Brook stormwater management improvements in public rights of way.</li> <li>3. New stormwater BMP to remove pavement at Turner Road, Green End Avenue, Paradise Avenue, and Berkely Avenue.</li> <li>4. Establish a Middletown Resilience Committee to help incorporate resilience mandates into the practices and help focus all town councils, boards, and commissions.</li> <li>5. Create resiliency guidelines or ordinances for development, incorporating green infrastructure, stormwater infrastructure, protect environmental assets, and promote low impact development.</li> </ol>
<b>Bridges</b>	<p>None</p>	<p>NA</p>	<p>NA</p>	<p>NA</p>

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
<b>Wastewater</b>	<p>Wave Ave. Sewage Pump Station – Wave Ave. and Memorial Blvd.</p> <p>Paradise Ave. Sewage and Pump Station – Paradise Ave. at Sachuest Pt. Rd.</p>	<p><b>Hazards:</b>                      Flooding                      Severe Weather                      Hurricanes/Nor’easters</p> <p><b>Problems:</b>                      Overflow, pollution of sensitive coastal area (Easton’s Bay) around First Beach and local streets.</p> <p>Overflow, pollution of sensitive wetland areas around Second Beach and swimming inlets</p>	<p>Eliminating illegal sump pump connections.</p>	<p>6. Pump station improvements</p> <ol style="list-style-type: none"> <li>a. Paradise Avenue Pump Station floodproofing.</li> <li>b. Upgrade Coddington pump station and re-direct wastewater from Wave Avenue pump station by diverting West Side sewage directly to the sewage treatment plant.</li> </ol>
<b>Water Supply Systems</b>	<p>Easton Pond</p>	<p><b>Hazards:</b>                      Hurricanes/Nor’easters                      Flooding                      Winter Storms                      Tornados                      Earthquakes</p> <p><b>Problems:</b>                      Loss of water supply;</p>	<p>Involved in island-wide resilience effort for Easton Pond.</p>	<p>None at this time.</p>
<b>Services/Utilities</b>	<p><b>Propane</b></p> <ul style="list-style-type: none"> <li>• B.J.’s</li> <li>• Newport Propane</li> </ul> <p>Taylor Rental</p>	<p><b>Hazards:</b>                      Hazardous Material Incident</p> <p><b>Problems:</b>                      Explosion could cause property damage and human injury/loss of life, leak could cause respiratory problems including suffocation</p>	<p>Tree trimming program. Coordinate with RI Energy for tree trimming around power lines.</p>	<p>None at this time.</p>

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
<b>Communication Facilities</b>	Town-wide	<p><b>Hazards:</b> Severe weather Hurricanes/Nor'easters Wind</p> <p><b>Problems:</b> Downed utility lines, loss of power and communications</p>	Maintain town-owned communication equipment.	7. Install two back-up repeaters for Police Department.
<b>Dams</b>	<ul style="list-style-type: none"> <li>Gardiner Pond Dam and surrounding retaining wall EAP on file</li> <li>Nelson Pond Dam and surrounding retaining wall EAP on file</li> <li>N. Easton's Pond Dam EAP on file</li> <li>S. Easton's Pond Dam EAP on file</li> </ul>	<p><b>Hazards:</b> Flooding Hurricanes/Nor'easters</p> <p><b>Problems:</b> Loss of water supply Flooding of local roads, sensitive wetlands and Second Beach area</p>	Working with dam owners to encourage proper maintenance.	None at this time.
<b>Marinas/Docks</b>	None	NA	NA	NA
<b>Critical Municipal Hazard Response Facilities</b>	<p>Fire Department at 239 Wyatt Road Police Department at 123 Valley Road (near SFHA) Public Works Garage at 239 Wyatt Road/Berkeley Town Hall at 350 East Main Road Potter League for Animals at 87 Oliphant Lane State Airport</p> <p><b>American Red Cross Mass Care Facilities:</b></p> <ul style="list-style-type: none"> <li>Gaudet Middle School (primary) at 1113 Aquidneck Avenue</li> </ul> <p>Middletown High School (secondary) at 130 Valley Road</p>	<p><b>Hazards:</b> Hurricanes/Nor'easters Wind Severe Weather</p> <p><b>Problems:</b> Downed utility lines, loss of power and communications, Evacuation routes and roads blocked, Limited bandwidth to focus on coordinated planning with other towns</p>	New school building which will include middle school and high school will handle emergency sheltering.	8. Improve access to emergency shelters. <ul style="list-style-type: none"> <li>Conduct a feasibility study on offering emergency buses from low-income neighborhoods to evacuation shelters.</li> <li>If needed, develop an implementation plan.</li> </ul>
<b>Populations</b>	<p>Low Income: Oxbow &amp; Commodore Perry Disabled: Unity Dr. Group homes:</p>	<p><b>Hazards:</b> Severe weather Wind</p>	Maintain roads during snow/ice events.	9. Revisit the list and prioritize communicating with individuals who

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
	<ul style="list-style-type: none"> <li>• Anita Jackson House</li> <li>• Jepson Ln.</li> <li>• Beacon St.</li> <li>• Green End Ave.</li> <li>• Beagle Dr.</li> <li>• William Dr.</li> <li>• Toni Lynn Ter.</li> </ul> <p>Day Programs: Maher Center &amp; Forest Farm Adult Day Services</p> <ul style="list-style-type: none"> <li>• Nursing homes &amp; assisted living</li> <li>• Daycare &amp; schools</li> </ul> <p>People with Special Needs Registry (RIDOH)</p>	<p>Hurricanes/Nor'easters Flooding</p> <p><b>Problems:</b> No access to car to evacuate Unable to evacuate independently Isolation during power outage or due to roadways being impassable Health risk due to medical equipment failing during a power outage</p>	<p>Emergency Preparedness information available online.</p>	<p>rely on electronic health devices during power outages.</p> <p>10. Increase efforts to encourage the public to be added to RI Department of Health's registry of people with special needs and to sign up for Code Red alerts.</p> <p>11. Provide educational resources for property owners with properties in the flood zone to floodproof their structures.</p>
<b>Businesses</b>	<ul style="list-style-type: none"> <li>• Commercial properties along Route 114 and Route 138.</li> <li>• Atlantic Beach District</li> </ul>	<p><b>Hazards:</b> Flooding Hurricanes Nor'easters Sea Level Rise Erosion</p>	<p>Atlantic Beach District Development Plan.</p>	<p>12. Formally add Fire Chief/EMA Director to Technical Review Committee which reviews applications relating to hazardous materials.</p>
<b>Schools</b>	<ul style="list-style-type: none"> <li>• Aquidneck School – 70 Reservoir Avenue</li> <li>• Forest Avenue School – 315 Forest Avenue</li> <li>• Gaudet Learning Academy and Middle School – 1113 Aquidneck Avenue</li> <li>• Middletown High School – 130 Valley Road</li> <li>• St. Georges School – 372 Purgatory Road</li> <li>• All Saints STEAM Academy – 915 W Main Road</li> </ul>	<p><b>Hazards:</b> Hurricanes/Nor'easters Flooding Winter Storms Tornadoes Earthquakes</p> <p><b>Problems:</b></p>	<p>Clear snow/ice on sidewalks and parking lots.</p>	<p>None at this time.</p>
<b>Recreation Facilities</b>	<ul style="list-style-type: none"> <li>• St. Georges School Ice Rink</li> <li>• Sachuest Pt. Campground</li> <li>• Forest Ave. Trailer Park</li> <li>• Mello Trailer Park</li> <li>• Prospect Ave. Trailer Park</li> </ul>	<p><b>Hazards:</b> Flooding Erosion Wind</p> <p><b>Problems:</b> Campers not properly anchored</p>	<p>Educating about properly anchoring and securing mobile homes and recreational vehicles</p>	<p>13. Armor the shoreline at Dunlap Wheeler Park.</p> <p>14. New stormwater BMP at Wyatt field.</p>

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
<b>Natural Resources</b>	<ul style="list-style-type: none"> <li>• Maidford River</li> <li>• Bailey Brook</li> <li>• Sachuest Point</li> <li>• Norman Bird Sanctuary</li> <li>• Albro Woods</li> </ul>	<p><b>Hazards:</b>                      Flooding                      Erosion                      Wildfire</p> <p><b>Problems:</b>                      Flooding of evacuation routes and sensitive wetlands                      Pollution of water supply                      Flooding of sensitive wetlands                      Habitat loss due to accidental wildfires during drought periods</p>	<p>Tree trimming program. Maintaining the public tree database for the Town’s GIS.</p> <p>Continue to clear debris from Maidford River.</p> <p>Tree Commission manages the planning and maintenance of trees on Town property. Also reviews landscape plans for commercial developments.</p>	<ol style="list-style-type: none"> <li>15. Stormwater BMPs (tree boxes) in neighborhoods near the Maidford River.</li> <li>16. Continue to partner with the Aquidneck Land Trust to develop a strategy for open space acquisition.</li> <li>17. Investigate nature-based solutions to protect against storm surge and sea level rise around Sachuest Point.</li> </ol>
<b>Historic/Cultural Resources</b>	<ul style="list-style-type: none"> <li>• Stonybrook Estate Historic District</li> <li>• Smith-Gardiner-Norman Farm Historic District (SFHA)</li> <li>• Whitehall/Bishop George Berkeley House</li> <li>• Taylor-Chase-Smythe House</li> <li>• Witherbee School</li> <li>• Paradise School (SFHA)</li> <li>• Boyd’s Windmill</li> <li>• St. Georges School</li> <li>• Clambake Club of Newport (SFHA)</li> <li>• St. Columba’s</li> <li>• Bailey Farm (SFHA)</li> <li>• Middletown Historical Society Building (SFHA)</li> </ul>	<p><b>Hazards:</b>                      Flooding                      Erosion                      Hurricanes/Nor’easters                      Wind                      Severe weather</p>	<p>Active Middletown Historical Society, an all-volunteer, non-profit educational organization.</p>	<ol style="list-style-type: none"> <li>18. Distribute Silver Jackets/ACOE report “Historical Structure Flood Hazard Vulnerability Assessment”.</li> </ol>

## Mission Statement

The Town of Middletown is building a disaster resistant community and achieving sustainable development through the commitment of state and local government and its policymakers to mitigate hazard impacts before disaster strikes. By doing so, local leaders aim to preserve and enhance the quality of life, property, and resources.

## Mitigation Goals

To effectuate the mission statement, the Town of Middletown establishes the following hazard mitigation goals, toward which all action must reach:

1. Protect public health, safety and welfare; minimize social dislocation and distress due to impacts from natural hazards.
2. Prioritize underserved and disadvantaged communities, especially those in high-risk areas.
3. Reduce property damages caused by natural hazards.
4. Reduce economic loss and minimize disruption to local business due to natural hazards.
5. Implement actions which protect Aquidneck Island’s cultural, historic, and natural environments.
6. Protect the ongoing operations of critical facilities and infrastructure during and after a storm/event.
7. Expedite post-disaster mitigation efforts during the recovery phase.
8. Promote non-structural flood and coastal erosion measures to reduce the risk of damage to the surrounding properties and environmental habitats.

## Status of Prior Actions

Action	Status	Notes
Study the necessity and feasibility of offering buses from low-income neighborhoods to evacuation shelters. If the decision is made to offer this service, then develop an implementation plan.	Not Complete	<i>Move to 2025 Plan.</i>
Prioritize communicating with individuals who rely on electronic health devices during power outages.	Not Complete	<i>Move to 2025 Plan.</i>
Increase efforts to encourage the public to be added to RI Department of Health’s registry of people with special needs and to sign up for Code Red alerts.	Not Complete	<i>Move to 2025 Plan.</i>
Evaluate the possibility of expanding the number of emergency shelter beds available during an evacuation event.	Not Complete	Covered in <i>2025 Regional Actions.</i>
Develop incentives for property owners with properties in the flood zone to flood proof their structures.	Not Complete	Reword to “Provide educational resources for property owners...” <i>Move to 2025 Plan.</i>

Action	Status	Notes
Offer technical assistance on business continuity plans to local business community.	Not Complete	Current lack of staff capacity and funding. <i>Defer in 2025.</i>
Increase culvert size, raise roadbeds, clear brooks, add guiderails, and make stormwater and drainage improvements to Town roads.	Not Complete	<i>Move to 2025 Plan.</i>
Formalize input of emergency management staff in DPR application process for applications relating to hazardous materials.	Not Complete	<i>Move to 2025 Plan.</i>
Eliminate illegal sump pump connections at Wave Ave Pump Station.	Complete	Sump pump violations are currently monitored and corrected.
Eliminate illegal sump pump connections	Ongoing	This is an ongoing practice of the town. Move to Ongoing Actions.
Reduce Inflow and Infiltration at Paradise Avenue Pump Station	Complete	
Install OptiCom Sensors on Traffic Signals	Complete	
Acquire Temporary Stop Signs for Use During a Power Outage	Complete	
Continue Town Tree-Trimming Program	Ongoing	This is an ongoing practice of the town. Move to Ongoing Actions.
Create a Public Tree Database for the Town's Geographic Information System (GIS)	Ongoing	This is maintenance action of the town. Move to Ongoing Actions.
Maintain Safe Roads during Snow and Ice Events	Ongoing	This is maintenance action of the town. Move to Ongoing Actions.
Assess Impact of the Privatization of Navy Housing	Complete	
Continually Clear Debris from the Maidford River	Ongoing	This is maintenance action of the town. Move to Ongoing Actions. Also <i>part of 2025 Regional Actions.</i>
Regulate Development in the Maidford River Watershed	Ongoing	This is an ongoing practice of the town. Move to Ongoing Actions.
Implement Debris Clearing of Bailey Brook	Ongoing	Part of <i>2025 Regional Actions.</i>
Limit Development in the Watershed of Bailey Brook	Ongoing	This is an ongoing practice of the town. Move to Ongoing Actions.
Complete Watershed Analysis and Update Flood Maps as needed.	Complete	
Extension of Buck Road to Serve as Evacuation Route.	Complete	
Work with Dam Owners to Encourage Proper Maintenance	Ongoing	This is an ongoing practice of the town. Move to Ongoing Actions.
Properly Anchor and Secure Mobile Homes and Recreational Vehicles	Ongoing	This is an ongoing practice of the town. Move to Ongoing Actions.

Action	Status	Notes
Enforce Property Owners/Homeowners Associations to Maintain Drainage Features	Ongoing	This is an ongoing practice of the town. Move to Ongoing Actions.
Evaluate which shoreline properties are at significant erosion risk due to coastal surge and wave action during Hurricanes, Tropical Storms, and other Severe Weather	Not Complete	Beyond the town's technical capabilities. <i>Move to 2025 Plan.</i>
Armor the shoreline at Dunlap Wheeler Park.	Not Complete	<i>Move to 2025 Plan.</i>
Identify any forested or heavy brush areas within the Town's jurisdiction that could create a wildfire hazard including the U.S. Sachuest Point Wildlife Refuge	Not Complete	The town does not presently contain any large areas of forest susceptible to wildfires after extended periods of dry weather. <i>Defer in 2025.</i>
Monitor fire risk areas and implement outside burn restrictions during times of severe drought	Not Complete	Has not been a current priority. <i>Defer in 2025.</i>

## Mitigation Actions

The RHMC decided to propose actions that addressed certain vulnerabilities that were identified earlier in the planning process. See Chapter 4.

The worksheets below summarize the specific problem and proposed possible solution, details the primary tasks to be undertaken, identifies an appropriate lead and anticipates financing options.

After all the Middletown action details were completed, the representatives from Middletown were given an anonymous survey to rank the priority of each action on the town. Each action was rated a high, medium, or low priority for the town as a whole. This helps to generally prioritize needs when funding becomes available or budgeted. In the case where the survey results showed a tie, the higher priority was assigned. When an equal number of respondents prioritized an action as low and high, the medium priority was assigned. All rankings were reviewed by the Middletown representatives during the draft plan review stage.

