

**PORTSMOUTH COMPREHENSIVE COMMUNITY PLAN**

**ELEMENT 11 -NATURAL HAZARDS AND CLIMATE CHANGE**

**11.1 NATURAL HAZARDS AND CLIMATE CHANGE VISION**

**PORTSMOUTH WILL BE A COMMUNITY THAT HAS PREPARED ITS VULNERABLE AREAS, ASSETS AND POPULATIONS TO MINIMIZE THE EFFECTS OF NATURAL HAZARDS IN A CHANGING ENVIRONMENT.**

**11.1.1 BASIS FOR PLANNING**

This section addresses Portsmouth’s management of natural hazard and climate change under the following categories:

- Existing conditions including the most significant threats from Natural Hazards.
- Existing, on-going resilience and mitigation measures.
- The challenges of planning for natural hazards and climate change.

Addressing the potential for future impacts of natural hazards and climate change requires a framing of the discussion in order to be effective. These potential impacts are not problems to be solved, they are predicaments we find ourselves in that demand a response. We are not going to solve climate change. We however must certainly respond. In crafting this response, we must understand the differences between the concepts of mitigation and resilience.

To mitigate is to act to reduce the severity, seriousness, or impacts of a challenging event. Natural Hazard mitigation is advance action taken to reduce or eliminate the risks to human life and property from natural hazard events, be they short or long-term –advance action to decrease the severity or damage from the punch of a natural disaster event. Structural mitigation involves strengthening building and infrastructure as well as developing and enforcing construction practices to increase damage resistance. Non-structural mitigation is developing policies and regulations directing development away from known natural hazards and putting in place measures to maintain protective features of the natural environment such as forests, sand dunes, salt marshes and wetlands.

Resilience is the ability from recover from a challenging event, In this case, the ability to bounce back from a natural disaster event. However, from a planning perspective, resilience must be thought of as not just bouncing back, but bouncing forward – not simply to return to a previous state, but to create a better, more thriving community, able to recover quicker, with less

disruption - the ability to recover from and more easily take the next punch. Economic resilience is addressing the costs of building community resilience and the cost of failing to do so. Societal resilience involves minimizing human vulnerabilities to disasters and strengthening our social and institutional foundations – keeping our community together in the face of adversity. Ecological resilience is maintaining a healthy natural environment which in turn acts to protect our community against natural hazard events.

The foundation of this element of the plan is the dual concept of reducing the damage or severity from a natural disaster event – mitigation – and increasing our ability to recover quicker and with less disruption from a natural disaster event – resilience.

## 11.2 EXISTING CONDITIONS

### 11.3.1 NATURAL HAZARDS: THREATS

According to Portsmouth’s Natural Hazard Mitigation Plan the Town is most susceptible to the following natural hazard threats

Type of Natural Hazard	Level of Risk
Hurricane	High
Nor’easter	
Coastal Flooding	
Snow Storm	
High Winds	Medium
Ice Storm	
Street Flooding	
Extreme Heat and Cold	
Drought	
Brushfire	Low
Earthquake	
Hail	
Lightning	
Tornado	
Sea Level Rise	

The following text discusses risk posed by the most severe natural threats—hurricanes, nor’easter, coastal flooding and snow storms.

#### *Hurricanes*

The Town’s close proximity to the Atlantic Ocean renders it particularly susceptible to hurricanes and the resulting loss of human life and property. Probability of future hurricane occurrence is considered likely. Cyclonic storms threaten the coast of Rhode Island virtually every year. Cyclonic storms that reach Rhode Island are usually weak—

Category 1 or less—notwithstanding these are still potentially dangerous storms. Portsmouth is a coastal community and, therefore, susceptible to coastal storm surge, damage from downed power lines and downed trees. Mobile homes, converted seasonal homes and older structures are at particular risk. Climate change is likely to intensify the effect of cyclonic storms. Some recent examples of severe tropical cyclones include Hurricane Irene (2011) and Tropical Storm Sandy (2012).

### *Nor'easters*

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 a winter weather event, Nor'easters are known to produce heavy snow, rain and heavy waves along the coast.

The Town's close proximity to the Atlantic Ocean renders it particularly susceptible to Nor'easters and the resulting loss of human life and property. Probability of future hurricane occurrence is considered highly likely. Portsmouth is a coastal community; most damage would be to utilities, roads, stormwater infrastructure, personal property, trees, and snow loads on roofs. The Blizzard of 1978 was the largest Nor'easter on record. Many people in Rhode Island were without heat, food, and electricity for over a week. More recent events include two Nor'easters in 2011. Similar to hurricanes, changes in air and water temperatures may lead to stronger Nor'easters along the Atlantic Ocean. Portsmouth should expect stronger Nor'easters, but not necessarily more frequent storms.

