# NATURAL HAZARDS AND CLIMATE CHANGE

## 11.1 Introduction

A natural hazard is an event or series of events caused by the forces of nature that result in a negative impact on infrastructure, people, or the environment. Natural hazards cannot be prevented, and sometimes cannot even be predicted. Therefore, to increase a community's resilience and mitigate negative impacts, a community must proactively prepare for natural hazard events.

The impacts of climate change have already been felt in Lincoln and can be expected to continue. Long-term climate change is likely to cause heavier and more frequent precipitation events, more intense storms, riverine and flash flooding, longer periods of drought, and extreme temperatures. These events will impact many aspects of the community, including both the natural and built environments. They can pose a threat to public safety, health, and welfare. Some populations within the community, such as the elderly and those experiencing homelessness, will be disproportionately affected by climate change.

Strategic infrastructure and thoughtful land use planning are essential components of creating a community that is resilient to natural hazards. Current hazard mitigation efforts are geared toward protecting the Town's resources, property, infrastructure, and general well-being from future disasters. This section addresses Lincoln's management of natural hazards and climate change under the following categories:

- Existing conditions including the most significant threats from natural hazards
- Vulnerability
- Ongoing resilience and mitigation measures currently practiced by the Town

The following considerations are of high priority to the Town when considering how natural hazards and climate change influence decision-making.

- Protection of the ongoing operations and functions of critical facilities
- Adaptation to climate change impacts aimed at protecting the Town's resources and infrastructure

## 11.2 Existing Conditions

The town of Lincoln maintains and updates a Hazard Mitigation Plan (HMP) that evaluates the impacts of natural hazards on the community and outlines the strategies and mitigation actions the Town is pursuing to mitigate the impacts of these hazards in the future. The plan was most recently updated in 2022. The Federal Emergency Management Agency (FEMA) requires communities to update their Hazard Mitigation Plans every five years to remain eligible for federal funding in the event of a natural disaster. Goals of the 2022 Hazard Mitigation Plan include:

1. Develop and implement projects and programs that minimize losses associated with natural hazards
2. Protect critical infrastructure and maintain essential services
3. Preserve cultural, historical, and natural resources
4. Facilitate a rapid recovery process following natural disasters
5. Facilitate actions so that businesses can rapidly recover from a disaster.

The next update for the Town's Hazard Mitigation Plan will occur in 2027.

### *11.2.1 Priority Hazards*

The Hazard Mitigation Plan provides a ranked identification of hazards likely to be experienced in Lincoln. The Lincoln Hazard Mitigation Committee reviewed the list of possible hazards and ranked them in relation to probability and impact. The following are considered priority hazards for Lincoln:

- Flooding (riverine)
- Flooding (dam breach)
- Hurricanes and tropical storms
- Snow and ice
- Severe storms (hail, lightning, wind)
- Extreme heat
- Earthquakes
- Wildfire
- Drought

### *11.2.2 Climate Change and Priority Hazards*

This section discusses how each identified hazard may be impacted by the effects of climate change. Some categories of hazards have been combined from how they are presented in the HMP.

#### Flooding

There are multiple types of flood-related hazards in Lincoln. Dam-related flooding is when a dam overtops, or components of the dam fail and release impounded water. Riverine flooding is when rivers, streams, and stormwater infrastructure are overcome by an excess of water flow. Stormwater-related flooding is when there is a rapid accumulation of runoff from impervious surfaces to the point that the flow exceeds the capacity of the conveyance or storage components of the stormwater system. With projected climate change impacts producing more frequent and more severe storm events, it is anticipated that both types of flooding events will increase in the future. Map 11-1 Flood Hazard Areas illustrates the flood zones in Lincoln.

#### Snow and Ice

Snow and ice are a regular occurrence during winter months in Lincoln. With climate change impacts, it is expected that snow events may become less frequent due to increasing temperatures but when they do occur, they are expected to be more severe in nature. Warming temperatures may mean less snowfall, but moisture in the air can still fall as freezing rain, coating everything in ice.

#### Severe Storms

For the purposes of this plan, severe storms refer to weather events that contain high winds, lightning, hail, and extreme rain. These weather conditions can happen independently, but more commonly occur simultaneously, during a single event. It is projected that climate change will produce more intense and more frequent storm events resulting in more damage to the environment and infrastructure in Lincoln.

