Past and Potential Hazards

The Weare Hazard Mitigation Committee identified past hazard events, which include flooding, wind, wildfire, ice, snow, and seismic events. Other hazards include geomagnetism, radon, drought, and extreme heat or cold. These hazards were identified in a brainstorming session with the Committee. The State of New Hampshire Hazard Mitigation Plan was consulted, as well as other supporting information derived from the resources listed in Appendix C. The Identified Hazard Zones Map at the end of this section reflects the impact areas for each hazard. The Committee reviewed background information, areas at risk, and the potential for each hazard to occur, pose a risk to, or cause damage to structures, infrastructure or human life.

A. Flooding

The Weare Hazard Mitigation Committee reviewed the following kinds of hazards related to flooding:

1. Riverine flood events

"Typical riverine flooding involves the overflowing of the normal flood channels or rivers or streams, generally as a result of prolonged rainfall or rapid thawing of snow cover. The lateral spread of floodwater is largely a function of the terrain, becoming greater in wide, flat areas, and affecting narrower areas in steep terrain. In the latter cases, riparian hillsides, in combination with steep declines in riverbed elevation, often force waters downstream rapidly, sometimes resulting in flash floods." (Schwab 208)

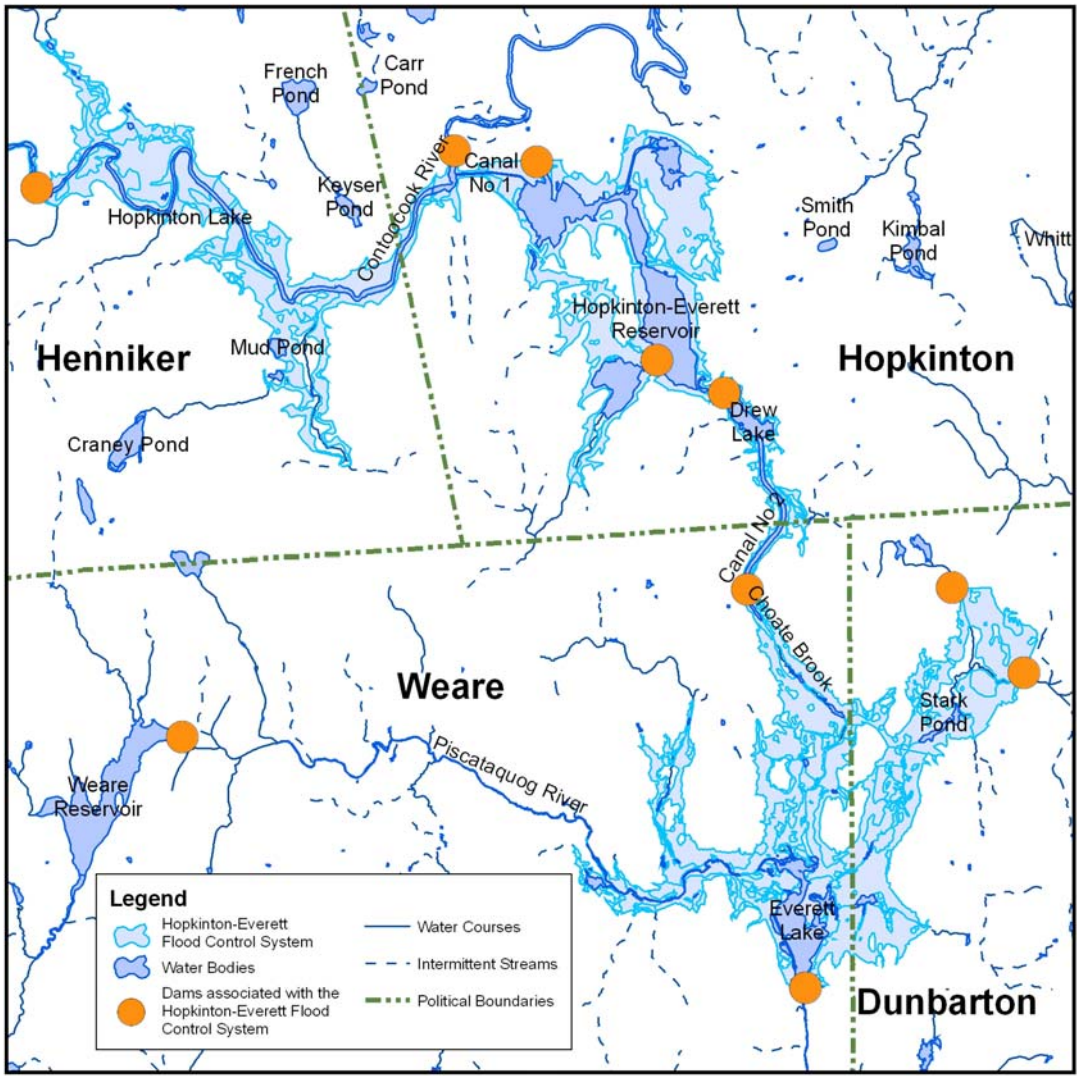
The most significant water features in the Town of Weare are the North Branch Piscataquog River and the Hopkinton Everett Reservoir (Everett Lake) Flood Control System. Other water bodies in town include Lake Horace (Weare Reservoir), Duck Pond, Mt. William Pond, Daniels Lake, and Perkins Pond Marsh. The numerous other watercourses include Breed, Center, Peaslee, Meadow, Choate, Buxton, Ferrin, Peacock, Hillside, Otter, and Huse Brooks. (FEMA FIS 2)

The North Branch Piscataquog River source is the Deering Reservoir, just west of northern Weare. The river flows for eight miles to the Weare Reservoir (274 acres) where it passes through a dam at the eastern end of the Reservoir and continues eastward for another 5.3 miles to the Hopkinton Everett Reservoir. The Piscataquog River flows southerly for 5.4 miles from its Everett Lake outlet to the Town of New Boston boundary. (FEMA FIS 3)

The Hopkinton Everett Flood Control System, built by the U.S. Army Corps of Engineers, was begun in 1959 and completed in 1963. The entire system is a complex of three reservoirs, two dams, and two canals in the towns of Henniker,

Hopkinton, Weare, and Dunbarton. During minor flooding events the three reservoirs work independently and during moderate and severe events as a single reservoir to provide additional storage capacity. The system is designed to minimize flood impacts in the Merrimack River Basin, as well as to communities downstream on the Contoocook River. (USACE NAE website)

Under normal circumstances, Everett Lake maintains an elevation of 340 feet and is 130 acres. Were floodwaters to reach the emergency spillway crest, the elevation would rise to 418 feet; the lake would cover 2,900 acres. During heavy floods, water from Hopkinton Lake and the Contoocook River is diverted to Everett Lake, which allows for 91,500 acre-feet of flood control storage. Additionally, the Army Corps of Engineers hold flowage easements for a maximum discharge of 1,500 cubic feet per second during extreme floods from the Everett Lake Dam into the Piscataquog River to relieve flood storage demands on Everett Lake. (FEMA FIS 3-4 and USACE NAE website)



Hopkinton-Everett Flood Control System

The June 1993 Flood Insurance Study for the Town of Weare identified the stillwater elevation during a 100 year flood event at Everett Lake to be 415.8 feet, at Weare Reservoir 657.4 feet, and 376.9 feet at Daniels Lake (FEMA FIS 7). Additionally, the FIS listed the following flood source locations and characteristics of each (FEMA FIS 6):

