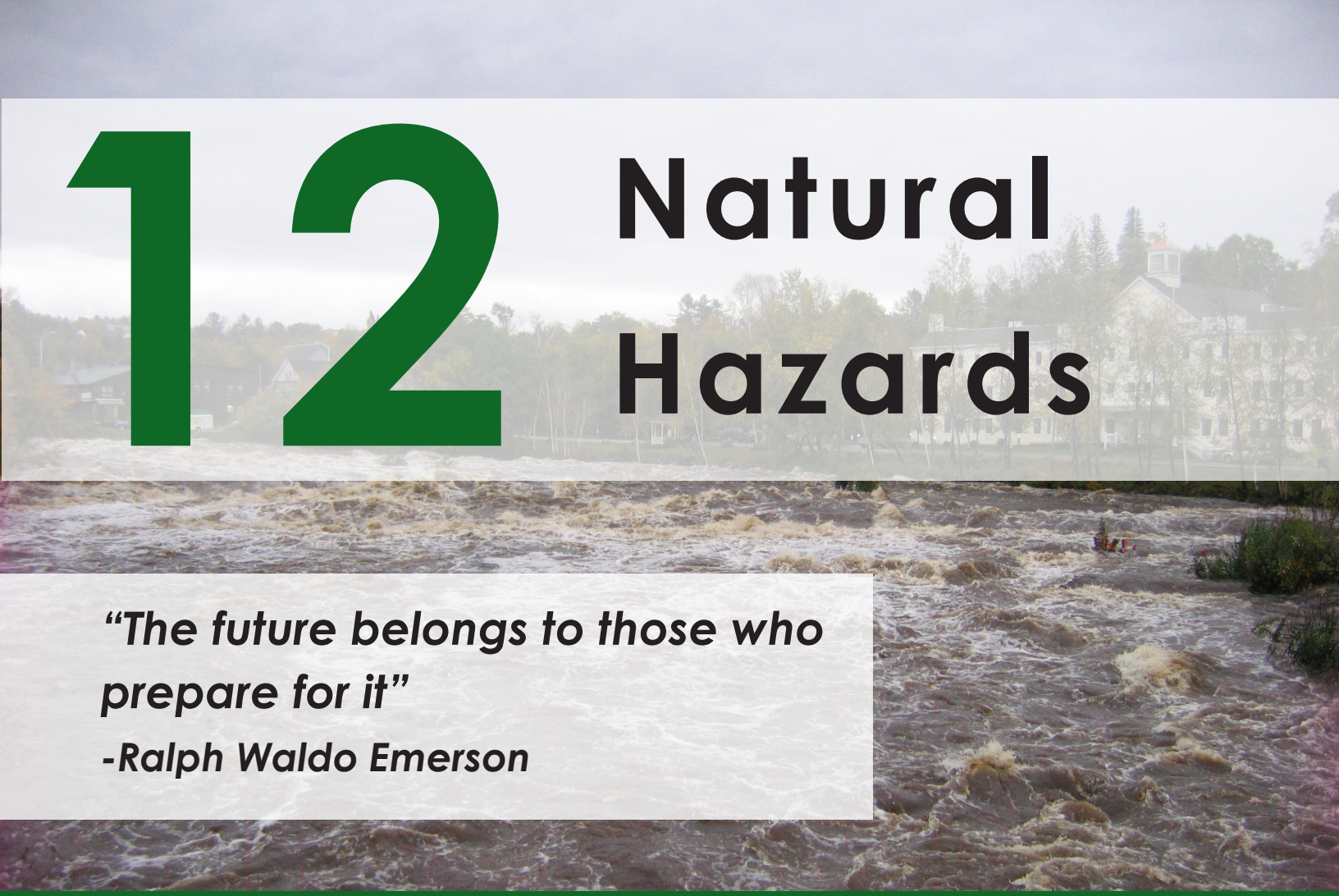

12 Natural Hazards

"The future belongs to those who prepare for it"

-Ralph Waldo Emerson

Introduction

Natural hazards refer to weather-related events that may impact lives, property, infrastructure, natural resources, and municipal assets.