### Extreme Heat and Drought

The National Weather Service issues extreme (or excessive) heat warnings when the maximum expected heat index is expected to be 105 degrees F or higher for at least 2 consecutive days and nighttime air temperatures are not expected to fall below 75 degrees. In the northeast, these criteria are generally modified to a heat index of 92 degrees or higher for 2 consecutive days. These extreme temperatures can contribute to drought conditions. During extreme heat or drought conditions, water supplies for drinking and firefighting may be stressed.

It is expected that climate change will result in more days above 92 degrees and fewer nights below 75 degrees for the northeast. This increases the chances of drought conditions occurring in the Town of Lincoln.

### Earthquakes

Earthquakes are not common occurrences in New England, but they do occur and can be strong enough to cause damage. The most vulnerable structures to earthquakes are those built prior to current seismic building standards and masonry structures. It is not clear what impacts, if any, climate change will have on earthquakes.

### Brushfires and Urban Fires

Brushfires are fueled by natural cover and are dependent upon weather conditions and topography. Brushfires are dependent on the quantity and quality of fuels and can spread rapidly causing damage to structures and the natural environment. However, most wildfires are caused by people through criminal or accidental misuse of fire.

Climatic and meteorological conditions that influence wildfires include solar insulation, 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 (Lincoln HMP, 2022).

## *11.2.3 Natural Hazard and Climate Change Vulnerability Assessment*

Communities must consider climate change when preparing and planning for future natural hazards. In Lincoln's Hazard Mitigation Plan, the potential impacts of these hazards are carefully analyzed against the existing components of the community, also called "community assets." This analysis of impacts from priority hazards on assets is commonly referred to as a Vulnerability Assessment.

Community assets include buildings and infrastructure, historical and cultural resources, vulnerable populations, community lifelines, and the natural environment. The hazards that Lincoln's community assets are most vulnerable to are flooding, hurricanes and tropical storms, snow and ice, severe storms, and extreme heat.

For a detailed community assets matrix that explains at-risk assets, specific hazards the assets are vulnerable to, their location in the Town, and new and ongoing mitigation actions in response, readers should refer to Chapter 4 Risk Assessment of the 2022 Lincoln Hazard Mitigation Plan.

Priority impacts from natural hazards that must be addressed by Lincoln include but are not limited to:

- Disruptions to daily life
- Damage to roads and infrastructure
- Damage to structures and property
- Business closures
- Damage to the natural environment
- Damage to utility infrastructure or water/sewer infrastructure
- Loss of life and property

For information on how Lincoln plans to mitigate the impact of these hazards, readers should refer to Chapter 6 Mitigation Actions of the 2022 Lincoln Hazard Mitigation Plan. Categories of mitigation actions include loss minimization, protection of critical infrastructure and services, preservation of cultural, historical, and natural resources, rapid recovery after natural disasters, and business recovery.

## 11.3 Goals and Policies

Goals and their corresponding policies reflect the desired changes of Lincoln residents for the next ten years, as gathered from a public workshop held in May 2024. The Town stands ready to build off its 2022 Hazard Mitigation Plan to continue strengthening its response to natural hazards, especially flooding and extreme heat.

| Table 11-1. Goals and Policies | |
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| Goals | Policies |
| NHC1. Town Wide Improve community resilience to natural hazards and climate change. | NHC1.1. Town Wide Integrate climate change adaptation and hazard mitigation into all municipal planning efforts. |
| | NHC1.2. Town Wide Enhance public awareness and preparedness for natural hazards and climate change impacts. |
| | NHC1.3. Town Wide Encourage development patterns that minimize exposure to natural hazards. |
| | NHC1.4. Town Wide Ensure that emergency services are well-prepared for climate-related events. |
| | NHC1.5. Town Wide Implement flood mitigation strategies to protect vulnerable areas. |
| | NHC1.6. Town Wide Protect and reinforce essential services and facilities against natural hazards. |
| | NHC1.7. Town Wide Develop strategies to mitigate heat island effects and provide cooling solutions. |
| | NHC1.8. Town Wide Support businesses in adapting to climate change and natural hazards. |

# REFERENCES

Town of Lincoln. 2022. “2022 Hazard Mitigation Plan Update”. April. https://www.lincolnri.gov/DocumentCenter/View/981/Updated-Hazard-Mitigation-Plan.