

**TOWN OF WASHINGTON,
NEW HAMPSHIRE**

HAZARD MITIGATION PLAN



Halfmoon Pond Road culvert flooding – July 2021



Upper Valley Lake Sunapee
Regional Planning Commission

Update September 2021



Town of Washington
Hazard Mitigation Committee

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
A.	BACKGROUND.....	1
B.	PURPOSE	1
C.	HISTORY	1
D.	SCOPE OF THE PLAN.....	2
E.	METHODOLOGY	2
F.	HAZARD MITIGATION GOALS.....	6
G.	ACKNOWLEDGEMENTS	7
II.	COMMUNITY PROFILE.....	8
A.	INTRODUCTION.....	8
B.	DEVELOPMENT TRENDS	10
III.	HAZARD IDENTIFICATION.....	14
A.	WHAT ARE THE HAZARDS IN WASHINGTON?.....	14
B.	DESCRIPTIONS OF HAZARDS	15
	<i>Dam Failure.....</i>	<i>15</i>
	<i>Flooding.....</i>	<i>19</i>
	<i>Erosion.....</i>	<i>23</i>
	<i>Tropical/Post-Tropical Storms.....</i>	<i>24</i>
	<i>High Wind Event.....</i>	<i>27</i>
	<i>Thunderstorms/Lightning/Hail.....</i>	<i>29</i>
	<i>Drought.....</i>	<i>32</i>
	<i>Extreme Temperatures</i>	<i>35</i>
	<i>Wildfire</i>	<i>39</i>
	<i>Severe Winter Weather.....</i>	<i>40</i>
	<i>Solar Storms and Space Weather.....</i>	<i>45</i>
	<i>Earthquake.....</i>	<i>47</i>
	<i>Natural Water & Air Contaminants</i>	<i>49</i>
	<i>Hazardous Materials Spills.....</i>	<i>52</i>
	<i>Terrorism</i>	<i>53</i>
	<i>Infectious Diseases.....</i>	<i>53</i>
C.	HAZARD RISK RATINGS	57
	<i>Assessing Probability.....</i>	<i>57</i>
	<i>Assessing Vulnerability</i>	<i>58</i>
	<i>Assessing Risk</i>	<i>59</i>
IV.	CRITICAL FACILITIES/LOCATIONS.....	61

V.	DETERMINING HOW MUCH WILL BE AFFECTED.....	63
A.	IDENTIFYING VULNERABLE FACILITIES	63
B.	IDENTIFYING VULNERABLE SPECIAL POPULATIONS	63
C.	POTENTIAL LOSS ESTIMATES.....	64
	<i>Dam Failure – Low Risk - \$4.7 Million Estimated Cost</i>	<i>64</i>
	<i>Flooding – Low/Medium Risk - \$6.4 Million Estimated Cost</i>	<i>64</i>
	<i>Erosion – Low/Medium Risk – No Recorded or Estimated Cost.....</i>	<i>64</i>
	<i>Tropical/Post-Tropical Storms – Medium Risk – \$1.2 Million Estimated Cost.....</i>	<i>64</i>
	<i>High Wind Events –Medium Risk – \$1.2 Million Estimated Cost.....</i>	<i>65</i>
	<i>Thunderstorm/Lightning/Hail –Low/Medium Risk – No Recorded or Estimated Cost.....</i>	<i>65</i>
	<i>Drought – Low/Medium Risk – No Recorded or Estimated Cost.....</i>	<i>65</i>
	<i>Extreme Temperatures – Low/Medium Risk – No Recorded or Estimated Cost.....</i>	<i>65</i>
	<i>Wildfire – Medium Risk – \$590,000 Estimated Cost.....</i>	<i>65</i>
	<i>Severe Winter Weather – Low/Medium Risk – No Recorded or Estimated Cost</i>	<i>66</i>
	<i>Solar Storms and Space Weather - Low Risk – No Recorded or Estimated Costs.....</i>	<i>66</i>
	<i>Earthquake – Low Risk - \$1.3 million Estimated Cost if All Buildings Impacted.....</i>	<i>66</i>
	<i>Natural Contaminants – Low/Medium Risk – No Recorded or Estimated Cost.....</i>	<i>67</i>
	<i>Hazardous Material Spills –Low/Medium Risk – No Recorded or Estimated Cost</i>	<i>67</i>
	<i>Terrorism – Low Risk – No Recorded or Estimated Cost</i>	<i>67</i>
	<i>Infectious Disease – Low/Medium - No Recorded or Estimated Cost.....</i>	<i>67</i>
VI.	MITIGATION PROGRAMS AND ACTIONS	68
A.	MITIGATION ASSESSMENT AND ACTION NEEDS	68
B.	HAZARD MITIGATION PROGRAM ASSESSMENT	69
C.	EXISTING AND PROPOSED HAZARD MITIGATION ACTIONS	70
D.	CRITICAL EVALUATION FOR IMPROVEMENTS TO EXISTING PROGRAMS AND NEW ACTIONS	74
E.	PRIORITIZED IMPLEMENTATION SCHEDULE	76
VII.	78
VIII.	EMERGENCY PREPAREDNESS ACTIONS.....	78
IX.	ADOPTION & IMPLEMENTATION OF THE PLAN	80
A.	IMPLEMENTATION THROUGH EXISTING PROGRAMS	80
B.	CONTINUED PUBLIC INVOLVEMENT	82

TABLES

Table II-1: AREA POPULATION TRENDS	12
Table II-2: POPULATION GROWTH IN WASHINGTON	12
Table II-3: POPULATION PROJECTIONS FOR WASHINGTON	12
Table II-4: BUILDING PERMITS AND SUBDIVISIONS BY YEAR	13
Table III-1: DAMS	16
Table III-2: NH DAM CLASSIFICATIONS	18
Table III-3: FLOODING.....	21
Table III-5: HURRICANES & TROPICAL STORMS.....	25
Table III-6: HIGH WIND EVENTS IN OR NEAR SULLIVAN COUNTY	28
Table III-7: ENHANCED FUJITA SCALE	29
Table III-8: LIGHTNING ACTIVITY LEVEL	31
Table III-9: THUNDERSTORM/LIGHTNING/HAIL	32
Table III-10: DROUGHT	34
Table III-11: DROUGHT MEASUREMENT	35
Table III-12: EXTREME TEMPERATURE EVENTS.....	38
Table III-13: SEVERE WINTER WEATHER.....	42
Table III-14: RICHTER SCALE and MERCALLI INTENSITY	47
Table III-15: EARTHQUAKES	48
Table III-16: RADON.....	50
Table III-17: INFECTIOUS DISEASE MEASUREMENT.....	54
Table III-18: ACTIONS TO REDUCE RISK OF INFECTIOUS DISEASE	55
Table III-19: INFECTIOUS DISEASE EVENTS.....	56
Table III-20: RISK AND PROBABILITY OF HAZARD IN SULLIVAN COUNTY - 2018 NH NATURAL HAZARDS MITIGATION PLAN	57
Table III-21: VULNERABILITY OF EXISTING DEVELOPED AREAS.....	58
Table III-22: RISK ASSESSMENT	60
Table IV-1: EMERGENCY RESPONSE FACILITIES, SERVICES & STRUCTURES	61
Table IV-2: NON-EMERGENCY RESPONSE FACILITIES & STRUCTURES	62
Table IV-3: FACILITIES & POPULATIONS TO PROTECT	62
Table V-1: VULNERABILITY OF EXISTING DEVELOPED AREAS.....	63
Table V-2: VULNERABILITY OF POTENTIAL DEVELOPMENT	63