This chapter explores the types of natural hazards that pose direct risk to Littleton, and evaluates the potential impacts and emergency management strategies for the town to consider. According to the Littleton's 2017 Hazard Mitigation Plan, natural hazard events that pose potential risks to Littleton include:

1. Flooding
2. Severe Winter Weather and Ice Storms
3. High Wind Storms
4. Hurricanes & Tropical Storms
5. Extreme Temperatures
6. Tornados
7. Erosion, Landslides, & Mudslides
8. Severe Thunderstorms & Lighting
9. Earthquakes
10. Wildfire

Emergency management and natural hazard mitigation strategies work to create safer, sustainable communities in the face of natural disasters. Effective risk reduction requires careful community planning, strategizing, and education. Responsible management of the environment and its resources and responsible development plays a key role in preventing or mitigating negative impacts of natural disasters. As Littleton plans for its future, it's important to note that there is variability in weather events and precipitation volume and frequency that can oscillate from flooding to drought. The Town should plan for all natural hazards, even those that seem less likely, knowing that extreme weather events are increasing in frequency.

HAZARD MITIGATION PLAN

Littleton's Hazard Mitigation Plan (HMP) was designed to assist the Town's emergency response personnel, public works, healthcare professionals, property owners, and schools in reducing and mitigating future losses from natural or human-caused hazardous events. It was developed by participants of the Town of Littleton Hazard Mitigation Planning Team with input from interested stakeholders and the general public. As part of the planning process, a variety of natural hazards were explored and assessed by their probability of occurring and by their potential impacts or risks.

The Plan also provides a list of critical infrastructure and key resources in Littleton categorized under the following topics: necessary for emergency response facilities, not necessary for emergency response facilities, facilities and populations to protect, and potential resources. The main focus of this plan was to provide mitigation action items for different natural hazards that pose ***safety and environmental risks*** to the Town.

The planning team identified a series of hazard mitigation goals that fall under four categories including: protecting community resources, preparing and responding to natural disasters and emergencies, emergency preparedness, coordinating communications, and preventing and reducing property damage and critical infrastructure. The HMP should be the primary document used for preparing for natural hazards and was the primary source of information used in this chapter for documenting hazard risks and recommendations.

LITTLETON'S EMERGENCY RESPONSE FACILITIES

- Littleton Fire Rescue & Golden Cross Ambulance
- Littleton Police Department
- Littleton Public Works Department
- Littleton Town Offices
- Littleton High School
- Littleton Water & Light
- Littleton Regional Healthcare
- National Guard Armory
- FairPoint Switching Station
- Tower on Girard Road
- Towers on Mann's Hill

NATURAL HAZARDS

Flooding

The largest floodplain area within Littleton is along the Ammonoosuc River which passes through Downtown and flows parallel to Meadow Street. Flooding of this river is generally the result of heavy rain, ice jams, and rapid snowmelt causing overflow of the riverbank. According to the HMP, some of the most vulnerable areas and facilities that are subject to Ammonoosuc River flooding include the Lane House Senior Center, Riverglen, Saranac Street, Meadow Street businesses such as Walmart, Home Depot, and Shaw's, the River District, and the wastewater treatment plant. Historically, flooding events along the Ammonoosuc, and its tributaries, caused severe damage in 1927, 1936, 1938 and 1973. More recently, an unusually heavy rainstorm in July 2017 caused an estimate of $612,500 worth of road damage to 10 town roads. Local road flooding is a common occurrence in locations throughout Littleton.

According to the Hazard Mitigation Plan, its estimated that the Town experiences some sort of stormwater overflow issue whenever there are two or more inches of rain in a short period of time, often overwhelming aging and undersized culverts in Town. This poses risks to water quality and threatens the Town's river ecosystems. The amount and location of impervious surfaces developed in Littleton alter stormwater runoff rates and prevents infiltration of water. When runoff is increased in volume or speed, it results in increased erosion rates and non-point source pollution, and places extra pressure on flood storage areas downstream.

There is also the possibility of damage from dam failure due to flooding. The HMP notes that, if the White Mountain Electric Dam were to fail, transportation and communication infrastructure could be damaged as would private property and lives. Two downstream facilities, the Town sewage treatment plant and Littleton Water and Light, could also be affected. Additionally, failure of Dells Dam and Reynolds Dam could pose risks to property and roadways.

Hazard mitigation strategies for flood protection should focus on ensuring that the Town has updated floodplain mapping, developing communication strategies to landowners about the flood insurance program, increasing communication strategies about flooding events to Littleton residents, and ensuring the Town's land use regulations protect the floodplain areas in the community (as they are critical to floodwater storage during a storm). Inappropriate development of these areas can reduce their ability to handle extra volumes of water and result in serious implications locally and downstream.