The Middletown group was encouraged to propose a range of mitigation actions regardless of project costs. Some of the less expensive action items such as improving access to emergency shelters is a low-cost item but can still provide a lot of benefit to the local population. Armoring the shoreline at Dunlap Wheeler Park is of high importance, yet it will require substantial funds. It is still a high priority for the Town to pursue funding and support to get this accomplished. If costs have already been set aside for a particular mitigation action, the RHMC prioritized that action to ensure that it was completed, and funds were spent in a timely manner.

Funding and staff time will be the determining factors on when various actions are completed. The Middletown group understands that implementation of many of these proposed actions requires the securing external funding.

These actions include wants to prevent or reduce the consequences of disaster (mitigation), planning and education (preparedness), improved response in the immediate aftermath of an event (response), and improved restoration efforts (recovery). Those which are true mitigation actions are noted as such.

There are necessary planning elements that need to be completed before additional mitigation actions can be considered. The Middletown group has identified a range of actions below, some of which are planning activities. However, there is a mitigation action identified for each vulnerable area where applicable.

### Priority Level

- › **High:** Reduces the greatest risks, is important to accomplish first, funding has already been secured.
- › **Medium:** May need other actions to be completed first, funding may need to be identified.
- › **Low:** Less of an impact on safety and property

### Time Frame (from date of plan adoption)

- › **Short Term:** less than 2 years
- › **Medium Term:** 2-3 years
- › **Long Term:** 3-5 years

### Mitigation Actions

## VULNERABILITY: Flood Prone Streets or Infrastructure

<b>MITIGATION ACTION:</b>		<b>Action Priority</b>	
<ol style="list-style-type: none"> <li>1. Increase culvert size, raise roadbeds, clear brooks, add guiderails, and make stormwater and drainage improvements to Town roads.               <ol style="list-style-type: none"> <li>a. Maidford River/Berkley Avenue culverts</li> <li>b. Bailey Brook/Green End Avenue culverts</li> </ol> </li> </ol>		<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low	
		<b>Action Status</b>	
		2019	
<b>Rationale</b>			
<p>Many of the main roads, including evacuation routes, flood, making them impassable to emergency service crews and evacuees. The flooding also puts property, infrastructure and lives at risk.</p>			
<b>Benefits</b>			
<p>Increasing culvert size, raising roadbeds, clearing brooks of debris, adding guiderails, and making stormwater and drainage improvements will help prevent road flooding. Increased public safety and decreased damage to structures and infrastructure.</p>			
<b>Hazard Addressed</b>			
Flooding			
<b>Mitigation Type</b>	<b>Supporting Plans/Efforts</b>	<b>Alignment With Plan Goals</b>	
<input type="checkbox"/> Prevention <input checked="" type="checkbox"/> Property Protection <input type="checkbox"/> Emergency Services <input type="checkbox"/> Local Plans and Regulations <input checked="" type="checkbox"/> Structure and Infrastructure <input type="checkbox"/> Natural Systems Protection <input type="checkbox"/> Education and Awareness	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans <input type="checkbox"/> CRB Workshop Summary of Findings <input type="checkbox"/> Local Capital Improvement Plans <input type="checkbox"/> Local Comprehensive Plans <input type="checkbox"/> Military Installation Resilience Review	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 5 <input checked="" type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
<b>Obstacles</b>			
Timeline to use grant funding.			
<b>Lead/Champion</b>	<b>Support</b>		
Middletown Public Works	Middletown Engineering		
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>	
Narragansett Bay and Watershed Restoration Fund Grant	<input type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input checked="" type="checkbox"/> Over \$100,000	<input type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input checked="" type="checkbox"/> Long Term (3-5 years)	
<b>Other Notes</b>			
<ol style="list-style-type: none"> <li>a. This project will install new stormwater BMPs to intercept and treat runoff from Miantonomi Avenue which discharges into North Easton Pond and replace an undersized culvert at Green End Avenue that has caused localized flooding issues for decades. North Easton Pond is part of the Newport Drinking Water Supply System. \$400,000</li> <li>b. This project would replace an undersized culvert on Berkeley Avenue with a new culvert that improves watercourse continuity and aquatic habitat, management of peak flows, and resiliency of inland habitats and community infrastructure. \$400,000</li> <li>c. September 2024: \$750,000 RIIB Action Grants awarded: May need to be completed by 2025 (RIIB).</li> </ol>			

## VULNERABILITY: Flood Prone Streets or Infrastructure

<b>MITIGATION ACTION:</b> 2. Retrofit roadside swales focusing on Bailey Brook stormwater management improvements in public rights of way.	<b>Action Priority</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	New

### Rationale

Bailey Brook is a flood prone and impaired waterbody.

### Benefits

Green infrastructure projects within the Bailey Brook subwatershed will reduce nuisance street flooding.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input checked="" type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input checked="" type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Lead/Champion	Support
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Middletown Public Works	Middletown Engineering
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Potential Funding Sources	Estimated Cost	Timeline
Southeast New England Program (SNEP) Network	<input type="checkbox"/> less than \$10,000	<input type="checkbox"/> Short Term (less than 2 years)
	<input type="checkbox"/> \$10,000 to \$100,000	<input checked="" type="checkbox"/> Medium Term (2-3 years)
	<input checked="" type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

### Other Notes

See SNEP report/RCIP. Berger Report.  
 Estimate \$86,000-\$190,000 per location.

### VULNERABILITY: Flood Prone Streets or Infrastructure

<b>MITIGATION ACTION:</b> 3. New stormwater BMP to remove pavement at Turner Road, Green End Avenue, Paradise Avenue, and Berkely Avenue.	<b>Action Priority</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	New

**Rationale**

Repeated flooding.

**Benefits**

Reduced flooding at Maidford River and Paradise Brook crossings.  
 Improved water quality.

**Hazard Addressed**

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input checked="" type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input checked="" type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

**Obstacles**

Traffic calming activities.

Lead/Champion	Support
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Middletown Public Works      Middletown Engineering

Potential Funding Sources	Estimated Cost	Timeline
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Southeast New England Program (SNEP) Network	<input type="checkbox"/> less than \$10,000	<input type="checkbox"/> Short Term (less than 2 years)
	<input type="checkbox"/> \$10,000 to \$100,000	<input checked="" type="checkbox"/> Medium Term (2-3 years)
	<input checked="" type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

**Other Notes**

See SNEP report/RCIP.  
 Estimate \$86,000-\$190,000 per location.

## VULNERABILITY: Flood Prone Streets or Infrastructure

<b>MITIGATION ACTION:</b> 4. Establish a Middletown Resilience Committee to help incorporate resilience mandates into the practices and help focus all town councils, boards, and commissions.	<b>Action Priority</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	New

### Rationale

The Town wants to ensure that projects are in line with climate change projections and municipal goals.

### Benefits

Local input to coordinate local efforts.

### Hazard Addressed

Sea level rise, flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Lead/Champion	Support
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Planning	ALT
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Potential Funding Sources	Estimated Cost	Timeline
Staff time	<input type="checkbox"/> less than \$10,000 <input checked="" type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

### Other Notes

May be covered by Aquidneck Land Trust efforts.

## VULNERABILITY: Flood Prone Streets or Infrastructure

<b>MITIGATION ACTION:</b> 5. Create resiliency guidelines or ordinances for development, incorporating green infrastructure, stormwater infrastructure, protect environmental assets, and promote low impact development.	<b>Action Priority</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	New

### Rationale

The Town wants to ensure that projects are in line with climate change projections and municipal goals. The Atlantic Beach District, which is the main commercial area in Middletown, may benefit from elevation guidelines.

### Benefits

Improve capacity to convey and retain/store stormwater runoff. Improve water quality. Reduce floods caused by heavy rains.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Lead/Champion	Support
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Middletown Planning Department	ALT, other municipalities
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Potential Funding Sources	Estimated Cost	Timeline
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Staff time	<input type="checkbox"/> less than \$10,000 <input checked="" type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)
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### Other Notes

## VULNERABILITY: Wastewater

<b>MITIGATION ACTION:</b> 6. Pump station improvements. a. Paradise Avenue Pump Station floodproofing b. Upgrade Coddington pump station and re-direct wastewater from Wave Avenue pump station by diverting West Side sewage directly to the sewage treatment plant.	<b>Action Priority</b>
	<input checked="" type="checkbox"/> High
	<input type="checkbox"/> Medium
	<input type="checkbox"/> Low
	<b>Action Status</b>
	New

### Rationale

The Town has seen an increase in severe flooding. The Paradise Pump Station is vulnerable to the 0.2% (500-year) chance flood. If flooded, sewage would discharge into sensitive wetlands areas around Second Beach and into swimming inlets. Increase of pressure on Wave Avenue pump station.

### Benefits

Clean water, wetland protection, continuity of operations of critical infrastructure.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input checked="" type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

<b>Lead/Champion</b>	<b>Support</b>	
Middletown DPW	Middletown Engineering	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
Clean Water State Revolving Fund	<input type="checkbox"/> less than \$10,000	<input checked="" type="checkbox"/> Short Term (less than 2 years)
Town Capital funds	<input type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)
	<input checked="" type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

### Other Notes

Inflow and Infiltration (I&I) investigations and repairs were made in 2012. The Municipal Resilience Program (MRP) has awarded funding for the Paradise Avenue Pump Station floodproofing (\$69,600). The CIP also has a line item to replace the Paradise Pump Station generator (\$78,000).

Seeking funding for redirect and Coddington.

## VULNERABILITY: Communication Equipment

<b>MITIGATION ACTION:</b> 7. Install two back-up repeaters for Police Department.	<b>Action Priority</b>
	<input checked="" type="checkbox"/> High
	<input type="checkbox"/> Medium
	<input type="checkbox"/> Low
	<b>Action Status</b>
	New

### Rationale

The Middletown Police Department is preparing for continuity of operations should the State communication system fail.

### Benefits

Continuity of operations

### Hazard Addressed

Severe weather such as hurricanes, Nor'easters, ice.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input checked="" type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

<b>Lead/Champion</b>	<b>Support</b>	
Police Department		
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
Municipal Public Safety Infrastructure Grant/American Rescue Plan Act (ARPA)	<input type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input checked="" type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

### Other Notes

Funding may have been appropriated in March 2024.

**VULNERABILITY: Critical Municipal Hazard Response Facilities/Populations**

<b>MITIGATION ACTION:</b> 8. Improve access to emergency shelters. a. Conduct a feasibility study on offering emergency buses from low-income neighborhoods to evacuation shelters. b. If needed, develop an implementation plan.	<b>Action Priority</b> <input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b> 2019
	2019

**Rationale**

Determine if it is feasible to expand the number of shelter beds by increasing the sheltering areas managed by the Town and the Rhode Island Red Cross. Discuss options and necessary upgrades with the school department to investigate bringing additional school facilities up to emergency shelter specifications by the Rhode Island Red Cross. Investigate any private facilities with the capacity to serve as an emergency evacuation shelter in the time of need.

**Benefits**

Decrease risk of people becoming stranded during an evacuation.

**Hazard Addressed**

Severe weather such as hurricanes, Nor'easters, ice.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

**Obstacles**

Lead/Champion	Support
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Middletown EMA	Town Administrator
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Potential Funding Sources	Estimated Cost	Timeline
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Staff time.	<input checked="" type="checkbox"/> less than \$10,000	<input type="checkbox"/> Short Term (less than 2 years)
	<input type="checkbox"/> \$10,000 to \$100,000	<input checked="" type="checkbox"/> Medium Term (2-3 years)
	<input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

**Other Notes**

Determine if there is a need to offer transportation for low-income people without vehicles to evacuation shelters during evacuation events. Discuss options with providers including the Rhode Island Public Transit Authority (RIPTA) and Ocean State Transit, the company the Town contracts with for school buses. The Town already has access to school buses during emergencies through its contract with Ocean State Transit

## VULNERABILITY: Populations

<b>MITIGATION ACTION:</b>  9. Revisit the list and prioritize communicating with individuals who rely on electronic health devices during power outages.	<b>Action Priority</b>
	<input type="checkbox"/> High
	<input checked="" type="checkbox"/> Medium
	<input type="checkbox"/> Low
	<b>Action Status</b>
	2019

### Rationale

The Rhode Island Department of Health maintains a voluntary registry of people with special needs. When a hazard event is impending, Middletown emergency management staff request the current list and contact individuals that have been impacted or are likely to be impacted. Individuals who rely on electronic health devices are at particular risk during power outages. These people can be identified using the registry’s data and should be prioritized on the call list during power outages by emergency management staff. This action will require the coordination of the director of emergency management and GIS manager. The GIS manager should maintain an updated map of the RIDOH registry so that emergency management staff may request a list of people within the outage area, sorted to raise people with electronic health devices to the top of the list.

### Benefits

Decreased risk to people with special needs during power outages.

### Hazard Addressed

All severe weather events.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 6
<input checked="" type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

<b>Lead/Champion</b>	<b>Support</b>	
Middletown EMA	Planning Department. GIS Department	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
Staff time.	<input checked="" type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Short Term (less than 2 years) <input checked="" type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

### Other Notes

## VULNERABILITY: Populations

<b>MITIGATION ACTION:</b> 10. Increase efforts to encourage the public to be added to RI Department of Health’s registry of people with special needs and to sign up for Code Red alerts.	<b>Action Priority</b> <input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b> 2019

**Rationale**

Emergency management staff should increase its efforts to encourage people with special needs to have themselves added to the registry. Middletown participates in the Code Red alert system which allows the Town to communicate with residents and visitors via a smart phone app in the case of an emergency. The Town should increase its efforts to encourage Middletown residents and visitors to download the Code Red app so emergency notifications have a greater reach.

**Benefits**

Decreased risk to the general public and people with special needs during emergencies.

**Hazard Addressed**

All severe weather events.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input checked="" type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

**Obstacles**

Lead/Champion	Support
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Middletown EMA

Potential Funding Sources	Estimated Cost	Timeline
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Staff time.

- less than \$10,000
- \$10,000 to \$100,000
- Over \$100,000

- Short Term (less than 2 years)
- Medium Term (2-3 years)
- Long Term (3-5 years)

**Other Notes**

Already, there is information and links to sign up for the registry and Code Red on the Police and Fire Departments’ webpages and awareness is raised via social media. Further, a brochure is being developed about these programs and will be made available at the Police and Fire Departments’ headquarters. Additional measures should be taken, including stocking the brochure at other public locations including Town Hall, public libraries, and schools and creating awareness of the system during existing emergency management speaking events, including school assemblies. The Town could also consider paid advertising, such as on RIPTA buses or on social media platforms.

## VULNERABILITY: Populations

<b>MITIGATION ACTION:</b> 11. Provide educational resources for property owners with properties in the flood zone to floodproof their structures.	<b>Action Priority</b> <input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b> 2019

**Rationale**

Many properties within the Atlantic Beach District are in the 100-year flood zone. Further, most of the existing structures on these properties are of older stock and vulnerable to flooding. Until each property is redeveloped, these properties will not be required to comply with FEMA standards. To mitigate the impact of flooding in this area, the Town should develop incentives that encourage property owners in the Atlantic Beach District to floodproof their properties.

**Benefits**

Decrease structural damage during floods. Improve business continuity post-hazard.

**Hazard Addressed**

All severe weather events.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input checked="" type="checkbox"/> Education and Awareness			

**Obstacles**

<b>Lead/Champion</b>	<b>Support</b>	
Planning Department	Town Council, Building Department	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
Town Planning Department budget	<input checked="" type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

**Other Notes**

**VULNERABILITY: Businesses**

<b>MITIGATION ACTION:</b> 12. Formally add Fire Chief/EMA Director to Technical Review Committee which reviews applications relating to hazardous materials.	<b>Action Priority</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2019

**Rationale**

During the Technical Review Committee stage of the Development Plan Review process, input on all projects is requested from the Fire Department. This input process should be formalized in the regulations, especially when hazardous materials are involved in a development plan. During review, if hazardous materials are found to be located near critical facilities or vulnerable populations, measures to mitigate the impacts of an incident should be taken, such as burying a proposed propane filling tank.

**Benefits**

Reduce risk of and impacts from hazardous material incidents.