Table VI-1: COMMITTEE ASSESSMENT FOR HAZARD MITIGATION ACTIONS	68
Table VI-2: EXISTING HAZARD MITIGATION PROGRAMS.....	69
Table VI-3: EXISTING AND PROPOSED MITIGATION ACTIONS	70
Table VI-4: PUBLIC EDUCATION AND OUTREACH TOPICS	73
Table VI-5: PRIORITIZED IMPLEMENTATION SCHEDULE FOR EXISTING AND PROPOSED PROGRAM IMPROVEMENTS	76
Table VII-1: EMERGENCY PREPAREDNESS ACTIONS & PROPOSED IMPROVEMENTS	78

FIGURES

Figure III-1: HAIL SIZE COMPARISON CHART	30
Figure III-2: DROUGHT MAPS Figure III-3: PALMER DROUGHT INDEX	33
Figure III-4: HEAT INDEX.....	36
Figure III-5: WIND CHILL	37
Figure III-6: SCALED PREDICTIVE ICE STORM AFTERMATH INDEX.....	41
Figure III-7: RADIO BLACKOUTS SCALE	46
Figure III-8: MAP OF RADON ZONES	51

APPENDICES

Appendix A:	Technical Resources
Appendix B:	Hazard Mitigation Assistance Grants
Appendix C:	Meeting Documentation
Appendix D:	Map of Hazard Areas and Critical Facilities
Appendix E:	Town Adoption & FEMA Approvals of Hazard Mitigation Plan

I. INTRODUCTION

A. BACKGROUND

The New Hampshire Homeland Security and Emergency Management (NH HSEM) has a goal for all communities within the State of New Hampshire to establish local hazard mitigation plans as a means to reduce future losses from natural or man-made hazard events before they occur. The NH HSEM has provided funding to the Town of Washington, to update their local Hazard Mitigation Plan. UVLSRPC wrote the first Washington Hazard Mitigation Plan that was approved in 2004 and an update that was approved in 2010 and in 2016. The *Washington Hazard Mitigation Plan Update 2021* serves as a strategic planning tool for use by the Town of Washington in its efforts to reduce future losses from natural and/or man-made hazard events before they occur.

The Washington Hazard Mitigation Committee updated the *Washington Hazard Mitigation Plan* with the assistance and professional services of the Upper Valley Lake Sunapee Regional Planning Commission (UVLSRPC). After a public meeting held in the Washington Town Offices, the Washington Town Select Board adopted the updated plan on _____, 2021 as shown in Appendix E.

B. PURPOSE

The Washington Hazard Mitigation Plan Update 2021 is a planning tool for use by the Town of Washington in its efforts to reduce future losses from natural and/or man-made hazards. This plan does not constitute a section of the Town Master Plan, nor is it adopted as part of the Zoning Ordinance.

C. HISTORY

On October 30, 2000, President Clinton signed into law the Disaster Mitigation Act of 2000 (DMA 2000). The ultimate purpose of DMA 2000 is to:

- Establish a national disaster mitigation program that will reduce loss of life and property, human suffering, economic disruption, and disaster assistance costs resulting from disasters, and
- Provide a source of pre-disaster mitigation funding that will assist States and local governments in accomplishing that purpose.

DMA 2000 amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act by, among other things, adding a new section: 322 – Mitigation Planning. This places new emphasis on local mitigation planning. It requires local governments to prepare and adopt jurisdiction-wide hazard mitigation plans as a condition to receiving any hazard mitigation grants. Local governments must review and if necessary, update the mitigation plan annually to continue program eligibility.

Why develop a Mitigation Plan?

Planning ahead to lessen or prevent a disaster will reduce the human, economic, and environmental costs. The State of NH is vulnerable to many types of hazards, including floods, hurricanes, winter storms, wildfires, wind events, and earthquakes. All of these types of events can have significant economic, environmental, and social impacts. The full cost of the damage resulting from the impact of natural hazards – personal suffering, loss of lives, disruption of the economy, and loss of tax base – is difficult to quantify and measure.

D. SCOPE OF THE PLAN

The scope of the *Washington Hazard Mitigation Plan Update 2021* includes the identification of natural hazards affecting the Town, as identified by the Washington Hazard Mitigation Committee. The hazards were reviewed for relevance to the Town including the following categories as outlined in the *State of New Hampshire Multi-Hazard Mitigation Plan Update 2018*:

- Avalanche
- Flooding
- Drought
- Earthquake
- Extreme Temperatures
- High Wind Events
- Infectious Diseases
- Landslide
- Lightning
- Severe Winter Weather
- Solar Storms and Space Weather
- Wildfire

E. METHODOLOGY

Neighboring town officials were invited to participate or contribute to the planning process. The individuals who attended the meetings, the Washington Hazard Mitigation Committee, UVLSRPC staff, and the Field Representative from NH HSEM developed the content of the *Washington Hazard Mitigation Plan Update 2021* by tailoring the nine-task process set forth in the *Local Mitigation Planning Handbook by FEMA (2013)* appropriate for the Town of Washington. Many FEMA resources and multiple State and Federal websites were also used as well. The Committee held a total of three posted meetings in 2021. All meetings were posted inviting the general public. Though notices invited the general public to participate, no public attended the meetings except for a member of the Town of Goshen Select Board. All of these meetings occurred during the COVID-19 pandemic. The Town offices were open to the public at

the time of the meetings. The UVLSRPC staff email address and phone number was on the public notice for questions. Appendix C provides a list of those in attendance on the meetings.

Municipal officials from surrounding towns were also invited to participate.

Prior to the Town of Washington approving the updated Plan, a public meeting was held at a regular Select Board meeting to gain additional input from the citizens of Washington and to raise awareness of the ongoing hazard mitigation planning process. A Town of Goshen selectman attended the first meeting.

The following hazard mitigation meetings were vital to the development of this Plan:

June 17, 2021

June 24, 2021

July 15, 2021

To complete this updated Plan, the Hazard Mitigation Committee adhered to the following planning tasks to re-evaluate the plan sections of the existing 2016 plan and to update it to reflect current information and issues:

Task 1: Determine the Planning Area and Resource (June 2021)

Washington is a rural town and chose to continue their planning process as a single town. The Town chose to work with the Upper Valley Lake Sunapee Regional Planning Commission to provide technical support.

Task 2: Build the Planning Team (June 2021)

Members of the Committee included all relevant personnel as well as any interested citizens. This included municipal emergency personnel and Select Board member to represent municipal organizations with general, emergency preparedness and response authority.

Task 3: Create an Outreach Strategy (June-July 2021)

The Committee chose to provide public notices to the public to encourage participation at the public meetings. They also put a notice on the town website. Notices were also sent to each of the neighboring towns to invite them to participate in the meetings or send comments. The final plan will also be available for public review prior to adoption.

Task 4: Review Community Capabilities (June 2021)

Committee members identified facilities that were considered to be of value to the Town for emergency management purposes, for provision of utilities and services, and for historic, cultural and social value. A GIS-generated map was prepared to show critical

facilities identified by the Washington Hazard Mitigation Committee. A summary listing of “Critical Facilities” is presented in Chapter IV. Costs were determined for losses for each type of hazard. Using information and activities in the handbook, the Committee and UVLSRPC staff identified existing mitigation strategies which are already implemented in the Town related to relevant hazards. A summary chart and the results of this activity are presented in Chapter VI.