Flooding Source and Location	Drainage Area (square miles)	100 Year Peak Discharge (cfs)
Piscataquog River at the Riverdale Dam	69.0	2,200
Piscataquog River at the outlet of Everett Lake and USGE gage no. 01090800	63.1	2,200
Piscataquog River at the inlet to Everett Lake	41.0	3,860
Piscataquog River upstream from the confluence of Center Brook	34.2	3,380
Piscataquog River at the outlet of Weare Reservoir	27.5	2,880
Daniels Lake at the outlet	5.12	680

"Riverine flooding is the most common disaster event in the State of New Hampshire. Significant riverine flooding impacts upon some areas in the State in less than ten year intervals. (NHBEM III-3)" Heavy floods in Weare typically occur during the spring as a result of significant runoff generated from heavy rainfall and rapid snowpack melt. However, Weare is prone to flooding at all points in the year from heavy thunderstorms or hurricanes, causing rapid runoff and flooding. (FEMA FIS 3)

One of the greatest floods in Weare was during 1936 where flood water discharges as measured from the Piscataquog River near the Town of Goffstown reached 19,900 cubic feet per second, exceeding a 100-year recurrence interval (FEMA FIS 4). On record there are 18 flood-related FEMA-declared disasters in New Hampshire. Seven of these events have taken place since 2005. (FEMA, "Federally Declared Disasters by Calendar Year")

During an April 1987 event about six to eight inches of rain fell resulting in floods with between 20 and 50-year recurrence intervals and Everett Lake rose to 415.8 feet, the highest recorded height since construction of the flood control system. Previously, the highest water levels had been 405.5 feet in 1984. Additionally, the Weare Reservoir reached a flood elevation of 656.9 feet, surpassing the main spillway by 1.5 feet. (FEMA FIS 3-4)

The Town received grant funding from FEMA for several culvert replacements as a result of the flooding damages sustained during 1996. The Hazard Mitigation Committee members believe that the many repairs and mitigation efforts made following past flood events, especially after 1996, have reduced the Town's flood risk. During the October 2005 flood that wreaked havoc in southwestern New Hampshire and was a Federally Declared Disaster in five New Hampshire Counties including Hillsborough, the Town of Weare sustained virtually no damages.

However, during the May 13 to 16, 2006 floods the town, like many New Hampshire communities was greatly impacted by the nearly nine inches of rain that feel over a course of four days. This event, estimated to be a 100-year storm, was a clear example of how during heavy rainstorms, the most frequent cause of riverine flooding, damages are not limited to those from actual riverine flooding but also from high velocity water run-off.

The greatest damages occurred at the Lull Road Bridge, Old Francistown Road Bridge, Peacock Hill, and the landfill which partially lost its cap. Each of these locations incurred $150,000 to $250,000 in damages. While these larger damages were due to streams over topping the roads and ultimately causing several culverts to fail, much of the remaining damages were due to runoff. A total of 95 roads out of 129 roads or segments required repairs ranging from regrading to complete replacement. Total damages to the town, excluding that to private property, were estimated at just over $1,253,000. Damage to the land fill cap was in a different location than when there was a landslide at the old dump causing the cap to be displaced in 1996 flood event.

Two families had to be evacuated from Newman Wilson Road near Daniels Lake and power was cut to both homes to prevent further problems. One of the families stayed with family or friends and the other was accommodated by the American Red Cross. Of the two homes only one will be habitable with repairs.

Large flood events happened in 2007, 2008 and also in 2010 in New Hampshire. This event is becoming increasingly more frequent and is one of the greatest concerns for New Hampshire communities.

The following areas in the Town of Weare, as identified by the Weare Hazard Mitigation Committee have had past recurring flood problems, including erosion and problem culverts:

Area	Type of Damage and Description	Severity
Piscataquog River at Peaslee Bridge	Greatest annual flood risk in Town; flood waters rise to the bridge level; potential for debris obstructions to exacerbate the riverine flooding risk; bridge replacement is on the State Transportation Improvement Plan. 2011 – Started bridge project on Peaslee – funding approved for 2011	Moderate
Fields south of Everett Dam	Fields become inundated during heavy rainfall and snow melt periods.	Low
John Connor Bridge	Frequently the water levels reach the bridge decking, significant flooding problems during the 1996 flood. 2011 – No issues since the 1996 flood	Low
Chipmunk Falls Brook	Frequent flooding due to regular beaver dam activity. 2011 – No issues since 2006	Low
Lull Road Bridge	A large culvert traversing Peacock Brook that is failing, rusted through, and structurally unsound; on the State's red list for repair; the original arch pipe culvert was severely damaged during the May 2006 flood event and needs complete replacement with a larger box culvert. 2011 – Still needs replacement. Approved for funding in 2012 pending state budget issues	High
Old Francestown Road Bridge	A large culvert traversing Peacock Brook, just south of Lull Road, that was severely damaged during the May 2006 floods and will need to be replaced. The original structure was a 11 foot arch and is proposed to be replaced with a box culvert. 2011 – Still needs replacement. Approved for funding in 2012 pending state budget issues	High
Riverdale Bridge and Dam at the Piscataquog River	Debris obstructions from fallen trees near the dam have caused past flood problems and approached several homes on River Road	Low
Craney Hill Road	The unpaved road washes out with all major rainstorms and other run-off related events; most recently the road washed out during the October 2005 flooding event.	Low

Area	Type of Damage and Description	Severity
Newman-Wilson Road near Daniels Lake	Area homes flood; flooded during both the October 2005 and May 2006 flooding events; road and old bridge washed out during 1992 flooding; the bridge has been replaced with greater capacity culverts which mitigates most problems; most frequent road damages include erosion at the road edge but includes adjacent property damages in severe events. 2011 – Boards on the dam were pulled	High
Dunlop Pond/Shady Hill Farm	A beaver dam washed out and took out the road in two places.	Low
Peacock Hill Road and Culvert	Flooding exacerbated due to debris obstruction in the culvert crossing Peacock Brook during the 1996 flooding event. The same culvert and road were severely damaged and needed replacement after the May 2006 floods.	Low
Oak Hill Road	A beaver dam obstructed the culvert and when the obstruction was cleared the adjacent swamp filled with water.	Low
Colby Rd, Etta Ln, Shady Hill Rd and Buckley, Boyce Rd, East Rd	Beaver Dams are creating minor flooding issues in these areas	Low
Abijah Bridge	Stone placed to hold water back on the left	Low

All Special Flood Hazard Areas (SFHAs) in the Town of Weare are potentially at risk in the event of riverine flooding. The SFHAs are located on the Identified Hazard Zones Map at the end of this section.

High probability for riverine flooding to occur and cause significant damage in Weare.

2. Hurricanes

"A hurricane is a heat engine that derives its energy from ocean water. These storms develop from tropical depressions which form off the cost of Africa in the warm Atlantic waters. When water vapor evaporates, it absorbs energy in the form of heat. As the vapor rises, it cools within the tropical depression, and then condenses, releasing heat, which sustains the system. (NHBEM III-22)" Hillsborough County communities generally are impacted by hurricanes through rain induced flooding rather than high winds. (Ibid IV-10)

Since 1635, 12 hurricanes have reached and impacted New Hampshire: in the years 1635, 1778, 1804, 1815, 1869, 1938, 1954 (2), 1960, 1985, 1991, and 1999 (Ibid III-22). The September 1938 hurricane was the most notable flooding event to strike Weare and other municipalities in southern New Hampshire. Piscataquog river flood water discharges were measured near the Town of Goffstown at 21,900 cubic feet per second, exceeding a 100-year storm. Additionally, during the 1938 storm the Weare Reservoir failed. The 1938 flood is estimated to have been the greatest flood since 1733. (FEMA FIS 4) Hurricanes Carol and Edna caused some damage in August and September 1954.