### *Coastal and Street Flooding*

According to the Rhode Island 2014 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. Severe storms with heavy rain can generate flash floods which strike and end quickly. Flash flooding isn't limited to streams and rivers but also streets. Conditions in Portsmouth do not typically yield flash floods. During the March 2010 flood events several roads were unpassable on Prudence Island as well as Portsmouth. Low-lying coastal roads, as well as the neighborhoods of Common Fence Point, and Island Park are the most vulnerable. Localized flooding can be expected to occur on an annual basis. The flood event which occurred in March 2010 was a 250 year +/- event. Changing climate conditions are likely to bring more rainfall events to Portsmouth and fewer snow storms. More intense storms will stress the natural floodplains and stormwater infrastructure.

### *Snow Storms*

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 snow storm 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. For the purpose of this plan, snow storms include heavy amounts of snow and ice. All of which may occur independently or at the same time. A severe winter storm could have a serious impact in private, and public structures, as well as the general population throughout Portsmouth. Those most at risk to extreme cold are the elderly and those who work outside. Major snow storms are highly likely to occur in Portsmouth. Considering climate change, Portsmouth may likely see less snowfall over the winter season but may see more intense blizzards when they do occur.

#### Climate Change / Sea Level Rise

Portsmouth's 2018 Natural Hazard Mitigation Plan regards climate change as an on-going amplifier to the above identified natural Hazards. Long-term climate change is likely to cause the following impacts:

- Heavier, more frequent precipitation events likely to cause more frequent flash flooding.
- Longer periods of drought which may affect water availability and increase the threats for wildfires.
- Increasing air and water temperatures.
- More frequent high heat days and heat waves.
- More flooding from higher tides and storm surge.

How rapidly these changes will be felt is debatable but there should be no uncertainty that our mitigation and resiliency planning efforts need to acknowledge climate change is real and that its amplifying effects on a host of natural hazards needs to be taken into account.

NOAA Technical Report NOS CO-OPS 083, dated January 2017, reports global sea level rise as a persistent trend over past decades and "it is expected to continue beyond the end of this century." In assessing the most up-to-date scientific literature presented in peer-reviewed publications, the report supports a physically plausible range of global sea level rise somewhere between 11.8 inches and 8.2 feet by the year 2100. The report also finds that "along regions of the Northeast Atlantic...rise is projected to be greater than the global average for almost all future global mean sea level rise scenarios." A linear extrapolation of the data presented (local analysis) supports a physically plausible sea level rise for Portsmouth by the end of this 20-year planning period (2040) of somewhere between 5.2 inches and 3.6 feet, with slightly higher values attributable to our NE Atlantic location. While we currently debate where within this range of physically plausible sea level rise we will end up and we currently characterize the level of concern as low, our mitigation and resiliency planning efforts certainly need to acknowledge that some level of rise is in our future and to consider not only short-term rise during this 20-year planning period but potentially much higher levels towards the end of the century.

Maps to accompany this element will include:

- A map that illustrates areas that would be currently inundated in the event of a 1% (100-year) and 0.2% (500-year) storm as they appear on the most recent FEMA Flood Insurance Rate Maps (FIRMS).
- One or more maps that illustrate the areas that would be inundated in the event of a Category 1 through Category 4 hurricane.
- One or more maps that illustrate the areas that are projected to be inundated due to 1 foot, 3 feet and 5 feet of potential sea level rise.

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### 11.3.2 EXISTING, ON-GOING RESILIENCE AND MITIGATION MEASURES

Below summarizes the principal efforts to mitigate the adverse effects of natural hazards and increase community resilience in Portsmouth.

#### Building Codes

In the interest of the public health, safety, and welfare, all municipalities within the State of Rhode Island share a single building code (RIGL 23-27.3-100 et. al.). Last amended in 2015, the code, which incorporates the International Building Code, takes into account current scientific and engineering knowledge and allows for the utilization of modern materials and methods of construction to provide comprehensive construction requirements designed to mitigate the impacts from natural hazards such as high wind events and snow loading. The Code is enforced by the Portsmouth Building Department.