Task 5: Conduct a Risk Assessment (June 2021):

The Committee determined natural and human-made hazards affecting the Town and updated a description, location, and extent of those previous and potential hazards. Existing and future assets were updated to determine vulnerability to potential hazard events. Critical facilities needed during an emergency were identified and given values based on tax data. It was also determined if these facilities are in a hazard zone or not. Other facilities identified are those needed to continue the daily operation of the municipality and those that have dense populations or valued historical structures and vulnerable natural areas.

Task 6: Develop a Mitigation Strategy (June-July 2021):

The Committee evaluated the goals in the previous plan and determined they were still appropriate. They then determined actions that they could take to meet those goals to reduce their risk to hazard events. They discussed existing regulations, ordinances, and the Master Plan and how they could continue to incorporate hazard mitigation strategies into these documents to include hazard mitigation in land use planning. Committee members agreed to pursue this integration with appropriate municipal boards.

Task 7: Keep the Plan Current:

The plan will be reviewed after every major event to evaluate the effectiveness of the plan. It will also be updated at least every five years as required.

Task 8: Review and Adopt the Plan:

The Committee will incorporate any feedback from Committee members, municipal officials, residents, businesses and institutions, and neighboring communities. The plan will be assessed by using FEMA’s Local Mitigation Plan Review Tool prior to sending to NH Homeland Security and Emergency Management for preliminary review. If HSEM considers the plan to meet the requirements, they will forward the draft plan to FEMA for their review. Once FEMA determines the plan meets requirements, the municipality will hold a public meeting to obtain further comments and review the final draft. If there are no major suggested changes, the municipal government will adopt the plan and the adoption form will be sent to HSEM and then to FEMA to receive a final approval of the plan.

Task 9: Create a Safe and Resilient Community:

The municipality will implement the plan by committing to task accomplishment as indicated in the plan. The municipality will take advantage of available funding opportunities such as FEMA's mitigation grant programs. The process for monitoring and updating the Plan can be found in Chapter IX.

UVLSRPC staff compiled the results of tasks one through nine in a draft document, as well as helpful and informative materials from the *State of New Hampshire Multi-Natural Hazard Mitigation Plan Update 2018*, which served as a resource for the *Washington Hazard Mitigation Plan Update 2021*.

F. HAZARD MITIGATION GOALS

The Washington Hazard Mitigation Committee reviewed the hazard mitigation goals set forth in the previous Hazard Mitigation Plan and revised them as follows:

1. To identify, introduce and implement cost effective Hazard Mitigation measures so as to accomplish the Town's goals and to raise awareness and acceptance of hazard mitigation opportunities generally.
2. To improve upon the protection of the general population, the citizens, and visitors of the Town of Washington from natural and human-made hazards.
3. To reduce the potential impact of natural and human-made disasters to:
 - the Town of Washington's Critical Support Services,
 - Critical Facilities in the Town of Washington,
 - the Town of Washington's infrastructure,
 - private property,
 - the Town's economy,
 - the Town's natural environment, and
 - the Town's specific historic treasures and interests.
4. To improve the Town's Disaster Response and Recovery capability as a hazard mitigation strategy to be prepared for emergencies and reduce their impact.

G. ACKNOWLEDGEMENTS

The following people participated in developing the update of this plan as the Hazard Mitigation Committee:

- Shawn Atkins, Town of Washington Fire Chief
- Cynthia Dressel, Town of Washington Emergency Management Director
- Mark Dressel, Town of Washington Emergency Management Deputy/Police Officer
- Allan Dube, Town of Washington Selectman
- Donald Revane, Town of Washington Selectman
- Tom Marshall, Town of Washington Selectman
- Ed Thayer, Town of Washington Department of Public Works Director
- Victoria Davis, Planner, Upper Valley Lake Sunapee Regional Planning Commission

The Hazard Mitigation Committee was composed of local officials, citizens of Washington and a staff representative of the UVLSRPC for meeting facilitation and plan development.

Historical information, relevant data and potential future mitigation strategies were contributed by all parties involved in the planning process. For a record of all meeting topics see Appendix C: Meeting Documentation. The staff representative of the UVLSRPC gathered all information from local officials, agency representatives and public input and compiled the information to develop the Plan.

II. COMMUNITY PROFILE

A. INTRODUCTION¹



Washington, a town of about 53 sq. mi., lies in the southeast corner of Sullivan County some twenty miles west of Concord. Its rugged hills form two watersheds: via the Ashuelot River, the west slopes drain to the Connecticut, while drainage on the east flows to the Merrimack via the north branch of the Contoocook. The largest of Washington's 26 lakes and ponds are Ashuelot Pond (about 430 acres), Island Pond (200), Highland Lake (190 in Washington, the remainder in Stoddard), Millen Pond (150) and Halfmoon Pond (80).

Washington includes two villages: The town center has an elevation of 1507 feet, while East Washington is at 939 feet. The highest summit is Lovell Mountain, at 2496 feet, but several others reach to about 2000 feet. It is a rocky town, with many large boulders, outcrops and areas of ledge underlying stony loam. Maple, beech, birch, red oak, ash, red spruce, hemlock and scattered stands of white pine cover some 90% of the town. The mix of forest, farms, fields, ponds and wetlands is much admired by both residents and visitors.

Wildlife is both indigenous and migratory, but poorly planned development threatens the habitat. In Pillsbury State Park is a small rookery of Great Blue Herons, and other habitats could be protected by better forestry and agricultural management. The forest is one of the town's major assets. It stabilizes the soil,

retards runoff, provides habitat, buffers sound and wind, enhances the scenery, and is a wood source for both industry and fuel, but it is gradually disappearing as land ownership becomes more fragmented. Two thirds of the taxable land (about 23,800 acres) is forest, capable of repeated crops of wood. State (8000 acres) and town (500 acres) forests continue to be managed in ways that are compatible with town goals, but smaller tracts are vulnerable to growth pressures.

¹ Town of Washington Master Plan (2015)

The town's largest landowner is the State. Pillsbury State Park, about 5,000 acres, is largely in Washington, and the State also owns the 500 acre Max Israel tract about half a mile east of the park. Other public lands include the commons in the two villages, the town garage and transfer station, the roadways, and the 138-acre lakeshore recreation area known as Camp Morgan.

The town has 16 owners of tracts of more than 200 acres, four of whom are organizations rather than individuals; about 248 owners of 10 – 200-acre tracts; and 100 owners of tracts between 2 and 10 acres. Smaller lots number 1,063, many in lakeside communities planned for summer cottages that are gradually being winterized. Maps have been prepared by the Upper Valley Lake Sunapee Regional Planning Commission showing a variety of natural features. Incorporated in this Master Plan by reference, these maps may be seen in the Town Hall, or on the Town web site (www.washingtonnh.org). One of them addresses soil types that are suitable for agriculture; only 5% of the total town area, these soils are largely in the two villages and the Faxon Hill area.

Only ten to fifteen percent of the town is suitable for industrial or commercial development, These areas are defined by their slopes (less than 9%), good drainage, lack of ledge and the fact that they are not subject to flooding. Approximately 30-35%, of the land in town is suitable for houses with basements. This land has a slope of less than 16%, is not in a flood plain and is not poorly drained.

Steeper slopes, up to 50%, cover about a quarter of the town, including much of Lovewell Mountain, the northern corners of the town, Oak Hill and a line running northeast from Ames Hill to the town line.

Washington has more than 75 streams, evenly distributed except for Lovewell Mountain and part of Pillsbury, where streams are fewer. The maps show which of these streams are subject to overflow and land that is typically moist – about 10% of the town.

Another result of the County's analysis of soil types was the finding of eight possible gravel pits, leading to a potential supply of road gravel.