Potential effects of a hurricane include flooding, runoff not handled adequately, and disrupted travel. The most recent hurricanes were: September 1985 – Gloria, August 1991 – Bob, and September 1999 – Floyd. During these events trees and power lines came down, and there was minimal structural damage. Hurricane Bob was a Presidentially Declared Disaster for the State of New Hampshire and caused about $2.3 million in damages statewide (FEMA, "Federally Declared Disasters by Calendar Year").

All areas of the Town of Weare are potentially at risk if a hurricane reaches Hillsborough County, New Hampshire.

Moderate probability for hurricanes to occur and cause significant flood damage in Weare.

3. Debris-impacted infrastructure and river ice jams

"The potential effects of flooding are increased when infrastructure is obstructed either by debris or ice formations. These obstructions compromise the normal stormwater flow, creating an artificial dam or narrowing of the river channel causing a backup of water upstream and forcing water levels higher. Debris obstructions can be caused from vegetative debris, silt, soils, and other riparian structures that have been forced into the watercourse. Ice jams are caused by ice formations "in riverbeds and against structures." (NHBEM 1999 Plan 13, 16) Bridges, culverts, and related roadways are most vulnerable to ice jams and debris-impacted infrastructure.

Historically, floods in Weare have been due to snowmelt and heavy rains in conjunction with debris-impacted infrastructure. If flooding occurs in the Town of Weare, there is the potential for debris-impacted infrastructure and ice jams to cause damage at the Piscataquog River at Peaslee Bridge and Riverdale Road, Peacock Brook Culvert, and Oak Hill Road Culvert. Please see the table of past flooding events under Riverine Flooding for descriptions of each of these areas, past events, and event severity. Occasionally, beaver dams obstruct culverts and watercourses and have caused significant flooding.

All Special Flood Hazard Areas in the Town of Weare are potentially at risk if there is an ice jam or debris-impacted infrastructure. Particular concern should be given to bridges and culverts across the many brooks in Weare including Peaslee, Meadow, Choate, Peacock, Hillside, Otter, and Dudley Brooks, as well as, Canal Number 2, Weare Reservoir, and the Piscataquog River. Since the Town's watercourses flow southward, the southern end of Town would be at greater risk than the northern half.

Moderate probability for debris-impacted infrastructure or ice jams to occur and cause moderate damage in Weare.

4. Erosion and mudslides

The New Hampshire Department of Environmental Services (NHDES) defines erosion as "the process in which a material is worn away by a stream of liquid (water) or air, often due to the presence of abrasive particles in the stream (NHDES Watershed Management Bureau)." As it relates to this *Plan,* erosion is the gradual or rapid wearing away of stream banks or shores, due to prevailing winds, natural water movement, and more catastrophic events. Additional causes of erosion are removal of vegetation and soil disturbance. Riparian construction sites are one non-natural contributor (NHDES Shoreland Protection). Stream bank erosion may eventually result in mudslides.

Land in Weare which has at least a 15 percent slope, a vertical rise of 15 feet over a horizontal run of 100 feet, is scattered throughout the Town, usually occurring around hills and stream banks. Areas of steep slopes in Weare are shown on the Identified Hazard Zones GIS map at the end of this section.

The landfill cap slid in the mother's day flood of 2006. It was repaired but he potential for it to happen again is still there.

All areas of steep slopes, as mapped in this *Plan*, are potentially at risk in the case of erosion and mudslide events.

Moderate probability for erosion and mudslides to occur and cause moderate damage in Weare.

5. Rapid snowpack melt

Rapid snowpack melt, much as its name suggests, is the rapid melting of the snowpack in conjunction with warming temperatures and moderate to severe rains, typically during the spring. "The lower lying areas of the State may

experience either flash flooding or inundation events accelerated by the rapid melting of the snowpack." (NHBEM III-5)

Structures and improvements located on, along, or at the base of steep slopes are most vulnerable to rapid snowpack melt. These areas can be seen on the Identified Hazard Zones GIS map's depiction of steep slopes. In the Town of Weare the fields to the south of Everett Lake, and within a small valley, are susceptible to flooding from rapid snowmelt in addition to potential flooding from the Piscataquog River.

All areas of steep slopes, as mapped in this *Plan*, are potentially at risk in the event of rapid snowpack melt.

Low to moderate probability for rapid snowpack melt to occur and cause minimal to moderate damage in Weare.

6. Dam breach or failure

The New Hampshire Department of Environmental Services indicates several failure modes for dams. Most typical include hydraulic failure or the uncontrolled overflowing of water, seepage or leaking at the dam's foundation or gate, structural failure or rupture, general deterioration, and gate inoperability. These modes vary among dams depending on their construction type. (NHDES Dam Bureau, Environmental Fact Sheets DB-4 through 7) Additionally, failure may be triggered because of significant seismic activity, particularly earthquakes.

The State of New Hampshire uses a hazard potential classification based on the impact of dam breach or failure. All Class H and S dams have the potential to cause damage if they breach or fail. Weare has 11 Class NM dams (non-menace hazard potential), five Class L dams (low hazard potential), and two Class H dams (high hazard potential). The dam classes are defined in Appendix B. (NHDES Dam Bureau, "Dams")

"The Department of Environmental Services (DES), through its Dam Bureau, is responsible for the regulation of the state's dams to ensure that they are constructed, maintained and operated in a manner to promote public safety (NHBEM III-9)." Per RSA 482:2, RSA 482:12 and RSA 482-11a, all owners of Class H and S dams are required to submit an Emergency Action Plan to NHDES as well as other applicable agencies in the State. (NHDES Dam Bureau, Environmental Fact Sheet DB-11)

The first of Weare's Class H dams, is owned by the U.S. Army Corps of Engineers and is located at the southern end of Everett Lake and the Hopkinton-

Everett Flood Control System. The dam is constructed of rolled earth fill with rock slope protection and is about 2,000 feet long and 115 feet high. The reservoir has never reached capacity and thus the dam has never failed. In 1987 the reservoir was the closest ever to exceeding its capacity at 95%. (USACE NAE website)

Replicating the 1936 flood event, the most severe anticipated occurrence, the inundation area spans from the dam itself at the northern limits along the Piscataquog River to its confluence with the Merrimack River, impacting the shores of that river as well in Manchester and Bedford. The inundation area includes four additional dams downstream with a hazard class rating of L or higher; 21 river crossings including four highway crossings; the villages of Riverdale, Parker, Goffstown, Grasmere and Pinardville; and Manchester. (USACE Dam-Break Analysis 2-7)

Within the Town of Weare there are four bridges over the Piscataquog; Kuncanowet Hills Mobile Home Park; Riverdale Dam (class A); three historic homes including the Nathaniel Martin Cabin, Nancy Wilson House, and the Phineas Stone House; more than 15 occupied homes; two general contractors; two public water suppliers; and two industrial businesses on North Riverdale Road in or adjacent to the dam's inundation area. The two industrial businesses include New England Sheet Metal's warehouses and a variety of lessees utilizing the Riverdale Construction Company's facilities. Within the Riverdale Construction Company, one business is registered as a hazardous waste generator with the New Hampshire Department of Environmental Services. However, the Hazard Mitigation Committee suspects there may be additional sources of pollutants or contaminants on the 8 North Riverdale Road site.

During a storm event surpassing the 1936 event, floodwaters would take an hour from the start of dam failure to reach a peak stage at the dam. Floodwaters could take just over 1.1 hours to reach the Goffstown town line and as little as 1.6 hours after initial dam failure to reach Goffstown's center with peak floods occurring at the town line two hours after the start of dam-break and three hours at Goffstown's center. Floodwaters at both points would be about 50 feet above normal river levels.