**Hazard Addressed**

Earthquakes, floods, severe storms

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

**Obstacles**

<b>Lead/Champion</b>	<b>Support</b>	
Planning Department	Fire Department	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
Staff time	<input checked="" type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

**Other Notes**

## VULNERABILITY: Recreation Facilities

<b>MITIGATION ACTION:</b> <b>13. Armor the shoreline at Dunlap Wheeler Park.</b>	<b>Action Priority</b>
	<input checked="" type="checkbox"/> High
	<input type="checkbox"/> Medium
	<input type="checkbox"/> Low
	<b>Action Status</b>
	2019

### Rationale

The parking lot associated with Dunlap Wheeler Park and the CRMC right-of-way that provides public access to Easton's Bay floods regularly. Tidal flooding occurs during extreme high tides. Storm surge flooding occurs during storms that strike during a high-tide cycle. During Hurricane Sandy, flooding reached Aquidneck Avenue north of the parking lot. The shoreline should be armored between Dunlap Wheeler Park and the seawall at the Newport Beach House (3 Aquidneck Ave) to prevent tidal flooding and mitigate the impact of storm surge from lesser storms.

### Benefits

Make the park more resilient. Reduce debris and damage to the parking lot and right-of-way.

### Hazard Addressed

Coastal storms, flooding, sea level rise.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

<b>Lead/Champion</b>	<b>Support</b>	
Middletown Public Works	Open Space and Fields Committee, Planning Department	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
Town funds to design park FEMA HMA Grants	<input type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input checked="" type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

### Other Notes

BETA Group has been hired to design the park. The Town has previously applied for and failed to receive grant funding for this project. Will be protecting from SLR.

**VULNERABILITY: Recreation Facilities**

<b>MITIGATION ACTION:</b> 14. New stormwater BMP at Wyatt field.	<b>Action Priority</b>
	<input type="checkbox"/> High
	<input type="checkbox"/> Medium
	<input checked="" type="checkbox"/> Low
	<b>Action Status</b>
	New

**Rationale**

As identified in the Maidford River Watershed Assessment, the Maidford River has elevated concentrations of fecal indicator bacteria and nutrients. The elevated concentrations exceed the RIDEM Water Quality Standards for human contact and drinking water supply. Construct bioretention areas in between the parking area and the soccer fields upgradient of existing catch basins - overflow will be directed to existing storm drainage system - good demonstration value at public soccer fields - maintenance can be conducted as part of routine field maintenance.

**Benefits**

Improved water quality, reduce flooding.

**Hazard Addressed**

Flooding.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input checked="" type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

**Obstacles**

Nearby expansion of golf course may impact drainage but may come out as no significant impact.

<b>Lead/Champion</b>	<b>Support</b>	
Middletown Public Works	Planning Department	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
Town Capital funds	<input type="checkbox"/> less than \$10,000	<input checked="" type="checkbox"/> Short Term (less than 2 years)
FEMA HMA Grants	<input checked="" type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)
	<input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

**Other Notes**

CIP estimate \$30,000.

**VULNERABILITY: Natural Resources**

<b>MITIGATION ACTION:</b> 15. Stormwater BMPs (tree boxes) in neighborhoods near the Maidford River.	<b>Action Priority</b>
	<input type="checkbox"/> High
	<input type="checkbox"/> Medium
	<input checked="" type="checkbox"/> Low
	<b>Action Status</b>
	New

**Rationale**

As identified in the Maidford River Watershed Assessment, the Maidford River has elevated concentrations of fecal indicator bacteria and nutrients. The elevated concentrations exceed the RIDEM Water Quality Standards for human contact and drinking water supply. Tree boxes between sidewalk and curb on Windham Hill Ave, Beagle Dr, Tally Ho Ct, Trout Dr, Lighthouse View Drive, River Run Road, Maidford River Road - proposed neighborhoods have a sidewalk on at least one side of the road - avoids projects on residential 'front lawns' by using the tree belt will be more acceptable to homeowners - provides public shade trees that have additional benefits - low cost to install and maintain - provides similar benefits to bioretention areas - overflow can connect directly to existing drainage system.

**Benefits**

Improved water quality, increase shade, stormwater retention.

**Hazard Addressed**

Flooding, extreme heat.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input checked="" type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input checked="" type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

**Obstacles**

<b>Lead/Champion</b>	<b>Support</b>	
Middletown DPW		
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
Town capital funds	<input type="checkbox"/> less than \$10,000	<input type="checkbox"/> Short Term (less than 2 years)
RIDEM Forestry	<input checked="" type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)
	<input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Long Term (3-5 years)

**Other Notes**

CIP estimates \$30,000.

**VULNERABILITY: Natural Resources**

<b>MITIGATION ACTION:</b> 16. Continue to partner with the Aquidneck Land Trust to develop a strategy for open space acquisition.	<b>Action Priority</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	New

**Rationale**

Help increase their efforts to purchase and manage open space critical for watershed resilience and public health via passive recreation.

**Benefits**

More green space, better stormwater infiltration, improved water quality, habitat restoration,

**Hazard Addressed**

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input checked="" type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

**Obstacles**

<b>Lead/Champion</b>	<b>Support</b>	
Aquidneck Land Trust	Middletown Open Space and Fields Committee	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
Aquidneck Land Trust	<input type="checkbox"/> less than \$10,000 <input checked="" type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

**Other Notes**

Develop a strategy and become more proactive in determining if a parcel should be acquired for resilience benefits by using a scoring process.

## VULNERABILITY: Natural Resources

<b>MITIGATION ACTION:</b> 17. Investigate nature-based solutions to protect against storm surge and sea level rise around Sachuest Point.	<b>Action Priority</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	New

### Rationale

Sachuest Point is a peninsula located between the Sakonnet River and Rhode Island Sound. This natural area is subject to erosion from storm surge and brushfires. Future sea level rise scenarios will impact this area.

### Benefits

Resource protection.

### Hazard Addressed

Severe storms, flooding, sea level rise

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input checked="" type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Lead/Champion	Support
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Planning	Aquidneck Land Trust, National Wildlife Refuge (NWR)
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Potential Funding Sources	Estimated Cost	Timeline
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National Wildlife Refuge (NWR)	<input type="checkbox"/> less than \$10,000	<input type="checkbox"/> Short Term (less than 2 years)
FEMA BRIC grant	<input type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)
	<input checked="" type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Long Term (3-5 years)

### Other Notes

**VULNERABILITY: Historic Resources**

<b>MITIGATION ACTION:</b> 18. Distribute Silver Jackets/ACOE report "Historical Structure Flood Hazard Vulnerability Assessment".	<b>Action Priority</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	New

**Rationale**

The Rhode Island Historical Preservation & Heritage Commission (HPHC) operates the statewide historical preservation program that identifies over 21,000 historical assets. The Rhode Island Silver Jackets Team worked with HPHC and other stakeholders to convert existing data to a GIS format and complete a flood hazard vulnerability assessment of the historical features statewide. This resource will be helpful to members of the Middletown

**Benefits**

Understanding the risk to historic features can help better protect them.

**Hazard Addressed**

Severe storms, flooding, sea level rise, high wind

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input checked="" type="checkbox"/> Education and Awareness			

**Obstacles**

<b>Lead/Champion</b>	<b>Support</b>	
Middletown Planning and EMA Departments	RIEMA, Historical Society	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
Staff time.	<input checked="" type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

**Other Notes**

As of September 2024, this report was not yet available.



# G

## Appendix G3 Newport, Rhode Island

## Community Infrastructure/Assets Matrix

The matrix below, 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.

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
<b>Flood Prone Streets and Infrastructure</b>	<ul style="list-style-type: none"> <li>› Whitwell Ave. (development on natural drainage)</li> <li>› Harrison Ave.</li> <li>› Ellery at Gibbs; Eustice; and Kay</li> <li>› Marchant</li> <li>› Bedlow at Hillside (development on natural drainage)</li> <li>› Broadway at Ayrault; Marlborough</li> <li>› The rotary- JT Connell area</li> <li>› Prescott neighborhood</li> <li>› The Point/Bridge Street</li> <li>› Third Street</li> <li>› Wellington Ave.</li> <li>› Thames Street</li> <li>› Memorial Blvd @ First Beach</li> <li>› Cliff Walk seawall</li> <li>› Ocean Drive at Harrison</li> <li>› Ocean Avenue/Brenton Point</li> <li>› Hazard Road</li> <li>› America’s Cup Ave. and wharfs</li> <li>› West Marlborough St. (tied to Marsh Street- 1 drainpipe gets backed up when tide is over outfall (42inch diameter))</li> <li>› Bridge Street/Elm Street</li> <li>› Garfield Street/Halsey Street</li> <li>› Goat Island Causeway</li> <li>› Causeway (Luce Ave.) to Naval War College</li> </ul>	<p>Hurricane/Nor’easters Sea Level Rise Flooding</p> <ul style="list-style-type: none"> <li>› King tides cover outfalls + rain event</li> <li>› Storm surge</li> <li>› Erosion</li> <li>› Overwash during king tide event</li> <li>› Development in natural drainage areas</li> <li>› System cannot handle intense short rainfalls, esp. during high tides. Soils are poor for infiltration (clay).</li> <li>› Incremental infill (such as driveways) slowly increases the impervious surfaces</li> </ul>	<p>New tide gate on Bridge St. New tide gate on Marsh St. New tide gates on Wellington Ave.</p> <p>Drainage studies on riverine flooding. Using a Southeast New England Program (SNEP) grant to improve the area.</p> <p>Utility Department has been pro-actively floodproofing city buildings.</p> <p>Passed a zoning update for the North End that takes into account resiliency (North End Urban Plan).</p> <p>Catchabasin capacity improvements at Whitwell Avenue.</p> <p>State level (RI EC4) efforts to create a statewide buyout process.</p>	<ol style="list-style-type: none"> <li>1. Create A Stormwater Management Overlay District.</li> <li>2. Create a high-water table limitations overlay district.</li> <li>3. Improve Elizabeth Brook flooding.               <ol style="list-style-type: none"> <li>a. “Daylight” Elizabeth Brook.</li> <li>b. Create deep stormwater storage green areas along the brook.</li> <li>c. Evaluate the feasibility/need of a flood gate or storm surge gate where Elizabeth Brook flows into Coasters Harbor north of Admiral Kalbfus Road.</li> </ol> </li> <li>4. Improve stormwater education.               <ol style="list-style-type: none"> <li>a. Continue Adopt-a-Catch Basin initiative which encourages residents to help keep the city’s storm drains and catchbasins clear of leaves.</li> <li>b. Continue public education on how tide gates and tides interact during a storm. Teach adaptation, let the waters recede.</li> </ol> </li> </ol>

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
			<p>(re-)Development Plan Review Ordinance for larger projects.</p> <p>Robust catchbasin cleaning program.</p> <p>SNEP Grant, prioritizing projects.</p> <p>Hired a full-time Resiliency and Sustainability Director</p> <p>Ongoing wastewater and stormwater asset management.</p>	<p>c. Educate residents and builders on the effects of buildout, sea level rise, and stormwater connections. Promote adaptation to rising sea levels.</p> <p>d. Educate residents on the damaging effects of phosphorus loading.</p> <p>5. Require the use of the CRMC coastal hazards analysis worksheet for all development and redevelopment.</p> <p>6. Improve resilience of seawalls and associated structures at: Storer Park and causeway seawall, Long Wharf Seawall, Battery Park, Washington St., Van Zandt Pier, Elm St. Pier, Ocean Avenue.</p>
<p><b>Bridges</b> (ownership)</p>	<ul style="list-style-type: none"> <li>› Newport Claiborne Pell Bridge (State)</li> <li>› Jamestown Verrazano Bridge (State)</li> <li>› Goat Island Causeway (State/City, in STIP)</li> <li>› Van Zandt bridge (City)- access to evacuation route, in dire need of repair.</li> <li>› Green Bridge (City)</li> <li>› Memorial Blvd culvert</li> <li>› Bridge on north end to leave Coasters Island (Navy). Coast flooding east and north. Access issue.</li> <li>› Bridge to Harbor Island- high tides</li> </ul>	<p>Hurricane/Nor'easters</p> <p>Flooding</p> <p>Winter Storms</p> <p>Tornadoes</p> <p>Earthquakes</p>	<p>Pell Bridge ramps were re-designed and pulled out of flood zone (RIDOT)</p> <p>The Van Zandt approach to the Pell Bridge is in City Capital Improvement Plan.</p>	<p>7. Mitigate Goat Island causeway at Newport Harbor to protect from sea level rise. RIDOT to assess for major rehabilitation work, superstructure, and/or total bridge replacement.</p>

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
			<p>All bridges except for Memorial Blvd. are in State Transportation Improvement Program (STIP)</p> <p>The U.S. Navy is looking at bridge vulnerability as part of Military Installation Resiliency Review (MIRR) grant.</p>	
<p><b>Wastewater</b></p>	<p>Sewer collection system (Water Pollution Control Division and Newport Water Services LLC)</p> <ul style="list-style-type: none"> <li>› Wastewater Treatment Facility (WWTF): 250 JT Connell Highway</li> <li>› Wellington Avenue Combined Sewer Overflow Facility and Pumping Station: 50 Wellington Avenue</li> <li>› Washington Street Combined Sewer Overflow Facility (storage and treatment): 25 Washington Street</li> <li>› Sewer Pumping Station: 4-1/2 Alpond Drive</li> <li>› Sewer Pumping Station: Beach – 170 Memorial Boulevard</li> <li>› Sewer Pumping Station: Bliss Mine Road – 86 Ellery Road</li> <li>› Sewer Pumping Station: 224-1/2 Carroll Avenue</li> <li>› Sewer Pumping Station: 32 Coddington Wharf</li> <li>› Sewer Pumping Station: 7 Dyre Street</li> <li>› Sewer Pumping Station: Goat Island</li> <li>› Sewer Pumping Station: 17 Hazard Road</li> <li>› Sewer Pumping Station: 25 Lees Wharf</li> </ul>	<p>High Wind/Microburst Hurricane/Nor'easters Flooding Winter Storms Lightning Tornadoes Earthquakes Drought Heat Wave Dam Failure</p>	<p>Wastewater Treatment Facility and 2 CSOs have generators.</p> <p>Large pump stations have generators others have hook-ups.</p> <p>Raised controls at: Wastewater treatment facility, Washington, Wellington, Long Warf Pump Stations (in construction).</p> <p>Looked at resiliency for all utility projects.</p> <p>Wastewater pump stations and storm</p>	<ul style="list-style-type: none"> <li>8. Disconnect stormwater connections to the existing combined sewer-stormwater overflow (CSO) system. Construct a bioretention areas at Bellevue Avenue and Coggeshall Avenue.</li> <li>9. Evaluate flooding frequency and magnitude near the Wastewater Treatment Facility (WWTF) outfall at Coddington Point.</li> <li>10. Increase the capacity of staff to effectively conduct maintenance and install improvements to the stormwater management systems.</li> </ul>

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
	<ul style="list-style-type: none"> <li>› Sewer Pumping Station: 100 Long Wharf</li> <li>› Sewer Pumping Station: 214 Maple Avenue</li> <li>› Sewer Pumping Station: 12 Murray Place</li> <li>› Sewer Pumping Station: 50 Ruggles Avenue</li> <li>› Sewer Pumping Station: Ranger Road</li> </ul>		and sewer collections systems are being evaluated. About 30 miles left of CCTV.	
<b>Water Supply Systems</b>	<ul style="list-style-type: none"> <li>› Station 1 Water Treatment Plant: 100 Bliss Mine Road</li> <li>› Lawton Valley Water Treatment Plant and water storage tanks: 2154 West Main Road, Portsmouth</li> </ul> <p>Newport owns and operates the Regional Water system (Portsmouth, Middletown, and NPT), reservoirs on mainland.</p>	High Wind/Microburst Hurricane/Nor'easters Flooding Winter Storms Lightning Tornadoes Earthquakes Drought Heat Wave Dam Failure	Both water treatment plants have full generator power.  Water Treatment Station 1 improvements took into account sea level rise.	None at this time.
<b>Services/Utilities</b>	Electrical grid (RI Energy) Natural gas supply (RI Energy)	High Wind Hurricane/Nor'easters Flooding Winter Storms Lightning Tornadoes Earthquakes Drought Heat Wave Dam Failure	National Grid improved the electric grid at JT Connell Highway and rest of Aquidneck Island.  National Grid assessed the long-term resilience of the natural gas supply.  National Grid replacing low-pressure gas lines.  National Grid has a temporary tank farm on Whapping Rd. in Portsmouth. Focus on	None at this time.