Route 31 runs through the Town of Washington and is the major thoroughfare, connecting to Route 10 to the north in Goshen and to Route 9 to the south in Hillsborough. In addition, Lempster Mountain Road and East Washington Road connect Washington to surrounding towns.

A three-member Board of Selectmen governs the Town of Washington. There is a volunteer Fire Department, full-time Police Department, Rescue Squad, paid Health Officer and a full-time Road Agent and Department. The Planning Board has elected members and the Conservation Commission is appointed by the Select Board. The Concord Hospital in Concord is the most used hospital from Washington and is about 34 miles from Washington. There are no central water or sewage collection systems; the residents rely on individual wells and septic systems.

B. DEVELOPMENT TRENDS

Development in Washington is primarily residential, split between year-round and seasonal use. The 2000 Census data show that 53% of the homes are seasonal. The majority of those are clustered on relatively small lots around five of the town's twenty-some ponds - Ashuelot Pond, Island Pond, Highland Lake, Millen Pond and Halfmoon Pond.

Lake Ashuelot Estates (LAE), on the eastern shore of Ashuelot Pond, was developed in the late 1960s, prior to any land use regulations in Washington. With an original total of 482 lots, this is by far the largest single development in town. It is serviced by eleven miles of private roads, which are maintained by the homeowners' association. As the year-round population in this area increases, there is pressure to have the town take over the roads. LAE is accessible via a paved town road and a dirt road with their junction at the entrance to the development.

The average lot size in Lake Ashuelot Estates is approximately one acre. To date, a majority of the lots have been built on. The main section of development, which abuts the pond, consists of lots averaging about 3/4 of an acre and is mostly built out. Another section that is further away from the pond for the most part cannot be developed due to high incidence of ledge. The northern section, along the east bank of the Ashuelot River, has many open lots which range from one to two acres. While the lots within this development are generally undersized, most of the homes are substantial – not just small summer “camps.” Many people have built homes to be used as summer residences for a time, with the intention of eventually using them as their retirement homes. Lately there has been a trend toward construction of year-round homes on available lots. Obviously, as the population continues to age, there is potential for this trend to continue. The town has taken ownership of a number of lots for non-payment of back taxes, in some cases because the owner couldn't build due to unsuitability for sewage disposal purposes. In recent years, the town has sold most of these non-buildable lots to abutters who have merged them to their properties, making them unavailable as potential building lots.

Island Pond was also developed in the late 1960s and consists of water front lots of less than one acre and off shore lots of three acres or more. Many of the homes are substantial but for the most part are for seasonal use. There are currently about 150 lots on the east side of the pond, but there is potential for future subdivision on the west side, greatly increasing the size of the overall developed area around the pond.

The west side of Highland Lake was subdivided into some 50 lots in the 1930s, and consists mostly of summer camps which are winterized, although a few houses built there during the last twenty years are substantial, year-round homes. There are many trailers in the area, which due to recent changes in State Law and the Land Use Ordinance must each have its own septic disposal system. This is

a heavily populated area in the summer and the town was forced in the early 1990s to take over the main access road, Valley Road, which was formerly private, due in part to the number of properties that it serves Highland Haven, a development on the east side of Highland Lake contains some 75 lots, most of them not built on. There are about 10 lots on the shore of the lake which are small (1/2 acre or less) the remainder being two acres or more. Just south of this there is another 10-lot subdivision, approved in the early 1990s, while further south along the lake there is Highland Forest, a subdivision of some 40 ten-acre lots, which is actually close to if not south of the Washington/Stoddard town line. Most of these lots are not yet built on.

Millen Pond has many homes around it, many dating from early in the last century, some seasonal and some year-round, on a total of 55 lots. Camp Morgan, a town-owned recreational facility, occupies a good deal of the northeastern shore of the pond. There are very few remaining developable lots around the pond.

Halfmoon Pond has a few older summer cottages along the south eastern shore, but there is potential for a future sizable development along the western shore. A subdivision around Freezeland Pond was approved in 1990, consisting of 26 lots, ranging in size from 5 to 20 acres, but none has been built on. South of this, around Smith Pond, a subdivision of 10 to 15 lots has been created, with only about one half of the lots being developed to date with substantial homes on them and only a few occupied year-round.

There are three major subdivisions in town which are not located on or near a body of water: Washington Heights, Martin Road and Sandy Knolls Road. These subdivisions all have larger lots (5 to 10 acres) and are geared toward year-round residences. Washington Heights has 28 lots off Lempster Mountain Road, with an additional eight lots on Route 31. About three-quarters of the lots in this subdivision have been built on, including a few seasonal homes. The Martin Road subdivision is on the western side of Lovell Mountain; there are a few houses, occupied year-round, and also a couple of summer camps. The potential is there for this subdivision to be improved and fully occupied by year-round residents. Sandy Knolls Road, off Mountain Road in East Washington, consists of 18 lots, 5 of which have year-round homes; the remainder is as yet undeveloped. The status of these three developments has not substantially changed in the last ten years. A new subdivision was approved between Mill Street and East Washington Road consisting of 13 lots of approximately five acres. Only a few homes have been built on these lots so far.

There is still a lot of potential for future subdivisions in Washington, totaling perhaps as much as 1000 seasonal or year-round homes, which eventually could more than double the town's present population. However, because of the minimum requirements of the present Land Use Ordinance and septic disposal designs it would appear that there can no longer be a summer cottage type development. The earliest projects in town were designed for purely summer use and did not have regulations to control them. There are no public water or sewer services in Washington, with all lots depending on individual wells and septic systems, and it is conceivable that a higher density of homes could lead to future groundwater pollution problems. A recent rise in the number of building permit applications, should the trend continue, could be cause for concern that the next ten or twenty years could bring on

problems influencing the safety and quality of life in sections of Washington. On the other hand, with so many empty lots in subdivisions already approved, it is unlikely that additional major subdivisions would be easily marketable, unless they had some amenity not found in existing developments. With so few available water front lots there may, however, be a certain amount of pressure on land near other as yet undeveloped ponds.

Commercial or industrial land use is presently limited to the general store, the post office and a few small businesses scattered throughout the town. There are no industrial businesses in town. As a whole, the development patterns, and expected development, of Washington are not perceived to have increased the vulnerability of Washington to the hazards identified in this plan. The committee believes the vulnerabilities in the future will stay consistent and that new development will not cause any further risk to the town.

Table II-1: AREA POPULATION TRENDS

Area	1980	1990	2000	2010	2020
Washington	411	629	907	1,123	1,192
Goshen	549	718	744	810	796
Lempster	637	948	976	1,154	1,118
Acworth	590	776	836	891	853
Marlow	542	650	727	742	743
Unity	1,092	1,341	1,530	1,671	1,518
Sullivan County	36,063	38,592	40,458	42,093	43,063
New Hampshire	920,475	1,109,252	1,235,786	1,315,000	1,377,529

Source: US Census

Table II-2: POPULATION GROWTH IN WASHINGTON

	1980	1990	2000	2010	2020
Population	411	629	907	1,123	1,192
Decade Change in Population		53%	44%	24%	6.14%

Source: 1980 – 2010 US Censuses & NH OSI

Table II-3: POPULATION PROJECTIONS FOR WASHINGTON

Area	2015	2020	2025	2030	2035	2040
Washington	1,226	1,192	1,205	1,221	1,229	1,230
Change in Population	2.9%	-2.8%	1.1%	1.3%	0.7%	0.0%

Source: NH Office of Development and Energy September 2016; US Census 2020

Table II-4: BUILDING PERMITS AND SUBDIVISIONS BY YEAR

Year	Building Permits		Subdivisions	
	Residential	Commercial	Number of Subdivisions	Number of Lots
2010	11	0	0	0
2011	11	0	0	0
2012	9	0	0	0
2013	10	0	0	0
2014	7	0	0	0
2015	4	0	0	0
2016	56	0	0	0
2017	48	0	0	0
2018	51	0	0	0
2019	59	0	0	0
2020	92	0	0	0

III. HAZARD IDENTIFICATION

The Washington Hazard Mitigation Committee reviewed the list of hazards provided in the *State of New Hampshire Multi-Hazard Mitigation Plan Update 2018* and hazard history for the State of New Hampshire and Sullivan County in particular. A list of past hazard events in Washington, Sullivan County, and the State of New Hampshire can be found in the following discussion and tables. After reviewing this information and the Emergency Operations Plan, the Committee conducted a Risk Assessment. The resulting risk designations are provided in the heading of each hazard table below as well as a more detailed discussion further into this chapter.