Snow and Ice Storms

In New Hampshire, ice and snow events can cause injury or loss of life, as well as property and tree damage. Winter storms can take the form of:

- Heavy snow storm: ranging from moderate snow to blizzard conditions
- Ice storm: ice coating of at least one-1/4 quarter inch in thickness is heavy enough to damage trees and overhead wires, often resulting in widespread power outages
- Extreme cold: temperatures and wind chills that are significantly lower than normal causing health and safety concerns including frostbite and hypothermia, frozen pipes that are poorly insulated, ruptured indoor plumbing, and stress on water supply infrastructure
- Nor'easter: a large weather system traveling from south to north along the seacoast; its sustained winds may meet or exceed hurricane force

LITTLETON'S FLOOD INSURANCE PROGRAM

Littleton has been a participant in the National Flood Insurance Program since 1989. The town has a relatively small floodplain with approximately 5.23 square miles of land in the 100-year and 200-year floodplains, 4.0 square miles of which is inland water, leaving a net amount of 1.23 square miles in the floodplain. These areas are largely along the Connecticut River, the Ammonoosuc River, and Dells Pond. Additionally, the most recent FEMA Digital Flood Insurance Rate Map (DFIRM) show floodplain along lakes, ponds, and swampy areas in town, especially near Partridge Lake and Moore Reservoir. Its also known that other small streams and brooks in town may experience flooding. According to Littleton's 2017 Hazard Mitigation Plan, there are 21 NFIP policies in effect in Littleton for $3,411,000 of insurance in coverage. These policies cover 12 residential units, five non-residential units and three 2-4 family units. Ten losses have been paid for a total of $58,107 and three repetitive loss buildings were reported for $44,260.

According to the HMP, in the past, ice jams have occurred along the Ammonoosuc River, causing flooding. Areas that regularly receive flooding due to ice jams include the Lane House, Walmart, P&S Equipment, and other businesses and areas along the riverbank. Heavy winter storms typically occur between December and April in Littleton. Associated impacts include power outages, tree falls, extreme cold, increased traffic accidents, and infrastructure damage. As identified by the Plan, hazard mitigation strategies that can help the Town better prepare for these types of events include advance notification of events to residents, ensuring diverse communication methods for notifying residents and emergency responders, and increasing access of severe weather event preparation strategies to Littleton residents, such as staying off the roads and limiting time outside (especially for vulnerable populations like children and the elderly).

High Wind Storms

Due to the geography of Littleton, isolated high winds and down drafts often occur within the Town. These wind events are unpredictable and include potential impacts such as fallen timber, which could block roadways, down power lines, and impair transportation and emergency response. This poses risks for homeowners and residents of Littleton, particularly in the more rural and forested areas of Town, at higher elevations, and along Manns Hill Road. According to the Littleton Hazard Mitigation Plan, high winds are also experienced at Fox Ridge, Littleton Regional Healthcare, Slate Ledge and Parker Mountain.

Hurricanes and Tropical Storms

Hurricanes and tropical storms have the potential to cause significant damage in Littleton due to wind strength and flash flooding. Recent tropical

storms that have occurred in Littleton include Tropical Storm Irene and Sandy. Tropical Storm Irene caused minor road damage in Littleton while Tropical Storm Sandy had little or no impact. During Irene, ditch and culvert issues caused flooding on Dell's Road, Manns Hill Road (at Palmer Brook) and Gary's Drive. Hurricanes are rare in New Hampshire, though still remain a possibility and pose serious hazards. In most cases, hurricanes have been down-graded to tropical storms by the time they reach northern New Hampshire. Specific hurricane and tropical storm hazard mitigation strategies can be found in the Littleton Hazard Mitigation Plan. Extreme temperatures are somewhat common in the northeast and are likely to increase as we feel the effects of climate change in the future. In winter, temperatures can fall below negative 30 degrees Fahrenheit, while in summer, temperatures can rise to nearly 100 degrees Fahrenheit. Both pose major health and safety risks to human populations, particularly to elderly and children. While heating systems are common in most North Country homes, air conditioners are seen less often in homes. Both Town officials and the Community as a whole should be concerned and should look after its citizens to ensure that extreme temperatures do not create a life or property threatening disaster.

Extreme Temperatures

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Tornados

Tornados are violent windstorms characterized by a twisting, funnel shaped cloud. Typically, they develop when cool air overrides a layer of warm air, causing the warm air to rise rapidly. They travel at very fast speeds of up to 70 mph and damage paths can be in excess of one mile wide and 50 miles long, resulting in structural damage to buildings and other infrastructure. According to the Town's HMP, tornados have a relatively low possibility of occurring in Littleton. In 2008, a tornado touched down in Carroll County, but it did not reach Littleton. There has been no reported tornado activity in Littleton in the last ten years.