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
			<p>Aquidneck Island and gas supply resilience at the end of the pipe.</p> <p>Utilities consult on development projects within 200 feet of a reservoir.</p> <p>Ongoing study of the effects of climate change on southern reservoirs.</p> <p>City is looking to move from LNG to full electrification.</p> <p>HEZ did report on how disadvantaged communities.</p>	
<p><b>Communication Facilities</b></p>	<ul style="list-style-type: none"> <li>› Cell tower on Old Fort Rd at Fire Station</li> <li>› Internal comm tower at Police Station on Broadway. West Marlborough for FD, FD Station 5 on Touro St.</li> <li>› Cell towers at Reservoir. Rd in Middletown and Lawton Valley in Portsmouth.</li> <li>› Equipment on churches, etc.</li> <li>› 800 MHz tower is in Middletown.</li> <li>› Hospital communication equipment</li> </ul>	<p>High Wind/Microburst Lightning</p>	<p>New dispatch was constructed at Fire Station 5.</p> <p>Police department making upgrades as needed. Submitted grants for funding support.</p> <p>Bond passed to acquire land for a new Public Safety Complex.</p>	<ul style="list-style-type: none"> <li>11. Upgrade police department radio systems (including portables).</li> <li>12. Monitor available upgrades for mobile communications in police cruisers.</li> </ul>
<p><b>Dams</b></p>	<p>Easton Pond South (Dam #585) -high hazard</p>	<p>Hurricane/Nor'easters Flooding Winter Storms</p>	<p>Resiliency study at South Easton Pond Dam.</p>	<ul style="list-style-type: none"> <li>13. Design and construction resiliency actions as per results of the second</li> </ul>

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
		Tornadoes Earthquakes	Submitted a FEMA BRIC grant to better identify improvements from the study. Will then move to design and construction	round of the Easton Pond Dam Study. a. Raise earthen embankments of South Easton Pond. b. Raise the earthen embankment separating North Easton Pond from South Easton Pond. c. Install two gates to prevent saltwater intrusion.
<b>Marinas/Docks</b>	Various	Storm Surge Hurricane/Nor'easters	Implement Harbor Management Plan (10/2024)	None at this time.
<b>Critical Municipal Hazard Response Facilities</b>	<ul style="list-style-type: none"> <li>› City Hall: 43 Broadway</li> <li>› Fire Station 1: 21 West Marlborough Street at America's Cup Avenue (Built 1934), in flood zone</li> <li>› Fire Station 2: 100 Old Fort Road (Built 1986)</li> <li>› Fire Station 5: Touro Street at Mary Street (Built 1867, renovated 1895)</li> <li>› Police Station (EOC): 120 Broadway- limited space</li> <li>› Newport Hospital: 11 Friendship Street</li> <li>› Newport Animal Hospital: 541 Thames Street</li> <li>› JT Connell (evacuation route) floods</li> <li>› Sheffield School (Innovate Newport)- potential EOC location</li> </ul> <p><u>Emergency Shelters</u></p> <ul style="list-style-type: none"> <li>› Rogers High School, 15 Wickham Road, Newport</li> <li>› Pell School: 35 Dexter Street, Newport; capacity: 419 persons (area of refuge, not Red Cross approved)</li> <li>› Florence Gray Center: 1 York Street, Newport; capacity: 345 persons</li> </ul>	High Wind Hurricane/Nor'easters Flooding Winter Storms Lightning Tornadoes Earthquakes	Bond for funding a new Public Safety Complex, Nov. 2024.  Conducted a study to get a grant for generator due to data limits.	14. Relocate Fire Station 1 out of the floodplain. 15. Develop a Post-Disaster Recovery Plan. 16. Formally organize the current emergency management volunteers into a Citizens Emergency Response Team (CERT).

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
	<ul style="list-style-type: none"> <li>› Gaudet Middle School: Tuner Rd. (Preferred Regional Shelter)</li> </ul>			
<p><b>Populations</b></p>	<p>987 residential structures in the flood hazard area.</p> <p>Other housing complexes that may have vulnerable populations:</p> <ul style="list-style-type: none"> <li>› Heatherwood Nursing and Subacute Center, 398 Bellevue Avenue</li> <li>› St. Claire Home, 309 Spring Street</li> <li>› Village House Nursing and Rehabilitation Center, 70 Harrison Avenue</li> <li>› Scattered Elderly Housing Project: Edgar Court, Earl Avenue, Pond Avenue, Chapel Street (low-rise), and Coddington Street</li> <li>› Donovan Manor, Chapel Street</li> <li>› Mumford Manor, Farewell Street</li> <li>› John Clarke School Senior Apartments, Mary Street</li> <li>› Paramount Theatre Apartments, Broadway</li> <li>› Ahepa 245 I and II Senior Housing, Girard Avenue</li> <li>› Henderson Home (elderly)</li> <li>› Old YMCA housing- 50 Washington Sq.</li> <li>› Seamen’s Church Institute</li> <li>› Harbor House – Washington St.</li> <li>› Nina Lynette Home (independent seniors)</li> </ul> <p>Residents in the North End especially, which are burdened by poor water quality, low income, and asthma.</p>	<p>Hurricane/Nor’easters</p> <p>Flooding</p> <p>Winter Storms</p> <p>Lightning</p> <p>Tornadoes</p> <p>Earthquakes</p> <p>Drought</p> <p>Heat Wave</p>	<p>Promote Special Needs Registry.</p> <p>Fire Department checks on nursing home resiliency during annual site visits.</p> <p>Working on getting an MOU signed with Fisher Transportation Company in the event of needing to transport people in advance of an emergency.</p> <p>Ongoing flood education efforts as part of Community Rating System (CRS) requirements.</p> <p>Open Heating and Cooling Centers as needed.</p> <p>Collaborating with RIDEM on developing an Urban Tree</p>	<p>17. Improved public education.</p> <ul style="list-style-type: none"> <li>a. Education on storm drain road flooding, wait it out.</li> <li>b. Better guidance on 72-hour shelter-in-place.</li> <li>c. Effects of buildout on sea level rise and stormwater connections. (same as action 4c)</li> <li>d. Tactical urban education (educational signage or other installations).</li> <li>e. Climate change adaptation</li> </ul> <p>18. Create resiliency guidelines or ordinances for development, incorporating green infrastructure, stormwater infrastructure, protect environmental assets, and promote low impact development.</p>

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
<b>Businesses</b>	<p>260 commercial/industrial structures in the flood hazard zone.</p> <p>Tourism-related sector                      Defense industry                      Wharf businesses and marinas                      Businesses at Easton’s Beach</p>	<p>High Wind/Microburst                      Hurricane/Nor’easters                      Flooding                      Winter Storms                      Lightning                      Tornadoes                      Earthquakes</p>	<p>Canopy Plan and map.</p> <p><a href="#">Small Business Resilience Project</a> (CRC)</p> <p>URI students analyzed potential threats to JT Connell businesses along Elizabeth Brook that are vulnerable to flooding.</p> <p>Military Installation Resiliency Review (MIRR) report simulated storm events and response. RI Commerce and Statewide Planning Ready, Set, Rhody, award to provide targeted infrastructure vulnerability assessments, including information for the City on specific “hot spots” and ways to increase resilience for those areas.</p>	<p>19. Develop guidelines for waterfront post-disaster redevelopment.</p>

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
<b>Schools</b>	<ul style="list-style-type: none"> <li>› Pell School: 35 Dexter Street</li> <li>› Thompson Middle School: 55 Broadway</li> <li>› Rogers High School: 15 Wickham Road</li> <li>› Newport Area Career and Technical Center: 16 Wickham Road</li> <li>› Aquidneck Island Adult Learning Center: 435 Broadway</li> <li>› Naval War College</li> <li>› Met School</li> <li>› Community College of Rhode Island- Newport County Campus</li> <li>› St. Michael’s Country Day School</li> <li>› Salve Regina University</li> <li>› Various Private Schools</li> </ul>	<p>High Wind/Microburst Hurricane/Nor’easters Flooding Winter Storms Lightning Tornadoes Earthquakes</p>	<p>Deconstructed and now rebuilding Rogers HS.</p> <p>Pell School- \$8M addition completed.</p> <p>Improved distance learning capabilities.</p> <p>New buildings will be more resilient to storms/high winds. New buildings will also consider energy efficiency.</p>	<p>20. Develop a bus transportation plan to safely evacuate students and staff in advance of or during an event.</p> <p>21. Invest in broadband improvements for schools to boost remote learning capabilities.</p>
<b>Recreation Facilities</b>	<ul style="list-style-type: none"> <li>› Cliff Walk</li> <li>› Beaches</li> <li>› Major Parks</li> </ul>	<p>Hurricane/Nor’easters Flooding Winter Storms Lightning Extreme Heat</p>	<p>Cliff Walk continues to have improvements.</p> <p>Seawall repairs throughout the city.</p> <p>Easton Beach- looking at structural issues to make more resilient.</p> <p>Carousel/Snack Bar at First Beach has been removed.</p>	<p>22. Develop a Comprehensive Management Plan for the Cliff Walk.</p> <p>23. Design and install splash pads at two playground facilities.</p> <p>24. Improvements to the martin recreation center (“the Hut”).</p> <ul style="list-style-type: none"> <li>a. Conduct a needs assessment for interior and exterior projects.</li> <li>b. Implement the improvements.</li> </ul>
<b>Natural Resources</b>	<p>Freshwater wetlands Saltwater resources Newport Harbor Forested areas</p>	<p>High Wind/Microburst Hurricane/Nor’easters Flooding Winter Storms</p>	<p>Robust tree planting program.</p>	<p>25. Develop a steep slope ordinance.</p> <p>26. Establish a tree trust for development projects.</p>

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
	Beaches	Lightning Tornadoes Earthquakes Drought Heat Wave	<p>Tree maintenance by city and RI Energy.</p> <p>Save the Bay dune restoration- annual.</p> <p>Inlet at Hazard Road dune restoration.</p> <p>Lily and Almy Pond: TMDLs for nutrient loading. Identifying which outfalls contribute to loading. All residential property. Tree filters, other BMPs with DEM grant.</p> <p>Reducing beach closures by improving water quality.</p> <p>UV system treats runoff from moat. Continue to support our partners in habitat restoration.</p> <ul style="list-style-type: none"> <li>&gt; Newport Tree Program</li> <li>&gt; Aquidneck Land Trust</li> </ul>	<p>27. Follow up and document what has been done since Keeping History Above Water program.</p> <p>28. Develop a strategic managed retreat plan for the Point neighborhood</p>

At Risk	Location	Hazard/Problem	Ongoing Actions	Mitigation Actions
<b>Historic/Cultural Resources</b>	<p><u>In the floodplain</u></p> <ul style="list-style-type: none"> <li>› Weatherly (yacht), 49 America's Cup Boulevard, (8/28/12)</li> <li>› Castle Hill Lighthouse, Castle Hill, off Ocean Avenue, at the west end of Newport Neck (3/30/88)</li> <li>› Fort Adams State Park/Fort Adams, Harris Avenue-Fort Adams (7/28/70)</li> <li>› Newport Harbor Lighthouse, Goat Island (Newport Harbor) (3/30/88)</li> <li>› Ida Lewis Rock Lighthouse, Lime Rock (in Newport Harbor off Wellington Avenue) (2/25/88)</li> <li>› Seamen's Church Institute, Market Square (8/4/83)</li> <li>› Rose Island Lighthouse, Rose Island (4/10/87)</li> <li>› The Brick Market Historical Society, 127 Thames Street (10/15/66) NHL 1960</li> <li>› Perry Mill, 337 Thames Street (1/13/72)</li> <li>› Francis Malbone House, 392 Thames Street (4/28/75)</li> <li>› Coronet (yacht), 449 Thames Street (6/3/04)</li> <li>› Newport Steam Factory (Electric Works), 449 Thames Street (1/20/72)</li> <li>› Hunter House, 54 Washington Street (11/24/68) NHL</li> </ul>	<p>High Wind/Microburst Hurricane/Nor'easters Flooding Winter Storms Lightning Tornadoes Earthquakes</p>	<p>Rhode Island Coastline CSR (Coastal Storm Risk Management) Feasibility Study (USACE).</p> <p><a href="#">Guidelines on Flood Adaptation for Rehabilitating Historic Buildings</a>: re-released in 2021.</p> <p>Elevate historic structures. Streetscape/history preservation. None to full BFE.</p> <p>Local historic district has guidelines for elevating structures. 1 of 2 in the country! <a href="#">City of Newport   City Seeks to Elevate History Against Climate Change</a></p> <p>SHPO to maintain facade of Old Navy Hospital</p>	<p>29. Develop a strategic managed retreat plan for the Point neighborhood.</p>

## Mission Statement

The City of Newport is building a disaster resistant community and achieving sustainable development through the commitment of state and local government and its policymakers to mitigate hazard impacts before disaster strikes. By doing so, local leaders aim to preserve and enhance the quality of life, property, and resources.

## Mitigation Goals

To effectuate the mission statement, the City of Newport establishes the following hazard mitigation goals, toward which all action must reach:

1. Protect public health, safety and welfare; minimize social dislocation and distress due to impacts from natural hazards.
2. Prioritize underserved and disadvantaged communities, especially those in high-risk areas.
3. Reduce property damages caused by natural hazards.
4. Reduce economic loss and minimize disruption to local business due to natural hazards.
5. Implement actions which protect Newport’s cultural, historic, and natural environments.
6. Protect the ongoing operations of critical facilities and infrastructure during and after a storm/event.
7. Expedite post-disaster mitigation efforts during the recovery phase.
8. Promote non-structural flood and coastal erosion measures to reduce the risk of damage to the surrounding properties and environmental habitats.

## Status of Prior Actions

Action	Status	Notes
Create a Stormwater Management Overlay District.	Not Complete	Need support from City Council. <i>Move to 2025 Plan.</i>
Create a High-Water Table Limitations Overlay District.	Not Complete	Need support from City Council. <i>Move to 2025 Plan.</i>
"Daylight" Elizabeth Brook.	Not Complete	In progress. <i>Move to 2025 Plan.</i>
Create deep stormwater storage areas along Elizabeth Brook.	Not Complete	A study is planned for this. <i>Move to 2025 Plan.</i>
Construct a flood gate or storm surge gate where Elizabeth Brook flows into Coaster's Harbor north of Admiral Kalbfus Road.	Not Complete	This will be addressed in a study. <i>Move to 2025 Plan.</i>
Continue Adopt-a-Cath Basin.	Not Complete	Effort delayed due to lack of staff time. <i>Move to 2025 Plan.</i>
Continue public education on how tide gates and tides interact during a storm.	Not Complete	Effort delayed due to lack of staff time.