A. WHAT ARE THE HAZARDS IN WASHINGTON?

Washington is prone to a variety of natural and human-made hazards. The hazards that Washington is most vulnerable to were determined through gathering historical knowledge of long-time residents and town officials; research into the CRREL Ice Jam Database, FEMA and NOAA documented disasters, and local land use restrictions; and from the input of representatives from state agencies (NH HSEM). The hazards potentially affecting the Town of Washington are shown in the table below. Each of these hazards and the past occurrences of these hazards are described in the following sections.

The Hazard Mitigation Committee evaluated newly defined State natural hazards and the hazards provided in the 2016 Washington Hazard Mitigation Plan. They adapted names of hazards to coincide with the State definitions (Hurricanes to Tropical/Post-Tropical Storms and Tornado & Downburst to High Wind Event), added Infectious Disease and Solar Storms and Space Weather. The Committee determined that avalanche and landslide are not relevant to Washington as they have never occurred. Although there are steep slopes in Washington, they are not to the grade conducive of avalanches or landslides. They retained evaluations of Natural Contaminants, Hazardous Materials Spills, and Terrorism although they are no longer required by the State. Here are the hazards evaluated in this plan:

- Dam Failure
- Flooding
- Erosion
- Tropical/Post-Tropical Storms
- High Wind Events
- Thunderstorm/Lightning/Hail
- Drought
- Extreme Temperatures
- Wildfire
- Severe Winters
- Solar Storms and Space Weather
- Earthquake
- Natural Contaminants
- Hazardous Materials Spill
- Terrorism
- Infectious Disease

B. DESCRIPTIONS OF HAZARDS

An assessment of each hazard relevant to Washington is provided below. An inventory of previous and potential hazards is provided. Past events are shown in the following tables and the potential for future events is then discussed. The “risk” designation for each hazard was determined after evaluations discussed later in this chapter.



Dam Failure

Dam Failures result in rapid loss of water that is normally held by the dam. These kinds of floods pose a significant threat to both life and property. Appendix D shows the location of active dams in Claremont. HDES assigns a hazard designation to each dam in the state depending upon the potential damage it would cause if the dam failed: 1.) A “high hazard potential” is indicated if the dam is in a location and of a size that failure or mis-operation of the dam would result in the following: major economic loss to structures or property; structural damage to roads; major environmental; or public health losses; and probable loss of human life. 2.) A “significant hazard potential” would mean the dam is in a location and of a size that failure or mis-operation of the dam would result in any of the following: major economic loss to structures or property; structural damage to roads; major environmental or public health losses. 3.) A “low” hazard dam failure could cause some structural damage to buildings and roads. 4.) A “non-menace” dam failure would not cause any significant damage. Also see Table III-2.

Past Dam Failures

There have been no dam failures within the Town of Washington or outside the town that would have affected the Town of Washington.

Potential Future Dam Failures

Although there are 27 dams in Washington, there are no “high” and three “significant” hazard dams within town. There are three “low hazard potential” dams, and nine non-menace dams. The remainder are inactive although a few are “exempt.” All active dams are shown on a map in Appendix D and all dams are listed in a table below. There are no dams outside of Washington that will affect the Town of Washington if they fail.

There are currently an estimated 170 parcels with at least a portion of the lot within a dam inundation area.

The committee determined that the Dam Failure risk in Washington to be low.

Table III-1: DAMS

Dam #	Class	Dam Name	Water Body	Owner (Now or Formerly)	Status	Impoundment Area in Acres	Height of Dam (Ft)	Tax Map & Lot
245.1	S	May Pond Dam	Ashuelot River	NH DNCR	Active	158	14	
245.2		Halfmoon Pond Dam	Bog Brook	Miriam O'Keefe	Ruins	130	3	
245.3	L	Island Pond Dam	Tr Beards Brook	Washington Lake Association	Active	194	13	
245.4	S	Millen Lake Dam	Tr Ashuelot River	Millen Lake Association	Active	156	23	
245.5	S	Ashuelot Pond Dam	Ashuelot River	Ashuelot Pond Dam Village District	Active	360	13	15
245.6	NM	Ashuelot River	Ashuelot River	L Harry Mason	Active	9.6		14-506
245.7		Highland Lake Dike	Shedd Brook	NH DES Water Division	Ruins	711	8	
245.8		Morey Dam	Half Moon Pond Brook	David E Vibber	Ruins			
245.9	L	Robinson Pond Dam	Island Pond Brook	Miles Gelatt	Active	1	10	
245.10		Beards Brook Dam	Beards Brook	Joseph Perez	Breached		8	13/16
245.11	L	East Washington Dam	Beards Brook	NH DES Water Division	Active	3.2	10	
245.12		Pine Brook Dam	Pine Brook	Eccardt Farms Inc	Removed		3	
245.13		Mill Pond Dam	Ashuelot River	NH DNCR	Exempt	21	3	
245.14		North Pond Dam	Ashuelot River	NH DNCR	Ruins	53	2.5	
245.15		Cemetery Brook	Cemetery Brook	Clarissa Drew	Exempt	1	5	
245.16	NM	Ulrich Dam	Tr Purlingbeck Brook	Unknown	Active	0.25	13	
245.17	NM	Recreation Pond	Tr Woodward Brook	Donald McGranahan	Active	0.5	8	
245.18	NM	Onnela Dam	Cemetery Brook	Katherine Onnela	Active	0.87	9	
245.19	NM	Perley Crane Farm Pond Dam	Fool Brook	Crane Farm Inc	Active	0.2	8	
245.20		Wildlife Pond Dam	Shedd Brook	Cameron K Wehringer	Not built	3	3	

Dam #	Class	Dam Name	Water Body	Owner (Now or Formerly)	Status	Impoundment Area in Acres	Height of Dam (Ft)	Tax Map & Lot
245.21	NM	Wildlife Pond Dam	Unnamed Brook	Sumner A Dole Jr	Active	1.1	13	
245.22		Wildlife Pond	Unnamed Stream	Unknown	Exempt	0.84	5	
245.23		Woodbury Dam	Unnamed Stream	Bruce Woodbury	Exempt	0.01	2	
245.24	NM	Howe Rec Dam	Dinky Pond	John Howe	Active	1	6	
245.25	NM	Saunders Dam	Tr To Ashuelot River	Bradford O Saunders	Active	1.2	6	
245.26		Fonda Dam	Unnamed Stream	Mrs Robert Hamill	Exempt	0.3	4	
245.27	NM	Detention Pond	Runoff	Joseph Carrafa	Active	0.53	9	

Table III-2: NH DAM CLASSIFICATIONS

Non-Menace structure means a dam that is not a menace because it is in a location and of a size that failure or mis-operation of the dam would not result in probable loss of life or loss to property, provided the dam is:

- Less than six feet in height if it has a storage capacity greater than 50 acre-feet; or
- Less than 25 feet in height if it has a storage capacity of 15 to 50 acre-feet.