#### Zoning Ordinance – Flood Hazard Areas

Enabled by state legislation and intended to be provide consistency with the Comprehensive Plan, Portsmouth's Zoning Ordinance (February 13, 2012) is designed to address a variety purposes, first and foremost the promotion of the public health, safety, and general welfare. Purposes specific the natural hazards and climate change include:

- Provide for and protect the public investment in transportation, water, storm water management systems, sewage treatment and disposal, solid waste treatment and disposal, schools, roads, recreation, public facilities, open space, and other public requirements;
- Promote safety from fire, flood, and other natural or man-made disasters;
- Provide for orderly growth and development which recognizes, among other things, the values and dynamic nature of coastal and freshwater ponds, the shoreline, and freshwater and coastal wetlands and the values of our unique or natural resources and features.

Article III, Section F of the Zoning Ordinance describes zoning standards for the Special Flood Hazard Area. The purpose of this section of the ordinance is to ensure public safety, to minimize hazards to persons and property from flooding, to protect watercourses from encroachment, and to maintain the capability of floodplains to retain and carry off floodwaters.

#### National Flood Insurance Program

The Town of Portsmouth has been in compliance with the National Flood Insurance Program and been an active member since 1982. FEMA literature states, “the National Flood Insurance Program aims to reduce the impact of flooding on private and public structures. It does so by providing affordable insurance to property owners, renters and businesses and by encouraging communities to adopt and enforce floodplain management regulations. These efforts help mitigate the effects of flooding on new and improved structures. Overall, the program reduces the socio-economic impact of disasters by promoting the purchase and retention of general risk insurance, but also of flood insurance, specifically.” The Town of Portsmouth has adopted the most recent (September 4, 2013) Flood Insurance Rate Maps (FIRM) and Flood Insurance Study (FIS). The Town has designated the Building Official as the NFIP Coordinator to manage the program.

#### Narragansett Bay Estuarine Projects

The Narragansett Bay National Estuarine Research Reserve (NBNERR) is a partnership program established between the National Oceanic and Atmospheric Administration and the state of Rhode Island’s Department of Environmental Management to promote informed management and sound stewardship of our coastal resources. The physical Reserve is located in the geographic center of Narragansett Bay with 4,453 acres of terrestrial and submerged land on Prudence, Patience, Hope and Dyer islands, all part of the Town of Portsmouth. The Reserve’s headquarters and visitor center are located on the south end of Prudence Island.

One of the core functions of the Narragansett Bay Research Reserve is to support and conduct high quality research and monitoring with a focus on the Reserve’s mission to preserve and protect representative estuarine habitats within Narragansett Bay. Long-term monitoring data gathered and analyzed at the reserve provides insight into the current (and potentially changing) status of resources, habitat, and species. Trends over time capture response to a change in condition (e.g. climate change, environmental policy) indicated by shifts in relative abundance or distribution on the landscape. Research is conducted in-house by Reserve staff scientists, who also lend logistical and other support to visiting scientists conducting their own research in the Reserve.

In addition to research and monitoring activities, NBNERR engages in a host of stewardship projects involving habitat maintenance and restoration at the Reserve. Recognizing habitat maintenance as an important tool in both natural hazard mitigation and coastal resilience, efforts by Reserve staff and others include invasive species eradication, wetlands restoration, streamflow and groundwater monitoring, periodic selective mowing and the application of prescribed fire among many tools and techniques.

#### Development Plan Review

The Planning Board, Zoning Board of Review, the Planning Department, the Department of Public Works in its inspection capacity and the Portsmouth Water and Fire District all coordinate to help improve community resiliency and reduce costs and damages from natural hazards by reviewing all proposed development and/or redevelopment site plans to ensure the septic, water and storm water regulations are followed during the design, the construction and the final approval of the development.

### 11.4 PLANNING CHALLENGES FOR NATURAL HAZARDS AND CLIMATE CHANGE

Natural hazards and climate change present a number of critical challenges for Portsmouth, a coastal community on the front lines of addressing our changing natural environment. As noted above climate change will continue to act as an unknown amplifier of known natural hazards and the most authoritative sea level rise predictions vary widely. Given the uncertainty of available data and the potential for devastating impacts associated with future natural disasters and sea level rise, Portsmouth will need to build capacity to look at planning for climate change through a risk management perspective and develop a public information and communication strategy thereby allowing citizens and property owners to determine their own tolerance for risk and make intelligent choices on how to manage that risk.