<b>Action</b>	<b>Status</b>	<b>Notes</b>
		<i>Move to 2025 Plan.</i>
Educate residents and builders on the effects of buildout, sea level rise, and stormwater connections.	Not Complete	Effort delayed due to lack of staff time. <i>Move to 2025 Plan.</i>
Educate residents on the damaging effects of phosphorus loading.	Not Complete	Effort delayed due to lack of staff time. <i>Move to 2025 Plan.</i>
Require the use of CRMC Coastal Hazard Analysis Worksheet for all development and redevelopment.	Not Complete	Need support from City Council. <i>Move to 2025 Plan.</i>
Evaluate evacuation routes/timing for Coasters Island.	Complete	Documented in Appendix 5: Naval Postgraduate School Evaluation Study.
Mitigate Goat Island Causeway to protect from SLR.	Not Complete	Need support from RIDOT which does not see this as a priority. <i>Move to 2025 Plan.</i>
Evaluate flooding frequency and magnitude of the roads near the WWTF outfall at Coddington Point.	Not Complete	Other city priorities. <i>Move to 2025 Plan.</i>
Implement solutions to natural gas resiliency on Aquidneck Island.	Not Complete	Need support from RI Energy. <i>Move to 2025 Plan.</i>
Upgrade Police Department radio systems.	Not Complete	Other city priorities. <i>Move to 2025 Plan.</i>
Monitor available upgrades for mobile communications in Police cruisers.	Not Complete	Other city priorities. <i>Move to 2025 Plan.</i>
Design and construction as per results of the second round of the Easton Pond Dam study.	Not Complete	Need to prioritize results. <i>Move to 2025 Plan.</i>
Generator needs assessment for EOC.	Not Complete	Other city priorities. <i>New EOC approved. See RHMP.</i>
Purchase and install a generator at EOC.	Not Complete	Other city priorities. <i>New EOC approved. See RHMP.</i>
Relocate Fire Station 1 out of the floodplain.	Not Complete	Other city priorities. <i>Move to 2025 Plan.</i>
Develop a Disaster Recovery Plan.	Not Complete	Effort delayed due to lack of staff time. <i>Move to 2025 Plan.</i>
Form a CERT Team.	Not Complete	Effort delayed due to lack of staff time. <i>Move to 2025 Plan.</i>
Educate on storm drain road flooding.	Not Complete	Effort delayed due to lack of staff time. <i>Move to 2025 Plan.</i>

<b>Action</b>	<b>Status</b>	<b>Notes</b>
Better guidance on 72-hour shelter in place.	Not Complete	Effort delayed due to lack of staff time. <i>Move to 2025 Plan.</i>
Educate on effects of buildout on SLR.	Not Complete	Effort delayed due to lack of staff time. <i>Move to 2025 Plan.</i>
Educate on climate change adaptation.	Not Complete	Effort delayed due to lack of staff time. <i>Move to 2025 Plan.</i>
Develop guidelines for waterfront redevelopment post-disaster.	Not Complete	Effort delayed due to lack of staff time. <i>Move to 2025 Plan.</i>
Develop a student bus transportation plan to safely evacuate students.	Not Complete	Underway. <i>Move to 2025 Plan.</i>
Invest in broadband improvements.	Not Complete	Underway. <i>Move to 2025 Plan.</i>
Develop a comprehensive management plan for Cliff Walk.	Not Complete	Effort delayed due to lack of staff time. <i>Move to 2025 Plan.</i>
Design and install splash pads at two playground facilities.	Not Complete	<i>Move to 2025 Plan.</i>
Evaluate reconstruction/relocation of Easton's Beach Carousel/snack bar.	Not Complete	N/A Demolished.
Needs assessment for repairs to The Hut.	Not Complete	Effort delayed due to lack of staff time. <i>Move to 2025 Plan.</i>
Implement improvements to The Hut.	Not Complete	Effort delayed due to lack of staff time. <i>Move to 2025 Plan.</i>
Develop a steep slope ordinance.	Not Complete	Need support from City Council. <i>Move to 2025 Plan.</i>
Continue to support partners in habitat restoration.	Ongoing	Move this to ongoing actions.
Establish a Tree Trust for development projects.	Not Complete	Need support from City Council. <i>Move to 2025 Plan.</i>
Follow up on document what has been done since Keeping History Above Water.	Not Complete	Effort delayed due to lack of staff time. <i>Move to 2025 Plan.</i>
Community discussion after USACE CSRSM feasibility study is complete.	Complete	
Develop a Managed Retreat Plan for Point Neighborhood.	Not Complete	Effort delayed due to lack of staff time. <i>Move to 2025 Plan.</i>

## Mitigation Actions

The members of the RHMC from Newport decided to propose actions that addressed certain vulnerabilities that were identified earlier in the planning process. See Chapter 4.

*Please note that Newport adopted their previous mitigation plan in 2022; many of those actions were carried over into this 2025 plan.*

The worksheets below summarize the specific problem and proposed possible solution, details the primary tasks to be undertaken, identifies an appropriate lead and anticipates financing options.

After all the Newport action details were completed, the representatives from Newport were given an anonymous survey to rank the priority of each action on the city. Each action was rated a high, medium, or low priority for the city as a whole. This helps to generally prioritize needs when funding becomes available or budgeted. In the case where the survey results showed a tie, the higher priority was assigned. When an equal number of respondents prioritized an action as low and high, the medium priority was assigned. All rankings were reviewed by the Newport representatives during the draft plan review stage.

Actions that received a high priority ranking would provide more benefits than low priority items. Understanding that priorities can and will change, it was helpful to document what is important at that moment in time. Having this discussion as a group helped the Newport group consider maximum benefits to the entire region, not just individual municipal departments or residents.

The Newport group was encouraged to propose a range of mitigation actions regardless of project costs. Some of the less expensive action items such as creating overlay districts to manage development is a low-cost item but can still provide a lot of benefit to the city's resiliency goals. Relocating Fire Station 1 out of the floodplain is of high importance, yet it will require substantial funds. It is still a high priority for the city to pursue funding and support to get this accomplished. If costs have already been set aside for a particular mitigation action, the Newport group prioritized that action to ensure that it was completed, and funds were spent in a timely manner.

Funding and staff time will be the determining factors on when various actions are completed. The Newport group understands that implementation of many of these proposed actions requires the securing external funding.

These actions include wants to prevent or reduce the consequences of disaster (mitigation), planning and education (preparedness), improved response in the immediate aftermath of an event (response), and improved restoration efforts (recovery). Those which are true mitigation actions are noted as such.

There are necessary planning elements that need to be completed before additional mitigation actions can be considered. The Newport group has identified a range of actions below, some of which are planning activities. However, there is a mitigation action identified for each vulnerable area where applicable.

### Priority Level

- › **High:** Reduces the greatest risks, is important to accomplish first, funding has already been secured.

- › **Medium:** May need other actions to be completed first, funding may need to be identified.
- › **Low:** Less of an impact on safety and property.

### Time Frame (from date of plan adoption)

- › **Short Term:** less than 2 years
- › **Medium Term:** 2-3 years
- › **Long Term:** 3-5 years

### Mitigation Actions

## VULNERABILITY: Flood Prone Streets or Infrastructure

<b>MITIGATION ACTION:</b> 1. Create A Stormwater Management Overlay District.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

People are upgrading dwelling sizes, increasing stormwater generation. There are few options to improve stormwater capacity. The issue is compounded with climate change. Creating the overlay district has the added benefit of a public education component.

### Benefits

Reduce hazards to life and protect structures and uses from damages which may be caused by construction on or use of land which is unsafe for development.

Protect land, public infrastructure, and waters of the city from damages caused by improper use or construction on land which has physical, environmental or aesthetic limitations or development.

Maintain and enhance natural land features which are environmentally significant, or which constitute a natural resource of importance to the community at large.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Deciding if this would be citywide or a true overlay for targeted areas.

<b>Lead/Champion</b> Department of Utilities	<b>Support</b> Department of Planning	
<b>Potential Funding Sources</b> Southeast New England Program (SNEP) Grant	<b>Estimated Cost</b> <input checked="" type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<b>Timeline</b> <input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

### Other Notes

Currently being discussed.

## VULNERABILITY: Flood Prone Streets or Infrastructure

<b>MITIGATION ACTION:</b> 2. Create a High-Water Table Limitations Overlay district.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

The water table fluctuates seasonally. When new development occurs in areas with a high-water table, automatic sump pumps often discharge into the street, causing not only a flooding problem but an icing problem in the winter. This discharge also causes wetland migration.

### Benefits

Public safety. Creates an enforcement mechanism to address problem properties.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Seasonal problem. Requiring property owners to create drywells.

Lead/Champion	Support
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Department of Utilities	Department of Planning
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Potential Funding Sources	Estimated Cost	Timeline
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City General Funds	<input checked="" type="checkbox"/> less than \$10,000	<input type="checkbox"/> Short Term (less than 2 years)
	<input type="checkbox"/> \$10,000 to \$100,000	<input checked="" type="checkbox"/> Medium Term (2-3 years)
	<input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

### Other Notes

See Narragansett Municipal Code: Appendix A, Section 4.5

"District defined. This [high water table limitations overlay] district is composed of areas in which the water table is within three feet below the surface of the ground for significant periods of the year, creating moderate to severe limitations for subsurface development. In high water table limitations overlay district "A," the water table is generally within 18 inches of the surface of the ground. Areas included in district "A" are designated on the environmental inventory soils maps with the following symbols: Aa, Co, Mk, Re, Rc, Rf, Sb, Se, Sf, Wa, Ma, Me, Mc. In high water table limitations overlay district "B," the water table is generally between 18 inches and three feet below the surface of the ground. Areas included in district "B" are designated on the environmental inventory soils maps with the following symbols: Bc, Nt, PmA, PmB, PnB, RaA, RaB, RbB, StB, WbB, WhA, WhB, WoB, StB, Ss, Tb."

## VULNERABILITY: Flood Prone Streets or Infrastructure

<b>MITIGATION ACTION:</b> 3. Improve Elizabeth Brook flooding. a. "Daylight" Elizabeth Brook.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High
	<input type="checkbox"/> Medium
	<input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

Low-lying areas along Elizabeth Brook in the North End neighborhood, are prone to flooding due to surcharge of existing utility outfalls along the coastline as well as limited overland flooding during high tide storm events. Sea level rise will further threaten the North End neighborhood where Elizabeth Brook flows into Narragansett Bay.

### Benefits

Protect public infrastructure and private homes from flooding. The streambed can serve as both a stormwater mitigation and public amenity with the addition of walking paths and open space.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input checked="" type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Funding.

<b>Lead/Champion</b>	<b>Support</b>	
Department of Utilities	Department of Planning and Economic Development	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
Private developer as part of a land development project. FEMA BRIC grant funding	<input type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input checked="" type="checkbox"/> Over \$100,000	<input type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input checked="" type="checkbox"/> Long Term (3-5 years)

### Other Notes

Part of a larger stormwater management program with RIDOT's conveyance system. Working w Jacobs Engineering.

See the North End Urban Plan <https://www.cityofnewport.com/CityOfNewport/media/City-Hall/Boards-Commissions/Boards/Planning%20Board/2021-05-12-Newport-NEUP-compressed.pdf>

## VULNERABILITY: Flood Prone Streets or Infrastructure

<b>MITIGATION ACTION:</b> 3. Improve Elizabeth Brook flooding. b. Create deep stormwater storage green areas along the brook.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

Low-lying areas along Elizabeth Brook in the North End neighborhood, are prone to flooding due to surcharge of existing utility outfalls along the coastline as well as limited overland flooding during high tide storm events. Sea level rise will further threaten the North End neighborhood where Elizabeth Brook flows into Narragansett Bay.

### Benefits

Protect public infrastructure and private homes from flooding. The streambed can serve as both a stormwater mitigation and public amenity with the addition of walking paths and open space.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input checked="" type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Funding.

<b>Lead/Champion</b>	<b>Support</b>	
Department of Utilities	Department of Planning and Economic Development	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
Private developer as part of a land development project. FEMA BRIC grant funding	<input type="checkbox"/> less than \$10,000 <input checked="" type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input checked="" type="checkbox"/> Long Term (3-5 years)

### Other Notes

Part of a larger stormwater management program.

See the North End Urban Plan <https://www.cityofnewport.com/CityOfNewport/media/City-Hall/Boards-Commissions/Boards/Planning%20Board/2021-05-12-Newport-NEUP-compressed.pdf>

## VULNERABILITY: Flood Prone Streets or Infrastructure

<b>MITIGATION ACTION:</b> 3. Improve Elizabeth Brook flooding. c. Evaluate the feasibility/need of a flood gate or storm surge gate where Elizabeth Brook flows into Coasters Harbor north of Admiral Kalbfus Road.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input type="checkbox"/> Medium <input checked="" type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

Low-lying areas along Elizabeth Brook in the North End neighborhood, are prone to flooding due to surcharge of existing utility outfalls along the coastline as well as limited overland flooding during high tide storm events. Sea level rise will further threaten the North End neighborhood where Elizabeth Brook flows into Narragansett Bay.

### Benefits

Protect public infrastructure and private homes from flooding. Protect the restored wetlands. The streambed can serve as both a stormwater mitigation and public amenity with the addition of walking paths and open space.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input checked="" type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Funding. Coordinating with the Navy.

<b>Lead/Champion</b>	<b>Support</b>	
Public Services and Utilities	Department of Planning and Economic Development, Navy	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
Federal funding via the U.S. Navy American Rescue Plan Act (ARPA) Infrastructure funding	<input type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input checked="" type="checkbox"/> Over \$100,000	<input type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input checked="" type="checkbox"/> Long Term (3-5 years)

### Other Notes

Part of a larger RIDOT stormwater management program. The daylighting and bottleneck issues need to be resolved by RIDOT before the evaluation for storm surge gates can occur.

See the North End Urban Plan <https://www.cityofnewport.com/CityOfNewport/media/City-Hall/Boards-Commissions/Boards/Planning%20Board/2021-05-12-Newport-NEUP-compressed.pdf>

See 2023 article <https://www.newportthisweek.com/articles/newport-considering-65m-stormwater-mitigation-project/>

## VULNERABILITY: Flood Prone Streets or Infrastructure

<b>MITIGATION ACTION:</b> 4. Improve stormwater education. a. Continue Adopt-a-Catch Basin initiative which encourages residents to help keep the city's storm drains and catchbasins clear of leaves.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

Clogged catchbasins can result in minor street flooding, creating a nuisance for motorists, pedestrians and businesses. Oftentimes, it doesn't take much more than a thin layer of leaves to block these critical drainage elements.

### Benefits

Reduced flooding. Fewer beach closures.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input checked="" type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input checked="" type="checkbox"/> Education and Awareness			

### Obstacles

Other priorities for the city. As of date, there has been very little buy-in.

Lead/Champion	Support
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Department of Utilities	Newport Communications Department
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Potential Funding Sources	Estimated Cost	Timeline
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City General Funds	<input checked="" type="checkbox"/> less than \$10,000	<input checked="" type="checkbox"/> Short Term (less than 2 years)
	<input type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)
	<input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

### Other Notes

Catch basin adoption: <https://www.newportri.com/news/20191107/as-leaves-cover-streets-newport-catch-basins-go-up-for-adoption>

## VULNERABILITY: Flood Prone Streets or Infrastructure

<b>MITIGATION ACTION:</b> 4. Improve stormwater education. b. Continue public education on how tide gates and tides interact during a storm. Teach adaptation, let the waters recede.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High
	<input type="checkbox"/> Medium
	<input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

The City has invested in new tide gates to reduce flooding. The tide gates permit water flow in only one direction, so tide water will be prevented from flowing back into the stormwater system.

### Benefits

Better understanding of the infrastructure intent and capabilities can reduce the number of citizen complaints.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input checked="" type="checkbox"/> Education and Awareness			

### Obstacles

<b>Lead/Champion</b>	<b>Support</b>	
Department of Utilities	Newport Communications Department	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
City General Funds Rhode Island Department of Environmental Management (RIDEM) green economy bond	<input checked="" type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

### Other Notes

Catch basin adoption: <https://www.newportri.com/news/20191107/as-leaves-cover-streets-newport-catch-basins-go-up-for-adoption>

## VULNERABILITY: Flood Prone Streets or Infrastructure

<b>MITIGATION ACTION:</b> 4. Improve stormwater education. c. Educate residents and builders on the effects of buildout, sea level rise, and stormwater connections. Promote adaptation to rising sea levels.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

The City’s stormwater system cannot and will never fully be capable of diverting all the rainwater, especially as tides rise.

### Benefits

Smarter building practices that consider reclaimed water, or water retention infrastructure.