The HMP notes that a more common event in Littleton to occur would be a "microburst event", which typically follows a thunderstorm and are accompanied by high winds. Microbursts have occurred in Littleton in 2014 and 2017 and caused fallen trees, impaired power lines, and closure of some roads. To best prepare for these events, the Town should ensure that local utility companies continue to monitor and maintain brush cutting,

Above: Road damage from Hurricane Irene.
Source: National Public Radio

maintain drainage systems, and remove trees to create space around power lines. The Town should also continue to provide information on the town website that educates the public on measures they can take to protect themselves and increase personal safety.

Erosion, Landslides, and Mudslides

Heavy rains, steep terrain, and river overflow are linked with increased erosion and the susceptibility of landslides and mudslides. Landslides can also occur from clear cuts, new development, and deforestation. Although mudslides and landslides are not as likely in Littleton, erosion of the banks of Littleton's rivers happens regularly. Historically, Littleton has been impacted by these types of events, particularly along the Ammonoosuc River and Palmer Brook. The Cottage Street Bridge (US 302) over the Ammonoosuc River has been affected by erosion which has scoured the underpinnings of the bridge. Effects of this hazards include subsequent loss of land along river banks, road washouts, and overburdened culverts. Additionally, lack of planning, poor road design, and undersized culverts contributes to the risk of erosion along Littleton's roadways. For more information on where highly erodible soils are located in town, see the Highly Erodible Soils map in the Appendix.

Severe Thunderstorms and Lighting

According to the HMP, sometimes, as a result of summer and mountain storms or as a residual effect from hurricanes or tornadoes, severe lighting can occur. Lightning poses potential threats to the older structures in Town and to its power lines. Lighting has the potential to damage specific structures, injure or kill individuals, cause power outages, and hamper communication. Although lightning is a potential concern, the direct structure damage would not be widespread.

Earthquakes

Earthquakes are defined as a series of vibrations induced in the Earth's crust by the abrupt rupture and rebound of rocks in which elastic strain has been slowly accumulating. Overall, New Hampshire is considered to lie in an area of moderate seismic hazard comparing to other areas in the United States. Earthquakes can cause severe damage including collapse of buildings and bridges, disruption of gas, electric, and phone lines, and may cause landslides, flashfloods, and fires. According to the HMP, in New Hampshire, four earthquakes have occurred between 1924 and 1989 having a magnitude of 4.2 or more. Two occurred in Ossipee, one near Laconia, and one near the Quebec border. In October 2012, an earthquake with its epicenter in Hollis, ME and a magnitude of 4.6 occurred and its tremor was felt throughout New England. Earthquakes, though not common in Littleton, pose risks to the Town's water and sewer lines, dams, buildings, and people.

Wildfires

Above: A wildfire burning in North Woodstock, NH.
Source:

Because of how heavily forested Littleton is, there is potential for wildfires to occur. Logging operations may leave debris on the forest floor and occasional storms and blow downs deposit materials as well. According to the HMP, the Fire Department reported that they had responded to seven wildfires between 2013-2017, most of which were small grass fires. Since there is a low probability of drought and high humidity in the forests, it was felt that most fires that occur are "duff" fires which refers to the layer of decomposing organic materials that lie below the litter lay of twigs, needles, and leaves on the forest floor. In Littleton, burn permits are required, but often burning takes place without the proper permits. Currently, available documents on fires in Littleton states that the majority of fires are human caused.

In the mid-2000s, the Wildland Urban Interface (WUI) was determined in collaboration with the NH Division of Forests & Lands and the US Forest Service; the WUI represents the area in which forest and human habitation intersect. This area was defined to be a 1/4-mile buffer located 300 feet off the centerline of Class I-V roads. All structures within the WUI are generally assumed to be at some level of risk and therefore, vulnerable to wildfire. In communities that are heavily forested, like Littleton, many Rangers feel that the entire community is in the WUI and therefore the extent of a wildfire could potentially be the whole Town.

Conclusion

As Littleton continues to prepare for potential natural disasters and ensures that its residents, their property, Town infrastructure, and the environment remain safe and in intact, its town boards and local officials can use this chapter and the Town's Hazard Mitigation Plan as a resource for moving forward. Though natural hazards don't happen every day and can fall off the radar in terms of its relevance, they often strike with little warning, and coordinating prevention and response efforts now will produce tangible benefits in the future. Land use regulations play an important role in ensuring property construction techniques and development that are resilience to natural hazards and protect residents and visitors in Town.