An effective planning approach when confronted with uncertain data and timelines is scenario planning. Taking the broadest possible range of stakeholder viewpoints, scenario planning equally regards ignoring the possible impacts of climate change completely and spending large amounts of money to prepare for threats that may or may not materialize in the future. The planning process convenes a group of stakeholders to carve out a set of plausible intermediate scenarios between these extremes and sets forth a catalog of responses to these intermediate scenarios. Scenarios do not predict future changes, they describe and categorize potential future changes in such a way that a tolerance for risk can be arrived at by the group. In the case of sea level rise, if there is a low tolerance for risk, then the highest plausible scenarios for sea levels arriving sooner should be prioritized. Conversely, if tolerance for risk is much more acceptable, then the very lowest levels of potential sea level rise will suffice for planning purposes. This plan advocates future planning efforts be conducted in this manner, but until results are produced and consensus can emerge, this plan establishes an intermediate to low target level for planning purposes for all public and private coastal activities of 1 to 1.5 feet of sea level rise by 2040 and a 3 to 5 feet rise in sea level by 2100.

11.6 GOALS, POLICIES AND IMPLEMENTATION ACTIONS

GOAL NH/CC - 1

***Achieve a level of economic, societal and ecological resilience in our built and natural environment that enables Portsmouth to recover quickly from the effects of natural hazards and climate change and minimizes long-term community disruption.***

*Policy NH/CC - 1.1*

***Manage land use and the built environment within the floodplain and other vulnerable areas to not only mitigate but increase community resilience to, the effects of natural hazards and climate change.***

~~Action NH/CC - 1.1a – Evaluate current zoning and land use regulations related to future effects of climate change and update as needed.~~

Action NH/CC - 1.1b – Work with RIDOT to identify ways to mitigate future impacts and increase resilience to flooding, storm surge and sea level rise along Park Avenue in Island Park And other vulnerable State roads.

Action NH/CC - 1.1c – Develop “Where, When and How” land use and development management scenarios to address the effects of climate change and sea level rise.

Action NH/CC - 1.1d – Work with Federal and State partners to investigate and prioritize improvements in the town-owned storm drain system to enhance discharge, retention and infiltration capabilities.

~~Action NH/CC - 1.1e – Work with Federal and State partners to evaluate the functionality of onsite wastewater treatment systems due to various potential natural hazard scenarios.~~

Action NH/CC - 1.1f – Improve Portsmouth’s mapping and data gathering capabilities to support assessment, analysis and planning activities.

~~Action NH/CC - 1.1g – Update and obtain approval by RIDEM of Emergency Action Plans (EAPs) for all significant and high hazard dams in Portsmouth.~~



*Policy NH/CC - 1.2*

***Preserve and enhance the capacity of the natural environment to improve Portsmouth's resilience to the effects of natural hazards and climate change.***

Action NH/CC - 1.2a – Work with the Aquidneck Land Trust and others to identify and conserve areas vulnerable to the effects of increased natural hazards due to climate change.

Action NH/CC - 1.2b – Investigate the implementation of green infrastructure stormwater management strategies to enhance infiltration and increase retention on town properties and roadways.

Action NH/CC - 1.2c – Investigate the adoption of low-impact development standards to reduce the amount of impervious coverage and increase stormwater infiltration.

Action NH/CC - 1.2d – Work with stakeholders to identify, prioritize and implement coastal adaptations projects to allow wetlands expansion and salt marsh migration.

*Policy NH/CC - 1.3*

***Require all municipal departments, boards and commissions to incorporate resilience to natural hazards and climate change in all long-range planning and public infrastructure projects.***

Action NH/CC - 1.3a – Maintain a FEMA-approved Natural Hazard Mitigation Plan and report implementation progress on an annual basis.

~~Action NH/CC - 1.3b – At least on an annual basis, review Hazard Mitigation Plan, the Comprehensive Plan, SAMP plans, the city's land use regulations and the local Harbor Management Plan for consistency.~~

Action NH/CC - 1.3c – Establish a category in the 5-year Capital Improvement Program specifically for community resilience and hazard mitigation projects.

*Policy NH/CC - 1.4*

***Work to reduce the economic impacts of and increase the societal resilience to the effects of natural hazards and climate change.***

Action NH/CC - 1.4a – Participate in the FEMA Community Rating System and provide resources necessary to coordinate an effective implementation program. Determine a rating score target to be achieved by 2025.

Action NH/CC - 1.4b – On a quarterly basis, conduct community outreach including public forums and posting of information on the town website to educate residents regarding the risk of from the effects of natural hazards and the concept of community resilience.

Action NH/CC - 1.4c – Encourage the formation of neighborhood associations to assist in the monitoring of impacts of climate change.

Action NH/CC - 1.4d – Provide support for property owners to help take advantage of funding opportunities that assist with covering the costs of mitigating risk in flood zone areas.

Action NH/CC - 1.4e – Collaborate with State agencies and others to implement the Prudence Island Community Wildfire Protection Plan.

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