The leading edge of the floodwaters would reach Manchester 2.2 hours after the break and reach peak flood levels 4.5 hours after the initial dam break. At the confluence with the Merrimack River, the floodwaters could rise to 55 feet above normal river levels. At a point nine miles downstream from the confluence of the Piscataquog and Merrimack Rivers the flood waters would still be about 50 feet above normal river levels due to the relatively flat profile of the Merrimack River.

The 1983 Everett Lake Dam-Break Flood Analysis and 1985 Flood Emergency Plan for Everett Lake, as produced by the U.S. Army Corps of Engineers should be consulted for further detailed information.

The second of Weare's Class H dams is owned by the New Hampshire Department of Environmental Services and is the Weare Reservoir (or Horace Lake) dam at the eastern edge of the lake. The reservoir area covers 279 acres when the water level is at the spillway and has a maximum storage capacity of 4,439 acre-feet. The concrete gravity dam is 34 feet high and 340 feet long, with a 157-foot long ogee spillway. The drainage area stretches over 28.44 square miles, traveling five miles from the dam along the Piscataquog River into the Hopkinton-Everett Reservoir, then southeastward along the Piscataquog an additional 18 miles to the Merrimack River confluence in Manchester.

The dam breach analysis included in the Weare Reservoir Emergency Action Plan, developed by the NH Department of Environmental Services, assumes that a portion of the concrete spillway will fail during a 100-year flood event. The storm would reach a peak 100-year inflow of 6,778 CFS into the reservoir raising the lake elevation to 659.32 feet. The resulting breach width would be 70 feet and the peak discharge would be approximately 39,700 CFS immediately downstream.

The dam breach inundation area is limited to the land adjacent to the Piscataquog River between the Weare Reservoir Dam and the Hopkinton-Everett Reservoir, since it is assumed that the Everett Lake Dam and Reservoir will contain additional flood capacity and prevent further downstream flooding. It is estimated that during a 100-year event flood waters would take only 48 minutes from the initial break to reach the Barnard Hill Road Bridge in the Hopkinton-Everett Reservoir (4.8 miles downstream) and a total of 1.8 hours for the peak flood waters to reach the same point after the initial break. The inundation area includes numerous homes, State Routes 77 and 114, eight bridges, the North Weare and Chases' village centers, and two historic sites.

The Emergency Action Plan for the Weare Reservoir Dam, as produced by the NH Department of Environmental Services Water Division Dam Bureau should be consulted for further detailed information.

The Hazard Mitigation Committee was unaware of any past dam breaches or failures in the Town of Weare other than the Weare Reservoir failure during the 1938 flood.

The SFHAs in proximity to Weare's dams as well as their designated floodways would be impacted by a dam breach**.**

Low probability for dam breach or failure to occur and cause significant damage in Weare.

B. Wind

The most frequent problem and risk associated with all types of wind storms in the Town of Weare is downed trees and the secondary impacts of their falling, including downed power lines. There have been two Presidentially Declared Disasters for severe wind storms in Hillsborough County since 1982. The August 1990 windstorm caused approximately $2.3 million in damages across all counties in the state except Belknap. The February 2010 windstorm caused more than $2 million in damages across six counties in the state. The violent storm system left more than 330,000 without power in the state and 1 million across the Northeast after high winds and rain lashed the region. On March 29, the president declared a major disaster in six counties providing federal support to assist in the cleanup (FEMA, "Federally Declared Disasters by Calendar Year").

Since 1995 there have been 20 storms with high winds recorded in Hillsborough County that have not been associated with one of the specific wind event types as identified below. These 20 storms had winds of up to 615 knots and totaled $1.595 million in damages across the county. (NOAA National Climatic Data Center)

There are three areas in Weare with an increased susceptibility of downed trees, some with greater associated risks as well. These areas include:

1. **Colby Road** – A large clearing with a 10 food strip of trees between the road and clearing, trees frequently fall on power lines during wind storms;
2. **Merrill Road** – This is the only access to the Town's fuel pumps. If a tree falls across the road, as happened during a 2003 snowstorm, the Town's vehicles, including plows, cannot resume emergency operations or snow clearing until the obstruction is removed; and
3. **North Weare Bridge Area** – Site of the former Morgan Pines, where only one remaining 85 foot tree in poor health stands posing a potential risk during future storms.

All three of these locations should be considered risk areas for the following kinds of hazards related to wind, reviewed by the Weare Hazard Mitigation Committee. Since the 2010 windstorm the utilities have been doing major clearing in these areas and the risk has been lowered from this mitigation effort.

1. Hurricanes

Severe hurricanes reaching south-central New Hampshire in the late summer and early fall are the most dangerous of the coastal storms that pass through New England from the south. Tropical depressions are considered to be of hurricane force when winds reach 74 miles per hour (see the following table for hurricane categorization according to the Saffir-Simpson Scale). Substantial damage may result from winds of this force, especially considering the duration of the event, which may last for many hours. Potential effects of hurricane force winds include fallen trees, telephone poles, and power lines.

Saffir-Simpson Hurricane Scale		
Category	**Winds (mph)**	**Potential Damage**
1	74-95	Minimal
2	96-110	Moderate
3	111-130	Extensive
4	131-155	Extreme
5	>155	Catastrophic

Winds from the Hurricane of 1938, previously mentioned, reached a high of 186 miles per hour, a category 5 on the Saffir-Simpson Scale. (NHBEM III-22)

All areas of Weare are at risk if a hurricane reaches Hillsborough County, New Hampshire.

Moderate probability for hurricane force winds to occur and cause significant damage in Weare.

2. Tornadoes

"A tornado is a violently rotating column of air extending from a thunderstorm to the ground. 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." Originating from hurricanes and thunderstorms, tornadoes are formed when cold air overrides warm air, causing the warm air to rise rapidly. (FEMA, Understanding Your Risks, 2-20)

Tornadoes are measured using the Fujita Tornado Damage Scale, as seen in the following table (National Oceanic and Atmospheric Administration).

Fujita Tornado Damage Scale		
Category	**Winds (mph)**	**Potential Damage**
F0	<73	Light
F1	73-112	Moderate
F2	113-157	Considerable
F3	158-206	Severe
F4	207-260	Devastating
F5	261-318	Incredible

Since 1950, there has been 19 known tornadoes in Hillsborough County. Two of these were not rated, one was F0, 10 were F1, five were F2, and one was a F3 (August 1968). (Tornado Project Online) These storms totaled approximately $1.5 million in damages across the county (NOAA National Climatic Data Center).

All areas of Weare are potentially at risk if a tornado reaches the Town.

High probability for tornadoes to occur and cause moderate damage in Weare.

3. Nor'easters

A nor'easter, or winter extra-tropical storm, is "[a] large weather system traveling from south to north passing along the seacoast. As the storm approaches New England and its intensity becomes increasingly apparent, the resulting counterclockwise cyclonic winds impact the coast and inland areas from a northeasterly direction. The sustained winds may meet or exceed hurricane force, with larger bursts, and may exceed hurricane events by many hours in terms of duration (NHBEM 1999 Plan 58)."

"Unlike the relatively infrequent hurricane, New Hampshire generally experiences at least one or two significant events each year… with varying degrees of severity. These storms have the potential to inflict more damage than many hurricanes because … high winds can last from 12 hours to three days, while the duration of hurricanes ranges from six to 12 hours (Ibid)."

Nor'easters are measured on the Dolan- Davis Scale, as seen in the following table.