Low Hazard structure means a dam that has a low hazard potential because it is in a location and of a size that failure or mis-operation of the dam would result in any of the following:

- No possible loss of life.
- Low economic loss to structures or property.
- Structural damage to a town or city road or private road accessing property other than the dam owner's that could render the road impassable or otherwise interrupt public safety services.
- The release of liquid industrial, agricultural, or commercial wastes, septage, or contaminated sediment if the storage capacity is less than two-acre-feet and is located more than 250 feet from a water body or water course.
- Reversible environmental losses to environmentally-sensitive sites.

Significant Hazard structure means a dam that has a significant hazard potential because it is in a location and of a size that failure or mis-operation of the dam would result in any of the following:

- No probable loss of lives.
- Major economic loss to structures or property.
- Structural damage to a Class I or Class II road that could render the road impassable or otherwise interrupt public safety services.
- Major environmental or public health losses, including one or more of the following:
 - Damage to a public water system, as defined by RSA 485:1-a, XV, which will take longer than 48 hours to repair.
 - The release of liquid industrial, agricultural, or commercial wastes, septage, sewage, or contaminated sediments if the storage capacity is 2 acre-feet or more.
 - Damage to an environmentally-sensitive site that does not meet the definition of reversible environmental losses.

High Hazard means a dam that has a high hazard potential because it is in a location and of a size that failure or mis-operation of the dam would result in probable loss of human life as a result of:

- Water levels and velocities causing the structural failure of a foundation of a habitable residential structure or commercial or industrial structure, which is occupied under normal conditions.
- Water levels rising above the first floor elevation of a habitable residential structure or a commercial or industrial structure, which is occupied under normal conditions when the rise due to dam failure is greater than one foot.
- Structural damage to an interstate highway, which could render the roadway impassable or otherwise interrupt public safety services.
- The release of a quantity and concentration of material, which qualify as "hazardous waste" as defined by NH RSA 147-A:2 VII.
- Any other circumstance that would more likely than not cause one or more deaths.

Flooding

Flooding is the temporary overflow of water onto lands that are not normally covered by water. Flooding results from the overflow of major rivers and tributaries, storm surges, and inadequate local drainage. Floods can cause loss of life, property damage, crop/livestock damage, and water supply contamination, and can disrupt travel routes on roads and bridges.



Floods in the Washington area are most likely to occur in the spring due to the increase in rainfall and snowmelt; however, floods can occur at any time of the year. A sudden winter thaw or a major summer downpour can cause flooding. Floodplains indicate areas potentially affected by flooding. There are several types of flooding.

1% Annual Chance Floods The term “100-year flood” does not mean that flooding will occur once every 100 years, but is a statement of probability to describe how one flood compares to others that are likely to occur. What it actually means is that there is a one percent chance of a flood in any given year. These areas were mapped for all towns in New Hampshire by FEMA. Appendix D displays the “Special Flood Hazards Areas.”

River Ice Jams Ice forming in riverbeds and against structures presents significant hazardous conditions storm waters encounter these ice formations which may create temporary dams. These dams may create flooding conditions where none previously existed (i.e., as a consequence of elevation in relation to normal floodplains). Additionally, there is the impact of the ice itself on structures such as highway and railroad bridges. Large masses of ice may push on structures laterally and/or may lift structures not designed for such impacts. A search on the Cold Regions Research and Environmental Laboratory (CRREL) did not reveal any historical ice jams.

Rapid Snow Pack Melt Warm temperatures and heavy rains cause rapid snowmelt. Quickly melting snow coupled with moderate to heavy rains are prime conditions for flooding.

Severe Storms Flooding associated with severe storms can inflict heavy damage to property. Heavy rains during severe storms are a common cause of inland flooding.

Dams Failures results in rapid loss of water that is normally held by the dam. These kinds of floods pose a significant threat to both life and property. Appendix D shows the location of active dams in Washington. NH DES assigns a hazard designation to each dam in the state depending upon the potential damage it would cause if the dam failed: 1.) A “high hazard potential” is indicated if the dam is in a location and of a size that failure or mis-operation of the dam would result in the following: major economic loss to structures or property; structural damage to roads; major environmental; or public health losses; and probable loss of human life. 2.) A “significant hazard potential” would mean the dam is in a location and of a size that failure or mis-operation of the dam would result

in any of the following: major economic loss to structures or property; structural damage to roads; major environmental or public health losses. 3.) A “low” hazard dam failure could cause some structural damage to buildings and roads. 4.) A “non-menace” dam failure would not cause any significant damage.

Beaver Dams and Lodging Flooding associated with beaver dams and lodging can cause road flooding or damage to property.

Bank Erosion and Failure As development increases, changes occur that increase the rate and volume of runoff, and accelerate the natural geologic erosion process. Erosion typically occurs at the outside of river bends and sediment deposits in low velocity areas at the insides of bends. Resistance to erosion is dependent on the riverbank’s protective cover, such as vegetation or rock riprap, or its soils and stability. Roads and bridges are also susceptible to erosion.

Past Flooding Events

The Committee determined there are a few other flood areas in the town other than the FEMA designated flood zones. Appendix D shows the special flood hazard areas of Special Flood Hazard Areas as well as those determined by the Committee. The following tables provide a list of floods in the State, County, and Washington. Other flooding issues are listed in the Erosion section—primarily for roads. The Committee does not recall any significant flooding events in Washington other than road erosion issues. There have been no dam failures. A list of dams is shown in a following table. There have been no dam failures or significant flooding in Washington since the last hazard mitigation plan update. There has been flooding over Lovejoy Road as indicated in the following table.

Table III-3: FLOODING

HAZARD	DATE	LOCATION	DESCRIPTION OF AREAS IMPACTED	DAMAGES
Flood / Severe Storm	April 16, 1987	Cheshire, Carroll, Grafton, Hillsborough, Merrimack, Rockingham, & Sullivan	FEMA # 789- DR (Presidentially Declared Disaster). Flooding of low-lying areas along river caused by snowmelt and intense rain.	\$4,888,889 in damage.
Flood	August 7-11, 1990	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack & Sullivan	FEMA DR # 876. Flooding caused by a series of storm events with moderate to heavy rains.	\$2,297,777 in damage.
Flood (Ice Jam)	March 26, 1992	Cold River, Acworth	Ice jam (CRREL) which formed near a bend caused road flooding. Ice was removed by State equipment.	Unknown
Flood	October 29, 1996	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan Counties	FEMA Disaster Declaration # 1144- DR. Flooding caused by heavy rains.	\$2,341,273 in damage.
Flood	October 7-18, 2005	Cheshire, Grafton, Merrimack, Sullivan, and Hillsborough Counties, NH	FEMA Disaster Declaration # 1610. Severe storms and flooding; major devastation in neighboring town of Acworth	\$3,000,000 in damages.
Flood	October-November 2005	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan counties	FEMA Disaster Declaration # DR-1144- NH	No damage reported in Washington
Flood	April 16, 2007	All counties, NH	FEMA Disaster Declaration # 1695. Severe storms and flooding; 2,005 home owners and renters applied for assistance in NH.	\$27,000,000 in damages; no damage reported in Washington
Flood	July 24, 2008	Central and Southern NH; Counties Declared: Belknap, Carroll, Merrimack, Rockingham, and Strafford	FEMA DR 1782	Severe storms, tornado, and flooding; no damage reported in Washington
Flood	August 14, 2008	Central Northern NH; Counties Declared: Belknap, Carroll, Coos, and Grafton	FEMA Disaster Declaration #1787	\$3 million in public assistance; primary damage to roads; no damage reported in Washington
Flood	March 14-31, 2010	Statewide	FEMA DR-1913; severe storms & flooding; Declared Counties: Hillsborough and Rockingham Counties	75% federal match; No damage reported in Washington