### Hazard Addressed

Flooding, sea level rise.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input checked="" type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input checked="" type="checkbox"/> Education and Awareness			

### Obstacles

Lead/Champion	Support
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Department of Planning and Economic Development	Department of Utilities, Communication Department, Building Department, University of Rhode Island (URI) Coastal Resource Center.
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Potential Funding Sources	Estimated Cost	Timeline
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City General Funds	<input type="checkbox"/> less than \$10,000	<input checked="" type="checkbox"/> Short Term (less than 2 years)
	<input checked="" type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)
	<input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

### Other Notes

As of October 2024, the city is working on creating a pilot project to teach stormwater education.

## VULNERABILITY: Flood Prone Streets or Infrastructure

<b>MITIGATION ACTION:</b> 4. Improve stormwater education. d. Educate residents on the damaging effects of phosphorus loading.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

Freshwater lakes and ponds have experienced algal blooms as a result of historic and ongoing phosphorus loading. In addition to being unsightly, algae blooms create high biochemical oxygen demand (BOD) as the algae decomposes and uses up available oxygen supplies. This low oxygen environment threatens the survival of fish and other aquatic organisms.

There is local data to prove that nutrient loading is coming from neighboring lawns.

### Benefits

Healthier ecosystems.  
 Improved water quality.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input checked="" type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input checked="" type="checkbox"/> Natural Systems Protection			
<input checked="" type="checkbox"/> Education and Awareness			

### Obstacles

Language barriers, competing priorities.

<b>Lead/Champion</b> Department of Planning and Economic Development	<b>Support</b> Department of Utilities, Communication Department, Building Department, University of Rhode Island (URI) Coastal Resource Center.								
<b>Potential Funding Sources</b> City General Funds	<table border="1"> <thead> <tr> <th>Estimated Cost</th> <th>Timeline</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> less than \$10,000</td> <td><input checked="" type="checkbox"/> Short Term (less than 2 years)</td> </tr> <tr> <td><input type="checkbox"/> \$10,000 to \$100,000</td> <td><input type="checkbox"/> Medium Term (2-3 years)</td> </tr> <tr> <td><input checked="" type="checkbox"/> Over \$100,000</td> <td><input type="checkbox"/> Long Term (3-5 years)</td> </tr> </tbody> </table>	Estimated Cost	Timeline	<input type="checkbox"/> less than \$10,000	<input checked="" type="checkbox"/> Short Term (less than 2 years)	<input type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)	<input checked="" type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)
Estimated Cost	Timeline								
<input type="checkbox"/> less than \$10,000	<input checked="" type="checkbox"/> Short Term (less than 2 years)								
<input type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)								
<input checked="" type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)								

### Other Notes

This is also a Natural Resource Mitigation Action.

## VULNERABILITY: Flood Prone Streets or Infrastructure

<b>MITIGATION ACTION:</b>  5. Require the use of the CRMC coastal hazards analysis worksheet for all development and redevelopment.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

The State requires eligible applicants to go through the exercise of evaluating the risk of climate change on the project. The City of Newport would like to require development applicants to of potential coastal hazards such as sea level rise, storm surge and associated flooding and shoreline erosion.

### Benefits

Development/re-development that has is built smarter to be more resilient to future flooding.

### Hazard Addressed

Flooding, sea level rise.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input checked="" type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input checked="" type="checkbox"/> 4	<input checked="" type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input checked="" type="checkbox"/> Natural Systems Protection			
<input checked="" type="checkbox"/> Education and Awareness			

### Obstacles

Resistance to change in workflow

Lead/Champion	Support
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Department of Planning and Economic Development	Building Department, University of Rhode Island (URI) Coastal Resource Center.
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Potential Funding Sources	Estimated Cost	Timeline
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City General Funds	<input type="checkbox"/> less than \$10,000	<input type="checkbox"/> Short Term (less than 2 years)
	<input checked="" type="checkbox"/> \$10,000 to \$100,000	<input checked="" type="checkbox"/> Medium Term (2-3 years)
	<input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

### Other Notes

See <http://www.crmc.ri.gov/coastalhazardapp.html>

## VULNERABILITY: Flood Prone Streets or Infrastructure

<b>MITIGATION ACTION:</b>  6. Improve resilience of seawalls and associated structures at: Storer Park and Causeway Seawall, Long Wharf Seawall, Battery Park, Washington St., Van Zandt Pier, Elm St. Pier, Ocean Avenue.	<b>ACTION PRIORITY</b>	
	<input checked="" type="checkbox"/> High	<input type="checkbox"/> Medium
	<input type="checkbox"/> Low	
	<b>Action Status</b>	
	New	

### Rationale

The seawalls in the coastal city of Newport protect the waterfront business district. Not only do the structures age over time but increased storm activity and sea levels promotes destructive erosion. Repairing the seawalls, making them more resilient to storm surge better protects the business community and economic driver for the city.

### Benefits

Infrastructure resilience. Better protection of the downtown area from destructive wave action.

### Hazard Addressed

Flooding, sea level rise, hurricanes, Nor'easters

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input checked="" type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input checked="" type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

<b>Lead/Champion</b>	<b>Support</b>	
Department of Public Services	Newport Harbormaster	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
City funds, bond issue	<input type="checkbox"/> less than \$10,000 <input checked="" type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Short Term (less than 2 years) <input checked="" type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

### Other Notes

Capital Improvement funding has been committed as match to repair or replace seawalls, making them more resilient. Current efforts include installing rip-rap which dissipates wave energy.

- 2020: Storer Park/Goat Island seawall re-built.
- 2024: King Park seawall repairs. \$2.3 million grant from Infrastructure Bank.

## VULNERABILITY: Bridges

<b>MITIGATION ACTION:</b> 7. Mitigate goat island causeway at Newport Harbor to protect from sea level rise. RIDOT to assess for major rehabilitation work, superstructure, and/or total bridge replacement.	<b>ACTION PRIORITY</b>	
	<input type="checkbox"/> High	<input checked="" type="checkbox"/> Medium
	<input type="checkbox"/> Low	
	<b>Action Status</b>	
	2022	

### Rationale

Protection for future sea level rise conditions. Address current deterioration.

### Benefits

Infrastructure resilience.

### Hazard Addressed

Flooding, hurricane, Nor'easter

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Funding.

Lead/Champion	Support
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Rhode Island Department of Transportation

Newport Department of Public Services

Potential Funding Sources	Estimated Cost	Timeline
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State Transportation Improvement Program (STIP) 2022-2025 (\$21.6 million over 4 years)

- less than \$10,000
- \$10,000 to \$100,000
- Over \$100,000

- Short Term (less than 2 years)
- Medium Term (2-3 years)
- Long Term (3-5 years)

### Other Notes

This project is in the STIP but only for 1/2 of the funds needed for rehabilitation. The city was asked to supply the remaining half but it is too expensive. RIDOT is not inclined to pay the full cost for repairs due to the low traffic volume on the causeway.

## VULNERABILITY: Wastewater

<b>MITIGATION ACTION:</b> 8. Disconnect stormwater connections to the existing combined sewer-stormwater overflow (CSO) system. Construct a bioretention areas at Bellevue Avenue and Coggeshall Avenue.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	New

### Rationale

Following heavy rainstorms, water running off of the roads are conveyed to the water treatment system. The City of Newport has over 90 miles of sanitary sewer pipes, many of which have been in operation for over 100 years. Prior to the 1970's, many of these pipes were designed as combined sewers- collecting both sanitary sewage as well as stormwater during rainstorms. This extra influx of water can overload the system, causing releases of untreated water. Since the 1970's the city has constructed several projects to separate the storm water connections from the sanitary sewer to reduce the number of combined sewer overflow (CSO) events.

### Benefits

Improved water quality. Reduced volume entering the CSO eases the strain of the system.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input checked="" type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input checked="" type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

<b>Lead/Champion</b> Department of Utilities	<b>Support</b>	
<b>Potential Funding Sources</b> RIDEM Narragansett Bay and Water Restoration Fund (BYRF) grant. RISE Grant	<b>Estimated Cost</b> <input type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input checked="" type="checkbox"/> Over \$100,000	<b>Timeline</b> <input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

**Other Notes**  
 Designs are 90% done. In partnership with Spouting Rock Beach Association which owns the area.

## VULNERABILITY: Wastewater

<b>MITIGATION ACTION:</b> 9. Evaluate flooding frequency and magnitude near the Wastewater Treatment Facility (WWTF) outfall at Coddington Point.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

The roadways on Navy-owned property used to access the outfall may be compromised due to flooding. Stress from development on the North End has exacerbated the flooding issue.

### Benefits

Reduced flooding.

### Hazard Addressed

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

<b>Lead/Champion</b> Department of Planning	<b>Support</b> Naval Station Newport	
<b>Potential Funding Sources</b> Military Installation Resiliency Review (MIRR) grant	<b>Estimated Cost</b> <input type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input checked="" type="checkbox"/> Over \$100,000	<b>Timeline</b> <input type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input checked="" type="checkbox"/> Long Term (3-5 years)

### Other Notes

This area was studied as party of the MIRR report but only looked at future probabilistic scenarios. Part of a larger grant. Also, part of the City's Transportation Master Plan. Potentially install a tide gate.

**VULNERABILITY: Wastewater**

<b>MITIGATION ACTION:</b> 10. Increase the capacity of staff to effectively conduct maintenance and install improvements to the stormwater management systems.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	New

**Rationale**

There is an increasing demand on staff to maintain stormwater systems and keep the roads clear of flooding. Especially as the region sees more intense rainstorms.

**Benefits**

More efficient stormwater systems and less flooding.

**Hazard Addressed**

Flooding

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input checked="" type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

**Obstacles**

Funding.

Lead/Champion	Support
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Department of Utilities

Potential Funding Sources	Estimated Cost	Timeline
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Capital Improvement Plan

- less than \$10,000
- \$10,000 to \$100,000
- Over \$100,000

- Short Term (less than 2 years)
- Medium Term (2-3 years)
- Long Term (3-5 years)

**Other Notes**

## VULNERABILITY: Communication Equipment

<b>MITIGATION ACTION:</b> 11. Upgrade police department radio systems (including portables).	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High
	<input type="checkbox"/> Medium
	<input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

Radio communication systems need to be kept current.

### Benefits

Continuity of operations.

### Hazard Addressed

Tornadoes, high winds, lightning, hurricanes, Nor'easter

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Keeping up to date on RIEMA communication towers.

Lead/Champion	Support
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Police Department

RIEMA

Potential Funding Sources	Estimated Cost	Timeline
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Newport Capital Improvement Plan (CIP)

less than \$10,000

Short Term (less than 2 years)

Police Department Grants

\$10,000 to \$100,000

Medium Term (2-3 years)

Over \$100,000

Long Term (3-5 years)

### Other Notes

## VULNERABILITY: Communication Equipment

<b>MITIGATION ACTION:</b> 12. Monitor available upgrades for mobile communications in police cruisers.	<b>ACTION PRIORITY</b>	
	<input type="checkbox"/> High	
	<input checked="" type="checkbox"/> Medium	
	<input type="checkbox"/> Low	
<b>Action Status</b>		
2022		

### Rationale

Keeping up with the latest technology upgrades can ensure that the mobile communication systems and cell towers remain compatible.

### Benefits

Continuity of operations.

### Hazard Addressed

Tornadoes, high winds, lightning, hurricanes, Nor'easter

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Keeping up to date on RIEMA communication towers.

<b>Lead/Champion</b>	<b>Support</b>	
Police Department	RIEMA	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>
Newport Capital Improvement Plan (CIP)	<input checked="" type="checkbox"/> less than \$10,000	<input checked="" type="checkbox"/> Short Term (less than 2 years)
Police Department Grants	<input type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)
	<input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

### Other Notes

## VULNERABILITY: Dams

<b>MITIGATION ACTION:</b> 13. Design and construction resiliency actions as per results of the second round of the Easton Pond Dam Study. a. Raise earthen embankments of South Easton Pond. b. Raise the earthen embankment separating North Easton Pond from South Easton Pond. c. Install two gates to prevent saltwater intrusion.	<b>ACTION PRIORITY</b>	
	<input checked="" type="checkbox"/> High	<input type="checkbox"/> Medium
	<input type="checkbox"/> Low	
	<b>Action Status</b>	
	2022	

### Rationale

The aging dam and moat infrastructure has deteriorated over the past 70 years, which is now resulting in soil loss and threatening the future structural stability of the dam.

The runoff from these neighborhoods as well as activities in and around the dam and moat system generate significant bacteria loadings that lead to beach closures at Easton Beach.

### Benefits

Improved resiliency. Protecting drinking water supply from saltwater intrusion, overtopping, and to achieve consistent embankment height.

### Hazard Addressed

Flooding, hurricanes, Nor'easters, sea level rise, dam failure

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input checked="" type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Funding

Lead/Champion	Support
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Department of Utilities

Potential Funding Sources	Estimated Cost	Timeline
FEMA's Building Resilient Infrastructure and Communities (BRIC) grant to advance two design alternatives.	<input type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input checked="" type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

### Other Notes

City will submit a BRIC grant application later in 2024 to do some of the recommended actions.

Earthen embankments armored with articulated concrete blocks. 100-foot gate at South Pond Primary Spillway will prevent saltwater intrusion and increase storage capacity of South Easton Pond.

Second gate (tidal/flap) will be installed across the discharge channel near the NW corner of South Easton Pond. This will prevent saltwater from backing up the discharge channel and intruding into North Easton Pond.

## VULNERABILITY: Critical Municipal Hazard Response Facilities

<b>MITIGATION ACTION:</b> 14. Relocate Fire Station 1 out of the floodplain.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

Flooding during extreme weather events can damage critical infrastructure and increase emergency response time.

### Benefits

Continuity of operations

### Hazard Addressed

Flooding, sea level rise, hurricanes, Nor'easters

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input type="checkbox"/> 5
<input checked="" type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input checked="" type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Funding, other city priorities

Lead/Champion	Support
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Fire Department

Potential Funding Sources	Estimated Cost	Timeline
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FEMA Assistance to Firefighters Grant

FEMA Building Resilient Infrastructure and Communities (BRIC) Grant.

- less than \$10,000  
 \$10,000 to \$100,000  
 Over \$100,000

- Short Term (less than 2 years)  
 Medium Term (2-3 years)  
 Long Term (3-5 years)

### Other Notes

Potential site has been located. However, the focus has been on other critical infrastructure right now.

## VULNERABILITY: Critical Municipal Hazard Response Facilities

<b>MITIGATION ACTION:</b> 15. Develop a Post-Disaster Recovery Plan.	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High
	<input type="checkbox"/> Medium
	<input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

A Disaster Recovery Plan is imperative for a resilient and speedy recovery process after a natural disaster or pandemic strikes.

### Benefits

Having this type of plan in place before a natural disaster occurs will minimize risks associated with natural disasters and provide seamless coordination of recovery efforts.

### Hazard Addressed

Hurricanes, Nor'easters, flooding, severe winter weather, high winds, sea level rise, dam failure, tornadoes, earthquakes

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Department priorities

Lead/Champion	Support
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EMA Director

Potential Funding Sources	Estimated Cost	Timeline
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FEMA Hazard Mitigation Grant Program.

- less than \$10,000
- \$10,000 to \$100,000
- Over \$100,000

- Short Term (less than 2 years)
- Medium Term (2-3 years)
- Long Term (3-5 years)

### Other Notes

The purpose of a Disaster Recovery Plan is to mobilize different agencies, utilities, and aid programs as quickly as possible following a natural hazard event and help them work together cohesively to provide a calm and speedy recovery process. Completion of this plan will facilitate a more efficient recovery operation to restore and revitalize the social, economic and environmental health of the city.

Align with the precepts contained in the National Disaster Recovery Framework.

## VULNERABILITY: Critical Municipal Hazard Response Facilities

<b>MITIGATION ACTION:</b> 16. Formally organize the current emergency management volunteers into a Citizens Emergency Response Team (CERT).	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

Maintain momentum of the volunteers have helped out during the pandemic.

### Benefits

Educating volunteers about disaster preparedness and training them in basic disaster response skills. Professional responders can rely on this cadre during disaster situations.