Dolan-Davis Nor'easter Classification Scale				
Storm Class	**% of Nor'easters**	**Avg. Return Interval**	**Avg. Duration (hours)**	**Impact**
1- WEAK	49.7	3 days	8	No property damage
2- MODERATE	25.2	1 month	18	Modest property damage
3- SIGNIFICANT	22.1	9 months	34	Local-scale damage and structural loss

4- SEVERE	2.4	11 years	63	Community scale damage and structural loss
5- EXTREME	0.1	100 years	95	Extensive regional-scale damage and structural loss

Source: State of NH 1999 Natural Hazards Mitigation Plan and NC Division of Emergency Management

During a 2003 snowstorm, 50 miles-per-hour winds were responsible for a tree falling onto a vehicle and killing its two passengers. Also during another 2003 storm a tree fell across Merrill Road blocking access to the Town's fuel pumps. The Town's plows were not able to resume road clearing operations until the tree was removed.

All areas of Weare are potentially at risk for property damage and loss of life due to nor'easters.

High probability for nor'easters to occur and cause significant wind damage in Weare.

4. Downburst

"A downburst is a severe localized wind blasting down from a thunderstorm. These 'straight line' winds are distinguishable from tornadic activity by the pattern of destruction and debris. Depending on the size and location of these events, the destruction to property may be devastating. Downbursts fall into two categories: *Microburst* which covers an area less than 2.5 miles in diameter, and *Macroburst* which covers an area at least 2.5 miles in diameter. " (NHBEM III-20)

The Hazard Mitigation Committee was not aware of any past known downburst events in the Town of Weare.

All locations in Weare are at risk for property damage and loss of life due to downbursts.

Moderate probability for downbursts to occur and cause minimal to moderate damage in Weare.

5. Lightning

"During the development of a thunderstorm, the rapidly rising air within the cloud, combined with the movement of the precipitation within the cloud, causes electrical charges to build up within the cloud. Generally, positive charges build up near the top of the cloud, while negative charges build up near the bottom. Normally, the earth's surface has a slight negative charge. However, as the negative charges build up near the base of the cloud, the ground beneath the cloud and the area surrounding the cloud become positively charged. As the cloud moves, these induced positive charges on the ground follow the cloud like

a shadow. Lightning is a giant spark of electricity that occurs between the positive and negative charges within the atmosphere or between the atmosphere and the ground. In the initial stages of development, air acts as an insulator between the positive and negative charges. However, when the potential between the positive and negative charges becomes too great, there is a discharge of electricity that is known as lightning (NHBEM 1999 Plan 63)."

There was one recorded lightning strike in the Town of Weare on May 24, 2004. This storm struck two homes in Weare and Hollis, causing significant damages to both residences. Damages were estimated at $350,000. (NOAA National Climatic Data Center)

All areas of Weare are potentially at risk for property damage and loss of life due to lightning.

Moderate probability for lightning to occur and cause minimal damage in Weare.

C. Fires

The Weare Hazard Mitigation Committee reviewed the following kinds of hazards related to fires:

1. Wild Land Fires

"Historically, large New Hampshire wild land fires run in roughly 50-year cycles…The increased incidence of large wild land fire activity in the late 1940s and early 1950s is thought to be associated, in part, with debris from the hurricane of 1938. Significant woody 'fuel' was deposited in the forests during that event. (NHBEM III-13-14)" Present concerns of the New Hampshire Department of Resources and Economic Development, Division of Forests and Lands, are that the ice storm of 2008 has left a significant amount of woody debris in the forests of the region and may fuel future wildfires similar to the debris caused by the Hurricane of 1938.

The Town of Weare has a safety complex and two additional fire stations serving approximately 60 square miles. The Safety Complex also serves as the Emergency Operations Center and the Police Department.

Data pertaining to fires can be found in the Weare Town and School Annual Reports. There were a total of 294 fires from 2000-2004, including tree, brush, and grass fires, structure fires, vehicle fires, and other fire types including controlled burns, cooking, trash, or refuse fires, and other unauthorized burns. There was an average of 59 fires a year. A summary of data from 2005-2010 is provided as follows.

Fire Type	Number of Responses					Annual Average
	2000	2001	2002	2003	2004	
Structure Fires	4	14	6	9	10	9
Tree, Brush, or Grass Fires	31	36	25	8	12	22
Vehicle Fires	3	8	9	2	5	5
Other Fires	17	8	20	28	39	22
Total Number of Fires	**55**	**66**	**60**	**47**	**66**	**59**
HazMat, Gas Leaks, Downed Power Lines	32	31	52	47	44	41
EMS Responses	289	342	345	345	411	346
Mutual Aid Responses	20	32	32	30	27	28
All Other Responses	82	74	98	91	91	87
Total All Fires and Responses	**478**	**545**	**587**	**560**	**639**	**562**

Past wild land fire events in the Town of Weare have occurred at:

- Hopkinton-Everett Flood Control Reservoir area – frequent forest and wild land fires with anticipated future events; lack of access or fire roads make fire fighting difficult in this area;
- Clough State Park Road – an area of past events and anticipated future events, lack of access or fire roads make fire fighting difficult in this area;
- Ferrin Pond on the back side of Boars Head – past events, lack of access or fire roads make fire fighting difficult in this area; and
- Back side of Mount William Pond – a fire occurred here during 1953.

In the Town of Weare, the following areas are susceptible to wild land fires:

- All new developments – when trees are cut the soil dries leaving dead grass and creates a new urban-wild land interface;
- Trails – Weare has an extensive network of trails that are used year round for hiking, biking, and snowmobiling, the area to 250 feet on either side of all trails is at risk; and
- Campgrounds – unattended fires at the Town's three campgrounds (Cold Springs, Autumn Hills, and All Season's) pose an additional risk.

These areas have been identified on the Identified Hazard Zones GIS map.

High probability for wild land fires to occur and cause minimal damage in Weare.

2. Target Hazards

Target Hazards are facilities or areas of town that require a greater amount of pre-fire tactical planning to address emergencies larger than the average fire event. In the Town of Weare, a couple areas have high concentrations of either combustible or hazardous materials that, were a fire to occur, could increase the severity of the fire and possibly have catastrophic results.

In the Town of Weare, the following areas are susceptible to target hazard related fires:

- Austin Powder on Mount William next to Lilly Pond stores large quantities of explosives; and
- Putnam Fuel on B and B Lane has large fuel storage tanks and there is only one access point to the facility.

These areas have been identified on the Identified Hazard Zones GIS map.

Moderate probability for target hazard related fires to occur and cause moderate damage in Weare.

3. Isolated Homes

"New Hampshire is heavily forested and is therefore exposed to this hazard … The proximity of many populated areas to the State's forested lands exposes these areas and their populations to the potential impact of wildfire (NHBEM 1999 Plan 34)."

There are many dead end, single access roads in Weare with residential development along them. The largest and most significant area with isolated homes is Mountain Road that branches off to multiple other roads and subdivisions. The quality of Mountain Road and the large number of homes makes this the greatest area of isolated homes at risk. New developments in Weare with a single access point are required to place all utilities, including power, underground to prevent a disruption in supply during a hazard event. They are also required to provide other assurances that emergency vehicles will be able to reach the homes.

In the Town of Weare, Mountain Road has several large isolated residential developments branched off on the following eight roads that are at risk**:**

- Bartlett Drive;
- Lawrence Road;
- Etta Lane;
- Mountain School Road;
- Abbie Drive;
- Lorden Lane;
- Cram Road; and
- Bogue Road.

Other areas with isolated homes include:

- Elanor Way
- Fessenden Ln

- Hilbren Rd
- Rolling Hills Dr
- Eastman Way
- Elm Dr
- Meadow Dr

These areas have been identified on the Identified Hazard Zones GIS map.