HAZARD	DATE	LOCATION	DESCRIPTION OF AREAS IMPACTED	DAMAGES
Flood	May 26-30, 2011	Coos and Grafton Counties	FEMA-4006-DR Federal assistance for Coos and Grafton Counties and hazard mitigation statewide	\$1.8 million in public assistance; primary impact to roads and bridges; no damage reported in Washington
Flood	May 29-31, 2012	Cheshire County	FEMA DR-4065; severe storm and flood event	\$3million in public assistance; no damage reported in Washington
Flood	June 26-July 3, 2013	Grafton, Sullivan and Cheshire Counties	FEMA DR-4139; severe storms, flooding, and landslides	Baily Hill: Beaver Pond, a small set of culverts was compromised during storm event and was replace with a single pipe arch for \$64,000 and the road was closed for a single day. Old Marlow Road: 1/3 mile of road washout/erosion causing \$3,000 worth of damage. Bailey Hill Road: Additional 500-600 feet of washout require \$10,000 worth of repairs. The town received \$49,000 in public assistance.
Flood	July 2014	Washington, NH	Severe thunderstorm and flash flooding	Dole School House Road: culvert at turn around was overtopped, \$5,000 in damage. Purlingbeck Road: Bridge over topped and washouts along road at the bridge, \$3,000 in damage. Valley Road: Morse Hill Road Culvert at Cemetery Brook was overtopped and needed \$2,000 repair. King Street: First culvert on street was overtopped due to storm and beaver dam, resulting in \$2,000 in damage. Lovell Road: 300 ft washout causing \$1,500 in damage.
Flood	Oct 29 – Nov 1, 2017	Several counties including Sullivan	FEMA DR-4355	\$8 million in public assistance
Flood	July 1-2, 2017	Grafton & Coos Counties	FEMA DR-4329; severe flooding and storms	\$5 million in public assistance; 4” rain took out Faxon Hill Road – replace culvert with larger culvert in 2018
Flood	July 11-12, 2019	Grafton County	FEMA DR-4457	Unknown

The initial Flood Insurance Rate Map including Washington was published on 5/23/2006 and the current FIRM publication and FIS date is 5/23/2006. The official entry into the NFIP was on July 28, 2008. Currently, there are a total of 12 policies on single-family homes worth \$3,365,000 and there as only been a single (non-repetitive loss) claim totaling \$750.

Washington's 1% Annual Chance Special Flood Areas are located within the A and AE Zone, with no base flood elevations determined. See Appendix D for a map showing all Special Flood Hazard Areas.

Potential Future Flooding Events

Future flooding is likely as noted in the above table based upon local knowledge of past flood events. There are currently an estimated 234 properties located at least partially within the FEMA determined 100-year flood areas. There are a total of nine state and town owned bridges within the floodplain.

According to the State's Mitigation Plan, Sullivan County has a high hazard risk for flooding. The Committee determined flooding is a low/medium risk in Washington.

Erosion

Soil erosion, although a natural process, can be greatly accelerated by improper construction practices. Because of the climate in New Hampshire and the general nature of our topography, eroded soils can be quickly transported to a wetland, stream, or lake. The New Hampshire Department of Environmental Services (DES) regulates major construction activities to minimize impacts upon these resources. A properly conducted construction project should not cause significant soil erosion.



Soil becomes vulnerable to erosion when construction activity removes or disturbs the vegetative cover. Vegetative cover and its root system play an extremely important role in preventing erosion by: (1) Shielding the soil surface from the impact of falling rain drops; (2) Reducing the velocity of runoff; (3) Maintaining the soil's capacity to absorb water, and (4) Holding soil particles in place.

Because of the vegetation's ability to minimize erosion, limiting its removal can significantly reduce soil erosion. In addition, decreasing the area and duration of exposure of disturbed soils is also effective in limiting soil erosion. The designer must give special consideration to the phasing of a project so that only those areas actively under construction have exposed soils. Other factors influencing soil erosion are: (1) Soil types, (2) Land slope, (3) Amount of water flowing onto the site from up-slope, and (4) Time of year of disturbance.

Past Erosion Events

There have been several erosion events in Washington. Many were primarily road washes associated with flooding and are addressed in that section. There are also several road washes associated with major storms such as in May and July 2013 and July 2014.

Potential Erosion Events

Due to the topography of the town, there is always potential for erosion. The town also has a fair amount of dirt roads that can be prone to erosion. As properties are developed there will be less vegetative buffer to protect the town from erosion during rainstorms. The Committee determined there was a low/medium risk for erosion damage.

Tropical/Post-Tropical Storms



A hurricane is an intense tropical weather system with a well-defined circulation and maximum sustained winds of 74 mph (64 knots) or higher. Hurricane winds blow in a large spiral around a relative calm center known as the "eye." The "eye" is generally 20 to 30 miles wide, and the storm may extend outward 400 miles. As a hurricane nears land, it can bring torrential rains, high winds, and storm surges. A single hurricane can last for more than 2 weeks over open waters and can run a path across the entire length of the eastern seaboard. August and September are peak months during the hurricane season that lasts from June 1 through November 30. Damage resulting from winds of this force can be substantial, especially considering the duration of the event, which may last for many hours (*NH Multi-Hazard Mitigation Plan Update 2018*; FEMA website).

The Saffir-Simpson Hurricane Wind Scale provides categories of sustained winds by miles per hour: 1 – 74-95 mph; 2 – 96-110 mph; 3 – 111-129 mph; 4 – 130 – 156 mph; and 5 – 157 mph or higher. Categories 3 -5 are considered to be major wind events that can cause devastating to catastrophic damage.

Past Tropical/Post-Tropical Storms Events

There have been several hurricanes over the years which have impacted New England and New Hampshire. These are listed below. The 1938 hurricane directly impacted Washington according to the Committee member recollections, but no other tropical storm event impacted the town. Since the last hazard mitigation plan update, the Town has not experienced any significant impacts from Tropical Storms.