### Hazard Addressed

Hurricanes, Nor'easters, flooding, severe winter weather, high winds, extreme temperatures, sea level rise, dam failure, tornadoes, earthquakes

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input checked="" type="checkbox"/> Education and Awareness			

### Obstacles

Interest

Lead/Champion	Support
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EMA Director

Potential Funding Sources	Estimated Cost	Timeline
FEMA Preparedness or Training grants.	<input type="checkbox"/> less than \$10,000 <input checked="" type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

### Other Notes

See <https://www.ready.gov/cert>

Discussions have begun. Taking advantage of Train the Trainer opportunities.

## VULNERABILITY: Populations

<b>MITIGATION ACTION:</b> 17. Improved public education. a. Education on storm drain road flooding, wait it out. b. Better guidance on 72-hour shelter-in-place. c. Effects of buildout on sea level rise and stormwater connections. (same as action 4c) d. Tactical urban education (educational signage or other installations) e. Climate change adaptation	<b>ACTION PRIORITY</b>
	<input checked="" type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

Education can encourage changes in behavior and help people make informed decisions.

### Benefits

Fewer drivers getting stranded in floodwaters, more informed building decisions, reducing damages from rising sea levels.  
 Influence behavior change.

### Hazard Addressed

Hurricanes, Nor'easters, flooding, severe winter weather, high winds, drought, extreme temperatures, sea level rise, brushfire, dam failure, tornadoes, earthquakes

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input checked="" type="checkbox"/> Education and Awareness			

### Obstacles

Funding

Lead/Champion	Support
Department of Planning	Department of Utilities, Communication Department, Building Department, University of Rhode Island (URI) Coastal Resource Center. Resiliency and Sustainability Director

Potential Funding Sources	Estimated Cost	Timeline
City General Funds	<input type="checkbox"/> less than \$10,000 <input checked="" type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

### Other Notes

Level of storm surge, flooding as shown on stop signs, buildings, etc.

## VULNERABILITY: Populations

<b>MITIGATION ACTION:</b> 18. Create resiliency guidelines or ordinances for development, incorporating green infrastructure, stormwater infrastructure, protect environmental assets, and promote low impact development.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	New

### Rationale

The City wants to ensure that projects are in line with climate change projections and municipal goals. The working waterfront area, which is the main commercial area in Newport, may benefit from elevation guidelines.

### Benefits

Planning consistency, future resiliency.

### Hazard Addressed

Hurricanes, Nor'easters, flooding, severe winter weather, high winds, drought, extreme temperatures, sea level rise, brushfire, dam failure.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input checked="" type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input checked="" type="checkbox"/> 4	<input checked="" type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Lead/Champion	Support
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Department of Planning and Economic Development	City Council, Town Manager, City Solicitor
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Potential Funding Sources	Estimated Cost	Timeline
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Planning Department funds	<input checked="" type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Short Term (less than 2 years) <input checked="" type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)
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### Other Notes

See Appendix H of the Aquidneck Island Regional Hazard Mitigation Plan.

**VULNERABILITY: Businesses**

<b>MITIGATION ACTION:</b> 19. Develop guidelines for waterfront post-disaster redevelopment.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

**Rationale**

To facilitate pre-disaster planning in a way that guides long-term recovery efforts (five years or more) following a disaster. Rebuilding damaged structures or infrastructure in the same location and/or in the same way may leave the community at risk from similar disaster losses in the future.

**Benefits**

Swifter return of community stability.

**Hazard Addressed**

Hurricanes, Nor'easter, flooding, sea level rise

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

**Obstacles**

Lead/Champion	Support
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Department of Planning and Economic Development      Building Department

Potential Funding Sources	Estimated Cost	Timeline
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Capital Improvement Program As part of a larger grant opportunity	<input type="checkbox"/> less than \$10,000	<input checked="" type="checkbox"/> Short Term (less than 2 years)
	<input type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)
	<input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

**Other Notes**

May be a longer-term project.

See: <https://www.fema.gov/sites/default/files/2020-07/post-disaster-redevelopment-planning.pdf>

## VULNERABILITY: Schools

<b>MITIGATION ACTION:</b> 20. Develop a bus transportation plan to safely evacuate students and staff in advance of or during an event.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

This effort will provide guidance should school district need to alter standard bus routes.

### Benefits

Improved student and staff safety during an emergency.

### Hazard Addressed

Hurricanes, Nor'easter, severe winter weather, brushfires, tornadoes, dam failure

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

<b>Lead/Champion</b> School Superintendent	<b>Support</b> Fire Department	
<b>Potential Funding Sources</b> School Department	<b>Estimated Cost</b> <input checked="" type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<b>Timeline</b> <input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

### Other Notes

School Superintendent is in talks with the Fire Chief.

## VULNERABILITY: Schools

<b>MITIGATION ACTION:</b> 21. Invest in broadband improvements for schools to boost remote learning capabilities.	<b>ACTION PRIORITY</b>	
	<input type="checkbox"/> High	
	<input checked="" type="checkbox"/> Medium	
	<input type="checkbox"/> Low	
	<b>Action Status</b>	
	2022	

### Rationale

Flexible learning options to allow students to continue their lessons regardless of if they are in the school or not.

### Benefits

Improved digital experience.

### Hazard Addressed

Hurricanes, Nor'easters, severe winter weather, extreme temperatures, lightning, tornadoes, earthquakes

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Lead/Champion	Support
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City Administration	School Department
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Potential Funding Sources	Estimated Cost	Timeline
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CDBG Grants	<input type="checkbox"/> less than \$10,000	<input checked="" type="checkbox"/> Short Term (less than 2 years)
	<input type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)
	<input checked="" type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)

### Other Notes

Determine how far the broadband infrastructure goes through Newport. At first glance, it looks like OSHEAN fiber stops at Old Fort Road. Does not go to Rogers High School.

## VULNERABILITY: Recreation Facilities

<b>MITIGATION ACTION:</b> 22. Develop a Comprehensive Management Plan for the Cliff Walk.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

The Cliff Walk is a valuable recreational resource both locally and regionally. A management plan must be developed that will address issues relating to the preservation and maintenance of the Cliff Walk. Over the years, portions of the Cliff Walk have been closed due to coastal erosion.

### Benefits

Management of the coastal resource in a sustainable manner.

### Hazard Addressed

Hurricanes, Nor'easter, sea level rise

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Lead/Champion	Support
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Department of Public Services      Cliff Walk Commission

Potential Funding Sources	Estimated Cost	Timeline
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Van Beuren Charitable Foundation FEMA Hazard Mitigation Assistance grants Other philanthropies Newport Capital Improvement Plan	<input type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input checked="" type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)
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### Other Notes

Currently, the repair phase has cost \$13 million.

## VULNERABILITY: Recreation Facilities

<b>MITIGATION ACTION:</b> 23. Design and install splash pads at two playground facilities.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

Warmer days will increase the demand at local beaches. More people will be looking for ways to cool off. Splashpads provides free access to water play.

### Benefits

Enhance the quality of urban life by providing relief from hot summer days.

### Hazard Addressed

Extreme heat, drought

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Funding

Lead/Champion	Support
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Recreation Department

Potential Funding Sources	Estimated Cost	Timeline
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Green Bonds

Rhode Island Department of Environmental Management  
Green Space Grant

- less than \$10,000  
 \$10,000 to \$100,000  
 Over \$100,000

- Short Term (less than 2 years)  
 Medium Term (2-3 years)  
 Long Term (3-5 years)

### Other Notes

## VULNERABILITY: Recreation Facilities

<b>MITIGATION ACTION:</b> 24. Improvements to the Martin Recreation Center (“the Hut”). a. Conduct a needs assessment for interior and exterior projects. b. Implement the improvements.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

The Recreation Department offers various indoor and outdoor activities for the community. The main recreation building is not equipped with air conditioning, thus limiting some indoor activities during the warmer months. Trees near the building should be cut back or removed to eliminate the risk of endangering the public or damaging the building.

### Benefits

A recreation center that can act as a cooling shelter and refuge from summer thunderstorms.

### Hazard Addressed

Extreme heat, lightning

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input checked="" type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Funding

Lead/Champion	Support	
Recreation Department		
Potential Funding Sources	Estimated Cost	Timeline
Capital Improvement Plan	<input type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input checked="" type="checkbox"/> Over \$100,000	<input type="checkbox"/> Short Term (less than 2 years) <input checked="" type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)

### Other Notes

Includes boiler replacement, lower roof replacement, repair to the brick wall, replace carpet, and redirect pipes.

## VULNERABILITY: Natural Resources

<b>MITIGATION ACTION:</b> 25. Develop a steep slope ordinance.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High
	<input checked="" type="checkbox"/> Medium
	<input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

When disturbed, steep slopes are highly susceptible to erosion, landslides, and subsidence which can endanger the public, degrade water quality, and damage structures. Needed to reduce the impacts to natural systems and stormwater.

### Benefits

Reduce erosion and stormwater runoff velocity.

### Hazard Addressed

Flooding, sea level rise

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Support

Lead/Champion	Support
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Department of Utilities

Potential Funding Sources	Estimated Cost	Timeline
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City General Funds

- less than \$10,000
- \$10,000 to \$100,000
- Over \$100,000

- Short Term (less than 2 years)
- Medium Term (2-3 years)
- Long Term (3-5 years)

### Other Notes

“Defining what constitutes “steep” for the purposes of slope regulation is at the discretion of each municipality, provided that the definition is reasonable. Some communities regulate slopes starting at 15%, which ties in neatly with soil survey slope classifications. Others start at 25%, another soil survey threshold and a clear benchmark for land-use limitations. Others establish more than one minimum slope threshold based on use (e.g., 25% for residential uses and 40% for non-residential uses). Some municipalities, particularly those in hilly locations, regulate development of specific steeply sloping soil types.” (conservationtools.org)

Steep Slope Overlay District, or Supplemental Regulations to control disturbance (example: development off Girard Ave.)

**VULNERABILITY: Natural Resources**

<b>MITIGATION ACTION:</b> 26. Establish a tree trust for development projects.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

**Rationale**

A dedicated tree trust can offset the costs of maintaining a healthy tree population in Newport. Supports Newport’s mission to “plant for the future”.

**Benefits**

Better air quality, reductions in stormwater runoff, beautification, reduce heat island effects.

**Hazard Addressed**

Extreme temperatures.

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

**Obstacles**

Legal

Lead/Champion	Support
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Public Services, Tree Warden      Rhode Island Tree Council

Potential Funding Sources	Estimated Cost	Timeline
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RIDEM Urban and Community Forest grants	<input checked="" type="checkbox"/> less than \$10,000 <input type="checkbox"/> \$10,000 to \$100,000 <input type="checkbox"/> Over \$100,000	<input checked="" type="checkbox"/> Short Term (less than 2 years) <input type="checkbox"/> Medium Term (2-3 years) <input type="checkbox"/> Long Term (3-5 years)
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**Other Notes**

Project funding comes from impact fees and “fee in lieu of” from development projects in the city.

**VULNERABILITY: Natural Resources**

<b>MITIGATION ACTION:</b> 27. Follow up and document what has been done since Keeping History Above Water program.		<b>ACTION PRIORITY</b>	
		<input type="checkbox"/> High	
		<input checked="" type="checkbox"/> Medium	
		<input type="checkbox"/> Low	
		<b>Action Status</b>	
		2022	
<b>Rationale</b>			
Increases in tidal flooding and heavy downpours increases the stress on historic properties in coastal communities. A team of consulting architects, engineers, landscape architects, city planners, academics, and community members participated in a conference in January 2016 to discuss resiliency for historic homes.			
<b>Benefits</b>			
Protecting or preserving important historic resources.			
<b>Hazard Addressed</b>			
Hurricanes, Nor'easter, flooding, sea level rise			
<b>Mitigation Type</b>	<b>Supporting Plans/Efforts</b>	<b>Alignment With Plan Goals</b>	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			
<b>Obstacles</b>			
<b>Lead/Champion</b>		<b>Support</b>	
Department of Planning and Historic District Commission		URI CRC	
<b>Potential Funding Sources</b>	<b>Estimated Cost</b>	<b>Timeline</b>	
City General Funds	<input checked="" type="checkbox"/> less than \$10,000	<input checked="" type="checkbox"/> Short Term (less than 2 years)	
	<input type="checkbox"/> \$10,000 to \$100,000	<input type="checkbox"/> Medium Term (2-3 years)	
	<input type="checkbox"/> Over \$100,000	<input type="checkbox"/> Long Term (3-5 years)	
<b>Other Notes</b>			
Guide for home elevation has been done. Website: <a href="https://historyabovewater.org/74-bridgest/">https://historyabovewater.org/74-bridgest/</a>			

## VULNERABILITY: Historic Resources

<b>MITIGATION ACTION:</b> 28. Develop a strategic managed retreat plan for the Point neighborhood.	<b>ACTION PRIORITY</b>
	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low
	<b>Action Status</b>
	2022

### Rationale

The Point neighborhood contains some of the best-preserved examples of houses built before the American Revolution. This historic neighborhood is located only a few feet above sea level and is susceptible to damage from rising tides.

### Benefits

Protecting historic buildings and reducing damage.

### Hazard Addressed

Flooding, sea level rise

Mitigation Type	Supporting Plans/Efforts	Alignment With Plan Goals	
<input type="checkbox"/> Prevention	<input checked="" type="checkbox"/> Local Hazard Mitigation Plans	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 5
<input type="checkbox"/> Property Protection	<input type="checkbox"/> CRB Workshop Summary of Findings	<input type="checkbox"/> 2	<input type="checkbox"/> 6
<input type="checkbox"/> Emergency Services	<input type="checkbox"/> Local Capital Improvement Plans	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 7
<input checked="" type="checkbox"/> Local Plans and Regulations	<input type="checkbox"/> Local Comprehensive Plans	<input type="checkbox"/> 4	<input type="checkbox"/> 8
<input type="checkbox"/> Structure and Infrastructure	<input type="checkbox"/> Military Installation Resilience Review		
<input type="checkbox"/> Natural Systems Protection			
<input type="checkbox"/> Education and Awareness			

### Obstacles

Public support, acquiring available land.

Lead/Champion	Support
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Department of Planning

Potential Funding Sources	Estimated Cost	Timeline
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FEMA BRIC grant

- less than \$10,000  
 \$10,000 to \$100,000  
 Over \$100,000

- Short Term (less than 2 years)  
 Medium Term (2-3 years)  
 Long Term (3-5 years)

### Other Notes

See the theoretical example in Warren, Market to Metacom which considering buying vulnerable, flood-prone properties and relocate the displaced to a redeveloped corridor, where a setting of retail, restaurants, and mixed-income housing would offer safety out of the floodplain.

<https://experience.arcgis.com/experience/6243398bbb804cc794fbd9bf2e5a71c0>

A case for strategic and managed retreat <https://www.science.org/doi/10.1126/science.aax8346>

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## Appendix H: Pre- and Post- Disaster Guidelines

# PRE- AND POST-DISASTER RECOVERY GUIDANCE

## PRE-DISASTER DEVELOPMENT GUIDELINES

Smart land use planning which considers sea level rise and other natural hazards can reduce the impacts to a community. Strengthening resilience is a collaborative effort. New policies may require that new development in coastal areas anticipate sea level rise for the building's lifespan. For existing developments, building-specific adaptations can be used to preserve the building's structural integrity in the event of storm surge or sea level rise.

## CLIMATE RESILIENT LAND USE STRATEGIES

Land use regulations can help make future development more resilient to changing climate conditions. Communities can adopt policies to reduce impacts from climate change such as more intense rain events, sea level rise, drought, and extreme weather events

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### MASSACHUSETTS METROPOLITAN PLANNING COUNCIL (MAPC)

<https://www.mapc.org/resource-library/design-standards>

Over 100 communities have developed land use regulations which support climate resiliency goals.

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### NEW YORK SOUTHERN TIER CENTRAL (CHEMUNG, SCHUYLER, AND STEUBEN COUNTIES)

<https://www.stcplanning.org/wp-content/uploads/2020/09/LandUseStrategiesForFlooding.pdf#:~:text=provide%20inspiration,%20ideas,%20and%20assistance%20to%20enable%20communities>

Guidance for New York State municipalities to plan for appropriate development while protecting people and property from the impacts of flooding.