Low probability for isolated homes to receive minimal damage in Weare.

D. Ice and Snow Events

The Weare Hazard Mitigation Committee reviewed the following kinds of hazards related to ice and snow events:

1. Heavy snowstorms

"A heavy snowstorm is generally considered to be one that deposits four or more inches of snow in a twelve-hour period. A blizzard is a violent snowstorm with winds blowing at a minimum speed of 35 miles per hour and visibility of less than one-quarter mile for three hours (NHBEM III-25)." During a blizzard temperatures drop to below 20°F. Intense wintertime nor'easters are often referred to as blizzards. 'White outs' occur when previously fallen dry snow is blown into the air and extremely reduces visibility.

For the intents of this *Plan*, heavy snowstorms include all storms with four or more inches of snow in a 12-hour period, including all blizzards and nor'easters (as defined under wind events) with large snow accumulation.

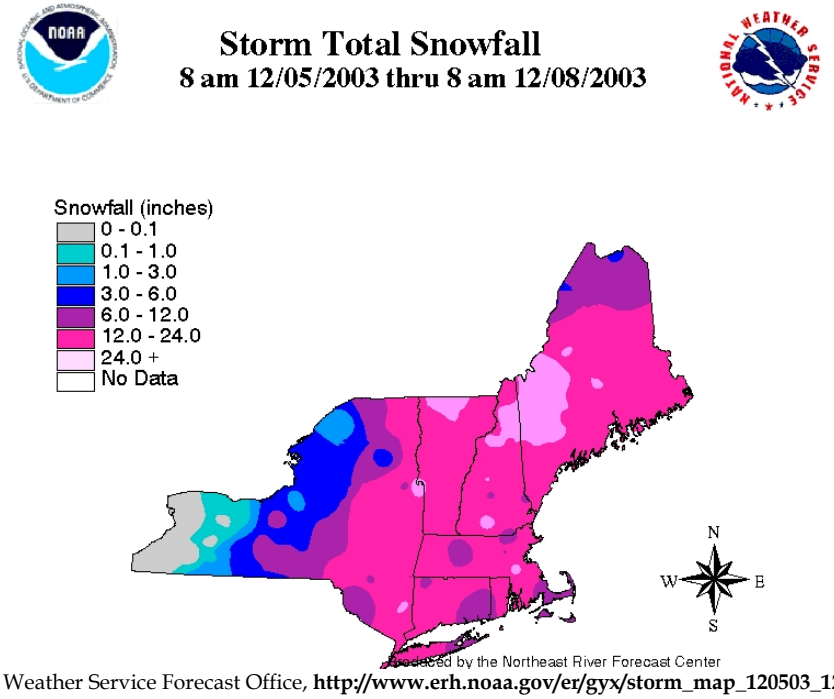
In the past 23 years, the Federal Emergency Management Agency declared six snowstorm-related Emergency Declarations for Hillsborough County. The first was declared by FEMA in March of 1993 for statewide heavy snow. (FEMA, "Federally Declared Disasters by Calendar Year")

The second was for snowstorms during March of 2001 covering seven of the state's 10 counties. Southern and central New Hampshire received approximately two feet of snow, on top of an existing base of about a foot, and many residents lost power. Wind speeds reached 24 miles per hour. (NOAA National Climatic Data Center and National Weather Service, Gray, Maine)

The third declared emergency was for a snowstorm on February 17-18, 2003. This storm accumulated approximately nine inches of snow, as reported in Henniker, added to an existing base of snow to create an approximate snow depth of 19 inches. Wind speeds reached a maximum of 14 miles per hour.

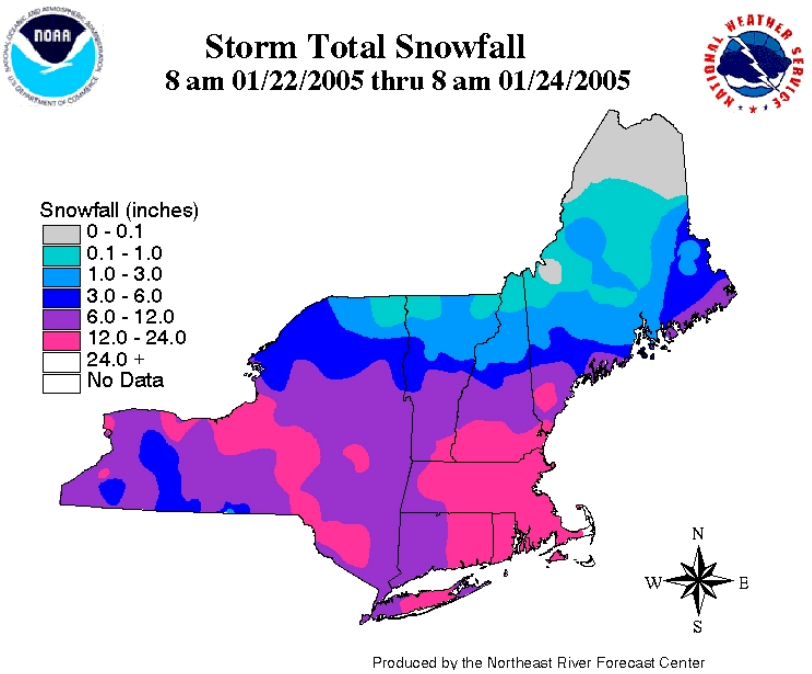
(NOAA National Climatic Data Center and National Weather Service, Gray, Maine)

The fourth declared emergency was on December 6-7, 2003. This emergency was declared for eight of 10 New Hampshire counties. The storm accumulated approximately 23 inches of snow, as reported in Henniker, and winds were measured at up to 25 miles per hour. There was three inches or less of existing snow depth before the storm. (NOAA National Climatic Data Center and National Weather Service, Gray, Maine) Following is a map depicting snowfall during this storm.



Source: National Weather Service Forecast Office, **http://www.erh.noaa.gov/er/gyx/storm_map_120503_120803.jpg**

The fifth declared emergency was for January 22-23, 2005 and was declared for all New Hampshire counties, except Coos. The storm accumulated approximately 11 inches of snow, as recorded in Concord, on top of an existing nine-inch approximate snow depth. Maximum wind speeds were measured at 26 miles per hour. (NOAA National Climatic Data Center and National Weather Service, Gray, Maine)



Source: National Weather Service Forecast Office, http://www.erh.noaa.gov/er/gyx/storm_map_012405.jpg

The most recent declared emergency was for March 11-12, 2005 and was declared for four of New Hampshire's nine counties. The storm accumulated approximately six inches of snow, as recorded in Concord, on top of an existing 17-inch snow depth. Highest recorded winds were 15 miles per hour. (NOAA National Climatic Data Center and National Weather Service, Gray, Maine)

All areas of Weare are potentially at risk for property damage and loss of life due to heavy snows.

High probability for heavy snowstorms, blizzards, and nor'easters to occur and cause significant damage in Weare.

2. Ice Storms

"Ice Storms occur when a mass of warm moist air collides with a mass of cold arctic air. The less dense warm air will rise and the moisture may precipitate out in the form of rain. When this rain falls through the colder more dense air and comes in contact with cold surfaces, ice will form and may continue to form until the ice is as thick as several inches. (NHBEM III-25)"

Despite the beauty of ice events, the extreme weight of ice build-up may strain tree branches, power lines and even transmission towers to the breaking point, resulting in a loss of power, telephone service, or other services. Fallen trees, limbs, or utility poles may obstruct roads and restrict emergency vehicle passage. Additionally, ice creates treacherous conditions for highway travel and aviation.

The 1998 icestorm was a Federally Declared Disaster by FEMA for nine of the State's 10 counties, including Hillsborough County. The January 1998 ice storm was very similar in both its impact area and severity to a 1929 ice storm that caused unprecedented damage to the telephone, telegraph and power system. The 1998 storm significantly damaged the utility network, causing all of Weare to lose power for four days. Across the State's impacted areas there were six related injuries, one fatality and 20 major road closures. Other ice storms in southern New Hampshire with impacts in Weare occurred in March of 1991 and January of 1979.

Weare, including the rest of New Hampshire and much of the Northeast, experienced an intense ice storm from December 11-12, 2008. A major disaster declaration was declared for 10 counties in New Hampshire, including Rockingham. The damage was widespread and approximately 400,000 residents of New Hampshire lost power from the storm. Restoring power to a majority of the State took approximately 14 days and in some extreme cases it took 17 days.

"It was absolutely unprecedented in devastation. Take the largest number of outages in any past storm, multiply that figure by three, and it still won't equal the outages in the 2008 ice storm." PSNH spokesman, Matt Chagnon, went on to say that, "the response was as unprecedented as the storm itself. PSNH put 2,400 linemen to work. On average, they restored power to 28,000 customers a day."[1] The 2008 ice storm is believed to be the worst ice storm ever recorded in New Hampshire.

All areas of Weare are potentially at risk for property damage and loss of life due to ice storms.

High probability for ice storms to occur and cause moderate damage in Weare.

3. Hailstorms

"Hailstones are balls of ice that grow as they are held up by winds, known as updrafts that blow upwards in thunderstorms. The updrafts carry droplets of super cooled water (at a below freezing temperature) but not yet ice. The super cooled water droplets hit the balls of ice and freeze instantly, making the hailstones grow. The faster the updraft, the bigger the stone can grow (NHBEM 1999 Plan 67)."

"Most hailstones are smaller in diameter than a dime, but stones weighing more than a pound has been recorded. Details of how hailstones grow are complicated but the results are irregular balls of ice that can be as large as baseballs,

[1] Sullivan, Margo. *State, power companies explore ice storm response*. 12/29/08. http://www.eagletribune.com/punews/local_story_364030134.html

sometimes even bigger. While crops are the major victims, hail is also a hazard to vehicles and windows. Hail damage events can be severe to persons, property, livestock and agriculture (Ibid)."

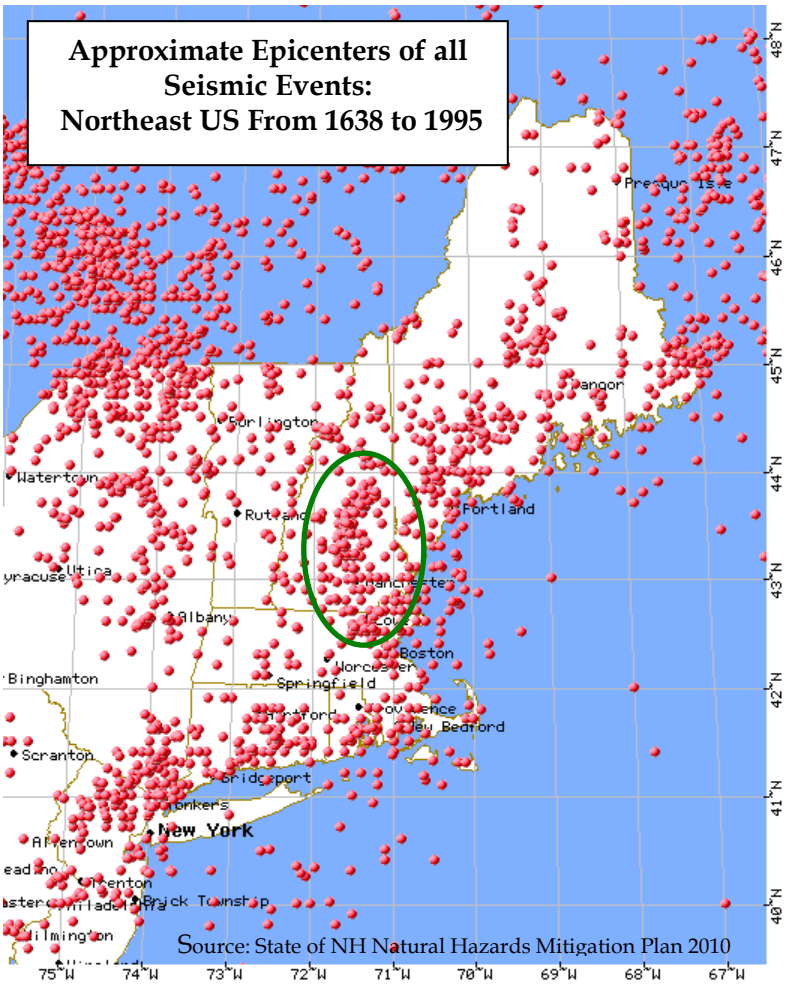
The National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC) online database has recorded 55 hail storms in Hillsborough County since 1950. Hailstone diameters recorded ranged from .75 to two inches. The database notes two events specifically occurring in Weare on June 20, 2001 with one-inch hailstones and on September 13, 2010 with 0.75 inch hailstones. No damages were recorded for any of the events.

All areas of Weare are potentially at risk from this hazard.

Moderate probability for hailstorms to occur and cause minimal damage in Weare.

E. Seismic Events

The Weare Hazard Mitigation Committee reviewed the following kinds of hazards related to seismic events:



1. Earthquakes

An earthquake is "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 (NHBEM III-15)."

In the State of New Hampshire, earthquakes are due to intraplate seismic activity, opposed to interplate activity or shifting between tectonic plates as occurs in California. The causes of intraplate earthquakes have yet to be scientifically proved. One

accepted explanation for the cause of intraplate "earthquakes in the Northeast is that ancient zones of weakness are being reactivated in the present-day stress field. In this model, pre-existing faults and/or other geological features formed during ancient geological episodes persist in the intraplate crust, and, by way of analogy with plate boundary seismicity, earthquakes occur when the present-day stress is released along these zones of weakness (Kafka)."

There are two scales that measure earthquakes, the Modified Mercalli (MM) and the Richter scales. The Richter scale is a measurement of magnitude of the quake as calculated by a seismograph and does not measure damage. The Modified Mercalli scale denotes the intensity of an earthquake as it is perceived by humans, their reactions, and damage created. It is not a mathematically based scale but a ranking of perception. (USGS)

One of New England's more notable seismic zones runs from the Ossipee Mountain area of New Hampshire, through the Weare area, and continues south toward Boston, Massachusetts. This particular area has a mean return time of 408 years for a 6.0 Richter scale earthquake or a 39 percent probability of occurrence in 200 years. Additionally for a 6.5 Richter scale quake, there is a mean return time of 1,060 years or a 17 percent probability of occurrence in 200 years. (Pulli) When New England is generalized as a whole for earthquake probability estimation, the risk increases from the specific hazard zone noted above. For New England there is an estimated return time of every 10 years for an earthquake with a 4.6 Richter scale magnitude and 1000 years for 7.0 magnitude. (NHBEM 1999 Plan 43)

From 1728 to 1989, there were 270 earthquakes in New Hampshire. This averages to approximately one quake per year. There were six quakes over 4.0 on the Richter scale during the 1900s. (Ibid 39-42)

The last earthquake in New Hampshire happened on March 18, 2011 15 miles WNW of Concord with a magnitude 1.6 on the richter scale. (USGS Earthquake Hazards Program)

All areas of Weare are potentially at risk for property damage and loss of life due to earthquakes. Additionally, all Class H and S dam's inundation areas in Weare would be at risk to dam failure as a secondary impact to a major earthquake.