Type	Purpose	Example
<b>Floodplain Overlay Districts</b>	Expanding overlay districts beyond the SFHA, restricting construction in the SFHA, and requiring special permits.	Oak Bluffs Floodplain Overlay District includes protection from impacts of sea level rise in the "Purpose".  Dennis and Nantucket measure building height from the base flood rather than the mean grade in FEMA 1% flood zones.

Type	Purpose	Example
		<p>Manchester-by-the Sea requires structures in the VE zone to be landward of spring high tide (the highest tide of the year).</p> <p>Cohasset requires that areas covered by water part of the year cannot comprise more than 15% of the lot area.</p> <p>The Southern Tier Central Region of NY recommends local regulated floodplains to include 0.2% annual chance floodplain erosion hazard areas, dam inundation areas, floodplain buffer zones, and flood-prone soils.</p>
<b>Other Zoning Districts</b>	<p>Strategies include providing incentives for resilient development, restricting development, and adding requirements that improve resilience.</p>	<p>Hull adopted a Nantasket Beach Overlay District to encourage mixed use and multifamily redevelopment. Height restrictions are relaxed to allow for freeboard.</p> <p>Gloucester created an Atlantic Road Overlay District to protect an area of coastal shoreline. A Special Permit is required to build in that area.</p> <p>Scituate limits impervious area to 15% or 2,500 sq/ft of the lot, whichever is greater, unless an artificial recharge system meets specific, more stringent standards.</p> <p>Groundwater Rise Overlay District. This is a guidance strategy for NH municipalities, but none have adopted it yet due to the need for additional research to develop best management practices.</p>
<b>Riparian Buffer Regulations</b>	<p>Prevent vulnerable development, protecting natural features, and managing</p>	<p>Ithaca, NY has stream setback standards ranging from 35 to 100 feet.</p>

Type	Purpose	Example
	vegetation within stream corridors.	Erwin, NY uses a Stream Corridor Overlay Zone that applies to 100 feet of the mean high-water mark.
<b>Stormwater Regulations</b>	Increase infiltration requirements, apply stormwater regulations to less than one acre.	All new construction greater than 25% of the existing building footprint is subject to the stormwater by-law.
<b>Site Plan Review</b>	Consider future sea level rise, incorporate resilience and sustainability.	<p>Hull design guidelines include protection against flood damage on site and protection against flood impacts to adjoining properties, taking into consideration current conditions and the potential for future sea level rise.</p> <p>Concord’s design standards include incorporation of sustainability and resiliency principles into the site design that result in a plan that is responsive to the environment and actively contributes to the development of a more sustainable community.</p>
<b>Regulate Water Conservation</b>	Reduce impacts drought can have on water quantity and quality.	<p>Danvers institutes a Water Use Mitigation Program which requires collection of a fee for new development. IN addition, new development must have energy efficient and water saving appliances.</p> <p>Danvers and other towns have bylaws which require automatic irrigation systems to have moisture sensors, and timing devices set to conform with town water use restrictions.</p>
<b>Tree Planting</b>	Trees can intercept stormwater and mitigate heat.	<p>Somerville has tree requirements for landscaped islands in parking lots.</p> <p>Boxborough has design standards for parking lots to require a certain amount of trees.</p>

## COASTAL WETLAND RESILIENCY REGULATIONS

Local ordinances and zoning related to floodplains is often focused on delineated Special Flood Hazard Areas (SFHA) as per the FEMA floodplain maps. These defined areas are based on historical flood data and do not consider future sea level or storm conditions, creating a false sense of safety.

As Aquidneck Island continues to see continuous sea level rise and increase frequency and intensity of storm surge, there are many areas outside the current SFHA that will be at risk of flooding. The shoreline, salt marshes, and other coastal resources will migrate landward. The flood capacity of these natural features could be impacted by development which prohibits natural landward migration.

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### CAPE COD COMMISSION

The following guidance was developed by the Cape Cod Commission and partners to help protect the wetland resources that are migrating landward and not identified on traditional maps.

- Establish a benchmark Target Year for projections of sea level rise and flood risk.
- Define the areas you want to protect. "The area subject to protection under this Coastal Resilience Zone Model Regulation is the Coastal Resilience Zone which includes Land Subject to Coastal Storm Flowage ("LSCSF"), Coastal Flood Risk Area (1% storm) for Target Year, and Other Coastal Wetland Resources within the LSCSF or Coastal Flood Risk Area, the Special Transitional Area, and the buffer to each of these resource areas."
  - Special Transition Areas area areas where the wetland is predicted to migrate due to rising sea levels.
- Projects or activities proposed in the defined area trigger performance standards to be met.
- Model Coastal Resilience Zone Wetlands Regulations, 2024.

<https://www.capecodcommission.org/resource-library/file/?url=/dept/commission/team/projects/Project%20Files/MULTI-TOWN/EEA%20Reg%20Tools%20for%20Floodplain%20Development/Final%20Documents/Model%20Coastal%20Resilience%20Zone%20Regulations.pdf>

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### MASSACHUSETTS METROPOLITAN PLANNING COUNCIL (MAPC)

<https://www.mapc.org/resource-library/wetlands-regulations/>

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### ARKANSAS DEPARTMENT OF AGRICULTURE, NATURAL RESOURCE COMMISSION

<https://agriculture.arkansas.gov/wp-content/uploads/2023/01/Leg-CounANRC.07-SOS-Clean-Copy-FINAL-RULE-Title-13.pdf>

The following are examples of strategies used to strengthen local wetland regulations.

Type	Purpose	Example
<b>Incorporate Climate Resilience</b>	Protecting local wetlands and promoting climate change adaptation.	In Arlington, MA compensatory storage at a 2:1 ratio is required as a climate resilience strategy.  Wrentham requires applicants to address climate change impacts including design consideration for flooding impacts.
<b>Establish Performance Standards for Land Subject to Coastal Storm Flowage (LSCSF)</b>	Includes drainage swales and channels that lead into, out of, pass through, or connect other freshwater wetlands or coastal wetlands, and that carry flows resulting from storm events, but may remain relatively dry at other times.	Hingham, MA requires projects in VE and A-zones to, at a minimum, incorporate 1 foot of projected sea level rise into project design and construction.  Scituate has similar language but also requires projects to consider land migration.
<b>Wetland &amp; Riparian Zones Tax Credit Program</b>	Promotes flood control, water quality enhancement, fish and wildlife habitat, recreational opportunities, and groundwater recharge.	The State of Arkansas allows a state income tax credit for taxpayers who engage in the development, restoration, or conservation of wetland and riparian zones through approved projects.
<b>Expand Buffer Zone Jurisdictions</b>	Provides the opportunity to consider impacts and provide protection to areas that may be subject to climate impacts in the future.	Some communities define buffer zones as regulated resource areas. Others have adopted buffers to Land Subject to Flooding.
<b>Strengthen Stormwater Requirements</b>	Stormwater flooding has become an even greater challenge than previously.	Stormwater regulations which apply to projects that disturb 500 sq/ft and require infiltration of 2" x the impervious area.
<b>Protect Compensatory Storage</b>	Loss of storage will increase flooding during peak flows.	Require additional compensatory storage beyond 1:1 ratio.
<b>Water Conservation</b>	Likelihood of increased probability of drought in summer and fall.	Sharon, MA reserves the right to limit the size of lawns and impose irrigation restrictions to protect and preserve hydrology.
<b>Tree Protection</b>	Trees and tree canopy can mitigate heat and flooding.	Dedham, MA requires that all healthy trees removed be replaced at a minimum 2:1 ratio.

	Wrentham and Wakefield, MA have tree removal policies which apply to the resource areas and their buffers.
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**BUILDING/SITE DESIGN STANDARDS AND GUIDELINES**

In addition to managing land use, incorporating resilient and sustainable design standards can make infrastructure withstand flooding, high winds, extreme temperatures and other climate change impacts.

**MASSACHUSETTS METROPOLITAN PLANNING COUNCIL (MAPC)**

<https://www.mapc.org/resource-library/design-standards/>

**RHODE ISLAND COASTAL RESOURCE MANAGEMENT COUNCIL (CRMC)**

<https://www.beachsamp.org/relatedprojects/coastalpropertyguide/>

[http://www.crmc.ri.gov/guidesreports/Coastal\\_Smart\\_Growth.pdf](http://www.crmc.ri.gov/guidesreports/Coastal_Smart_Growth.pdf)

**ROCKINGHAM PLANNING COMMISSION (NEW HAMPSHIRE)**

<https://www.therpc.org/ResilientLandUseNH>

Type	Purpose	Example
<b>Design Standards</b>	Improved design standards in zoning ordinances.	Watertown, MA encourages new development to address the highest sustainable and ecological principals, promote environmental performance standards, require tree shading.  Somerville, MA established landscaping requirements for urban areas.
<b>Stormwater Management: Impervious Surface Reduction</b>	Limit impervious surface coverage to provide reasonable protection of natural resources.	Unsewered lot coverage limits. Lots less than 2 acres are limited to 30% impervious coverage. In Hampton, NH new construction must meet lower impervious cover thresholds.
<b>Site Design Improvements for Pedestrians and Stormwater Reduction</b>	Improve public transportation networks and encourage alternate modes of transportation.	Dover, Portsmouth, and Seabrook NH have increase site design requirements. Examples include width of sidewalks, walkable open space within ¼ mile of residential development,

		complete streets connectivity, bicycle parking minimums.
<b>General Guidance</b>	Provide information to help developers and property owners to make informed decisions about resiliency.	<p>Boston, MA has <i>Coastal Flood Resilience Guidelines</i> for homeowners to make informed decisions about flood protection.</p> <p>The <i>Rhode Island Coastal Property Guide</i> talks about coastal features, current hazards, and how to make a building more resilient.</p> <p>The NOAA publication <i>Smart Growth for Coastal and Waterfront Communities</i> suggests enhancements to traditional smart growth principles which can be used in waterfront communities.</p>

## PERMITTING

Adding a special permitting requirement for projects in the coastal zone may create an extra burden for the applicant but it ensures that the project has been measured against future flooding and sea level rise scenarios. Both Massachusetts and Rhode Island have State coastal permitting requirements.

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MASSACHUSETTS METROPOLITAN PLANNING COUNCIL (MAPC)

<https://www.mapc.org/resource-library/special-permits/>

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RHODE ISLAND COASTAL RESOURCE MANAGEMENT COUNCIL (CRMC)

<https://ri-crmc-coastal-hazard-map-tool-crc-uri.hub.arcgis.com/>

Type	Purpose	Example
<b>Special Permits for Coastal Areas</b>	Require applicants to consider the future sea level rise conditions against the project's life expectancy.	<p>Winthrop, MA requires applicants use the Massachusetts Coast Flood Risk Model (MC-FRM) to identify the depth of flooding with 2.4 feet of sea level rise at the project location.</p> <p>Massachusetts Sea Level Rise and Coastal Flooding Viewer.  <a href="https://www.mass.gov/info-">https://www.mass.gov/info-</a></p>

Type	Purpose	Example
		<a href="https://www.mass.gov/info-details/massachusetts-sea-level-rise-and-coastal-flooding-viewer">details/massachusetts-sea-level-rise-and-coastal-flooding-viewer</a>  RICRMC requires permit applicants to complete a Coastal Hazard Application Worksheet to confirm understanding of potential risk from sea level rise, storm surge, and flooding scenarios.

### ADAPTATION STRATEGIES FOR COASTAL INFRASTRUCTURE

Adapting to rising sea level, shoreline change, flooding, and extreme storm events extends the usefulness of coastal infrastructure facing impacts from climate change.

#### CAPE CODE COMMISSION

<https://capecodcommission.org/our-work/managed-retreat/>

The Cape Code Commission has developed an online tool to explore the adaptation options for protecting coastal infrastructure from storms and sea level rise. The strategies are sorted into the following categories: retreat or relocate, maintain, redundancy, protect, and accommodate.

Type	Examples
<b>Retreat or Relocate</b>	Herring Cove Beach North Parking Lot in Provincetown, MA. Responding to shoreline change, a long-term strategy was developed to relocate the parking lot landward and at a higher elevation.  Breakwater Landing Beach, Brewster, MA. In addition to a managed retreat, the plan included dune restoration and installing an erosion fence along the backside of the beach.
<b>Maintain</b>	Surf Drive, Falmouth, MA. The initial phase of the plan (short term/2030) "is to maintain and repair the road, prepare for coastal storms, manage the response to flooding, and restore service as quickly as possible."
<b>Increase Redundancy</b>	Fort Perkins Ferry System, Pensacola, FL. "Given the frequency that roads in the Gulf Islands National Seashore washout and may become permanently inundated, the National Park Service developed a new ferry service to provide another mode of travel, thereby increasing redundancy of the transportation network during times of compromised road service."
<b>Protect</b>	Dr. Bottero Road, Dennis, MA. The town is considering options such as beach and dune nourishment and constructing two armored stone groins to protect the coastal road from storm damage.

Appendix H of the 2025 Aquidneck Island Regional Hazard Mitigation and Floodplain Management Plan.

Type	Examples
	Polpis Road, Nantucket, MA. Considering installing oyster reef balls and salt marsh restoration to protect the road from further erosion.
<b>Accommodate</b>	Black Point Wildlife Drive, Merritt Island National Wildlife Refuge, FL. Improved the existing unpaved road base with a cellular confinement system filled with limestone.

## POST-DISASTER DEVELOPMENT GUIDELINES

Re-building after a natural disaster takes a coordinated effort from the state, municipality, and communities.

## PRE-EVENT RECOVERY ORDINANCE

Model language was developed by the American Planning Association (APA), for a pre-event recovery ordinance. Adopted before an event occurs, it can help manage short- and long-term recovery.

### AMERICAN PLANNING ASSOCIATION (APA)

[https://planning-org-uploaded-media.s3.amazonaws.com/legacy\\_resources/research/postdisaster/pdf/modelrecoveryordinance.pdf](https://planning-org-uploaded-media.s3.amazonaws.com/legacy_resources/research/postdisaster/pdf/modelrecoveryordinance.pdf)

Type	Purpose	Example
<b>Local Ordinance</b>	Serve as an initial effort or support a formal recovery plan.	See link above.

## DISASTER RECOVERY PLAN

A comprehensive Disaster Recovery Plan, developed by the Emergency Management Agency and adopted in advance of a disaster can support resilient redevelopment efforts.

Type	Examples
<b>Disaster Recovery Plan</b>	<p>Douglas County, CO. The 2019 Plan serves as a guide for roles, prioritization, and decision-making practices post-disaster. This serves as an annex to the Comprehensive Emergency Management Plan. <a href="https://macog.org/wp-content/uploads/2019/12/Sample-Recovery-Plans-Douglas-Co-Colorado-Pre-Disaster-Recovery-Plan.pdf">https://macog.org/wp-content/uploads/2019/12/Sample-Recovery-Plans-Douglas-Co-Colorado-Pre-Disaster-Recovery-Plan.pdf</a></p> <p>Lahaina, Maui County, HI. This plan provides guidance for a coordinated, community-driven approach to recovery after a disaster. <a href="https://drive.google.com/file/d/1OLjtLtG_obTR-28Z37EybKG0WYFdLsOj/view">https://drive.google.com/file/d/1OLjtLtG_obTR-28Z37EybKG0WYFdLsOj/view</a></p> <p>State of Florida. The Post-Disaster Planning guide for Florida communities addresses the importance of a Post-Disaster Redevelopment Plan, examples of county-wide Post-Disaster Redevelopment Plans, how to prioritize areas of redevelopment, bringing businesses into the planning efforts, debris management, environmental restoration, and getting facilities and public services back online. <a href="https://www.floridadisaster.org/globalassets/importedpdfs/post-disaster-redevelopment-planning-guidebook-lo.pdf">https://www.floridadisaster.org/globalassets/importedpdfs/post-disaster-redevelopment-planning-guidebook-lo.pdf</a></p>