Moderate to high probability for earthquakes to occur and cause moderate damage in Weare.

2. Landslides

"A Landslide is the downward or outward movement of slope forming materials reacting under the force of gravity including: mudflows, mudslides, debris flows, rockslides, debris avalanches, debris slides and earth flows. Landslides may be formed when a layer of soil atop a slope becomes saturated by significant precipitation and slides along a more cohesive layer of soil or rock. Seismicity may play a role in the mass movement of landforms." (NHBEM III-17)

During the 1996 flooding event, mentioned earlier under Riverine Flooding, rapid run-off caused the Town's landfill cap to be washed off, causing a landslide. Weare received a $66,000 grant from FEMA to repair the landfill cap and install a new under-drain system that can adequately handle future high water flow capacity and prevent future erosion or landslides.

This same event happened again in 2006 and again the Town was awarded grant assistance to repair it.

All areas of steep slopes in Weare, as shown on the Identified Hazard Zones Map, are at risk for landslides.

Moderate probability for landslides to occur and cause moderate damage in Weare.

F. Other Hazards

The Weare Hazard Mitigation Committee reviewed the following other kinds of hazards:

1. Utility pipe failure

Failure of utility pipe systems, including water, gas, and sewer, can be caused by joint leakage, contamination, pipe fracture or tuberculation. Pipe fractures are the most costly and potentially damaging of the failure modes. (Makar 2) Fractures can be caused by blunt force (e.g. construction digging) or ground shifting caused by the natural expansion and contraction of freezing and thawing soil during the winter months or from earthquakes. Pipe blocks in sewer systems can cause a buildup of harmful gasses and lead to explosions. (Suffolk County Water Authority)

Potential effects of water main failures can include immediate loss of water supply in the surrounding area, flooding, and road collapse. Sewer main failures can cause sewage backups, effluent leakage, and exposure to harmful bacteria. Leaks in gas mains can lead to fires or explosions if there is either an ignition source or pressure built up in the pipe. Explosions occurring in underground

pipes can create craters, and possibly result in death, injuries, and property damage. (National Transportation Safety Board, "Pipeline Accidents")

There are approximately 790 linear feet of water lines and one-half mile of sewer lines in Weare. Weare's water mains are two inches in diameter and sewer mains are eight inches. The two systems are maintained by the Weare Public Works Department and service three municipal buildings. The Town is increasing sewer capacity to include the new school building.

During May 2006 the end cap of the water main broke. The end cap is located in the basement of the historic town hall. Subsequently the basement of the historic structure was flooded. Municipal staff believes the end cap failed due to age and a recent increase in water flow capacity from the new town well.

The developed area surrounding the intersection of Route 114, Flanders Memorial Road and East Road should be considered at risk for utility system failures.

Low probability for utility system failures to occur and cause minimal damage in Weare.

2. Geomagnetism

The State of New Hampshire Natural Hazards Mitigation Plan defines geomagnetism as "…of, or pertaining to, the earth's magnetic field and related phenomena. Large geomagnetic disturbances commonly known as magnetic storms, if global in scale, or as magnetic substorms, if localized in scale and limited to night time high altitude auroral regions, are of particular significance for electric power utilities, pipeline operations, radio communications, navigation, satellite operations, geophysical exploration and GPS (global positional system) use. (NHBEM 1999 Plan 50)"

Geomagnetism includes both solar wind coupling and magnetic storms. Solar wind coupling is the relationship between solar events and winds with geomagnetic activity within the earth's magnetosphere. "Magnetic storms occur when the radiation belts become filled with energetic ions and electrons. The drift of these particles produces a doughnut shaped ring of electrical current around the earth...Magnetic storms are often initiated by the sudden arrival of a high-speed stream of solar wind, carrying high particle density and high magnetic field. (Ibid)"

No known events of geomagnetism have been recorded for the Town of Weare.

High-tension lines and communications towers are at risk in Weare.

Low probability for geomagnetism to occur and cause minimal damage in Weare.

3. Drought

"A drought is a natural hazard that evolves over months or even years and can last as long as several years to as short as a few months, fortunately droughts are rare in New Hampshire. The central theme in the definition of a drought is the concept of water deficit. The severity of the drought is gauged by the degree of moisture deficiency, its duration and the size of the area affected. The effect of droughts, or decreased precipitation, is indicated through measurements of soil moisture, groundwater levels, and streamflow. Not all of these indicators will be minimal during a particular drought. For example, frequent minor rainstorms can replenish the soil moisture without raising ground water levels or increasing streamflow. " (NHBEM III-11)

While droughts are not as devastating as other hazards, low water levels can have negative effects on existing and future developed areas that depend on groundwater for water supply. Additionally, the dry conditions of a drought may lead to an increase wild fire risk.

Weare, as have other communities in southern New Hampshire, has experienced several droughts since the 1920s. The table below summarizes the droughts that may have impacted Weare since that time.

Dates	Recurrence Interval	Remarks
1929-1936	10 to >25 Years	Regional
1939-1944	10 to >25 Years	Moderate
1947-1950	10 to 25 Years	Moderate
1960-1969	>25 Years	Regional, Longest recorded continuous spell of less than normal precipitation in New Hampshire
2001-2002	Not Yet Determined	Third worst drought on record, exceeded only by droughts in the 1940s and 1960s

All areas of Weare would be affected by a drought.

Moderate probability for drought to occur and cause damage in Weare.

4. Extreme Heat

"A heat wave is defined as a period of three consecutive days during which the air temperature reaches 90 degrees Fahrenheit or higher on each day. (NHBEM 1999 Plan 33)" Extreme heat is an occasional and short-lived event in southern New Hampshire. While there have been no extended periods of extreme heat in

Weare, the State of New Hampshire Natural Hazards Mitigation Plan notes one of the hottest summers of record as 1999. There were 13 days above 90 degrees, five days over 95 degrees and two days over 97 degrees. From 1960-1994 there were 45 heat waves recorded in Concord, NH. This is an average of 1.3 heat waves per year. In 1988 there were a total of five heat waves. (NHBEM 1999 Plan 32-3)

All areas of Weare would be affected by extreme heat, in its event. Particular areas and populations at a greater risk are:

- elderly populations and day care centers;
- the power system that may become overburdened; and
- communication infrastructure negatively affected by power burden.

Low probability for extreme heat to occur and cause minimal damage in Weare.

5. Extreme Cold

While most New Hampshire residents are rather habituated to the extreme cold situations in the State, and this is not a section identified by the State of New Hampshire Natural Hazards Mitigation Plan, it was decided to include a statement in this *Plan*. For the purposes of this *Plan* extreme cold will be referred to in a general manner, without a scientific definition. Periods of extreme cold pose a life-threatening situation for Weare's low-income populations. With the rising costs of heating fuel and electric heat, many low-income citizens are not able to adequately heat their homes, exposing themselves to cold related medical emergencies or death.

In Concord, New Hampshire there are on average 21 days below 32 degrees Fahrenheit in November, 29 days in December, 30 days in January, 27 days in February, and 26 days in March. The coldest temperatures recorded for each month were –5 degrees Fahrenheit in November, -22° in December, -33° in January, -37° in February, and -16° in March. (Northeast Regional Climate Center)

All areas of Weare would be affected by extreme cold, in its event. Particular areas and populations at a greater risk are:

- elderly populations and day care centers;
- power system that may become overburdened; and
- low-income populations.

Moderate to high probability for extreme cold to occur and cause minimal damage in Weare.

A GIS-generated map, following this page, was prepared to illustrate the Identified Hazard Zones.