Table III-4: HURRICANES & TROPICAL STORMS

Hazard	Date	Location	Description of Areas Impacted	Damages
Hurricane	August, 1635	n/a		Unknown
Hurricane	October 18-19, 1778	n/a	Winds 40-75 mph	Unknown
Hurricane	October 9, 1804	n/a		Unknown
Gale	September 23, 1815	n/a	Winds > 50mph	Unknown
Hurricane	September 8, 1869	n/a		Unknown
Hurricane	September 21, 1938	Southern New England	Flooding caused damage to road network and structures. 13 deaths, 494 injured throughout NH. Disruption of electric and telephone services for weeks. 2 Billion feet of marketable lumber blown down. Total storm losses of \$12,337,643 (1938 dollars). 186 mph maximum winds.	Unknown
Hurricane (Carol)	August 31, 1954	Southern New England	Category 3, winds 111-130 mph. Extensive tree and crop damage in NH, localized flooding	Unknown
Hurricane (Edna)	September 11, 1954	Southern New England	Category 3 in Massachusetts. This Hurricane moved off shore but still cost 21 lives and \$40.5 million in damages throughout New England. Following so close to Carol it made recovery difficult for some areas. Heavy rain in NH	Unknown
Hurricane (Donna)	September 12, 1960	Southern and Central NH	Category 3 (Category 1 in NH). Heavy flooding in some parts of the State.	Unknown
Tropical Storm (Daisy)	October 7, 1962	Coastal NH	Heavy swell and flooding along the coast	No damage reported in Washington
Tropical Storm (Doria)	August 28, 1971	New Hampshire	Center passed over NH resulting in heavy rain and damaging winds	No damage reported in Washington
Hurricane (Belle)	August 10, 1976	Southern New England	Primarily rain with resulting flooding in New Hampshire. Category 1	No damage reported in Washington
Hurricane (Gloria)	September, 1985	Southern New England	Category 2, winds 96-110 mph. Electric structures damaged; tree damages. This Hurricane fell apart upon striking Long Island with heavy rains, localized flooding, and minor wind damage in NH	No damage reported in Washington

Hazard	Date	Location	Description of Areas Impacted	Damages
Hurricane (Bob)	August 19, 1991	Southern New England	Structural and electrical damage in region from fallen trees. 3 persons were killed and \$2.5 million in damages were suffered along coastal New Hampshire. Federal Disaster FEMA-917-DR	No damage reported in Washington
Hurricane (Edouard)	September 1, 1996	Southern New England	Winds in NH up to 38 mph and 1 inch of rain along the coast. Roads and electrical lines damaged	No damage reported in Washington
Tropical Storm (Floyd)	September 16-18, 1999	Southern New England	FEMA DR-1305-NH. Heavy Rains	No damage reported in Washington
Hurricane (Katrina)	August 29, 2005 & continuing	East Coast of US and more	FEMA-3258-EM. Heavy rains and flooding devastating SE US	No damage reported in Washington
Tropical Storm (Tammy)	October 5-13, 2005	East Coast of US	Remnants of Tammy contributed to the October 2005 floods which dropped 20 inches of rain in some places in NH.	No damage reported in Washington
Tropical Storm (Irene)	August 26 – September 6, 2011	East Coast of US	FEMA-4026-DR for Coos, Carroll, Grafton, Strafford, Belknap, Merrimack and Sullivan Counties; EM-3333 Hillsboro, Rockingham, and Cheshire Counties; there was little effect in Washington	\$2 Million primarily for roads and bridges; \$146,000 in damage in Washington. Mill Street culvert carrying Mill Pond Outlet flooded and washed out the culvert and road requiring a 3-month closure.
Hurricane (Sandy)	October 26 – November 8, 2012	East Coast of US	FEMA-4095-DR-NH for Belknap, Carroll, Coos, Grafton and Sullivan Counties.	\$2.1 million in public assistance statewide. No reported damage in Washington
Hurricane (Hermine)	September 6, 2016	Coastal NH	Closed Hampton Beach	No damage reported in Washington

Potential Future Tropical/Post-Tropical Storm Damage

Tropical Storm events will affect the entire town. It is impossible to predict into the future what damage will occur in the town. The State Plan determined tropical storm events are a medium risk for Sullivan County. The Committee determined the hurricane risk to be medium in Washington.

High Wind Event



Significantly high wind events occur especially during tornadoes, hurricanes, winter storms, and thunderstorms. Falling objects and downed power lines are dangerous risks associated with high winds. In addition, property damage and downed trees are common during severe wind occurrences. 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. Downbursts fall into two categories: 1. Microburst, which covers an area less than 2.5 miles in diameter, and 2. Macrobust, which covers an area at least 2.5 miles in diameter. Most downbursts occur with thunderstorms, but they can be associated with showers too weak to produce thunder.

“A tornado is a violent windstorm characterized by a twisting, funnel shaped cloud. These events are spawned by thunderstorms and, occasionally by hurricanes, and may occur singularly or in multiples. They develop when cool air overrides a layer of warm air, causing the warm air to rise rapidly. Most vortices remain suspended in the atmosphere. Should they touch down, they become a force of destruction.” (*NH Multi-Hazard Mitigation Plan Update 2018*). The Enhanced Fujita Scale is the standard scale for rating the severity of a tornado as measured by the damage it causes. Most tornadoes are in the EF0 to EF2 Class (an older scale was the Fujita Scale). Building structures to modern wind standards provides significant property protection from these hazard events. New Hampshire is located within Zone 2 for Design Wind Speed for Community Shelters, which suggests that buildings should be built to withstand 160 mph winds.

Past High Wind Events

The following table displays tornadoes occurring in Sullivan County between 1950 and 1995 as provided by the “Tornado Project” (www.tornadoproject.com) and the *NH Multi-Hazard Mitigation Plan Update 2018*. The Committee does not recall any high wind event damage in Washington except in 2018.

Table III-5: HIGH WIND EVENTS IN OR NEAR SULLIVAN COUNTY

Hazard	Date	Fujita/Enhanced Fujita Scale	Damages
Tornado	September 9, 1821	Most intense in NH	Killed 6 people; crossed Lake Sunapee
Tornado	July 14, 1963	F1	No deaths or injuries; costs unknown
Tornado	June 27, 1964	F0	No deaths or injuries; costs unknown
Tornado	August 11, 1966	F2	No deaths or injuries; costs unknown
Tornado	August 25, 1969	F1	No deaths or injuries; costs unknown
Tornado	May 31, 1972	F1	No deaths or injuries; costs unknown (Merrimack County)
Tornado	July 21, 1972	F1	No deaths or injuries; costs unknown
Tornado	May 11, 1973	F2	No deaths or injuries; costs unknown
Tornado	June 11, 1973	F0	No deaths or injuries; costs unknown
Tornado	August 15, 1976	F1	No deaths; 5 injuries; costs unknown (Merrimack County)
Downburst	Summer of 1995	N/A	Committee recalled a strong downburst, characterized by a straight line wind, coming from the west and all hillsides with western exposure were affected. The committee identified Britton Hill and Straw Hill as areas that were without electrical power due to this event.
Tornado	August 13, 1999	F1	No deaths or injuries; costs unknown; Sullivan County
Tornado	July 6, 1999	F2	No deaths or injuries; costs unknown (Merrimack County); in New London two roofs blown off structures; power outages,; downed trees, utility pole, and wires
Downburst	Around 2005-2006	NA	Severe microburst knocked down stand of trees in Washington between Hurd Road and Route 10
Tornado	Summer 2006	NA	Began in Barnet, VT and moved to Monroe, NH
Tornado	April 15, 2007	NA	Numerous trees were knocked down in Enfield, NH
Tornado	July 24, 2008	(EF 2)	DR 1799: Trees, utility poles, houses down near Concord; 1 fatality and 2 injuries
Tornado	May 4, 2018	EF 1	Sullivan/Merrimack Counties; Damage in surrounding towns, but none in Washington

Source: www.tornadoproject.com

Table III-6: ENHANCED FUJITA SCALE

Scale	Wind Strength (MPH)	Typical Damage
EF0	65-85	Light damage (Gale): Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
EF1	86-110	Moderate damage (Weak Winds): Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
EF2	111-135	Considerable damage (Strong Winds): Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165	Severe damage: Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown
EF4	166-200	Devastating damage: Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated
EF5	Over 200	Incredible damage: Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds); trees debarked; incredible phenomena will occur.

Source: <https://www.weather.gov/oun/efscale>

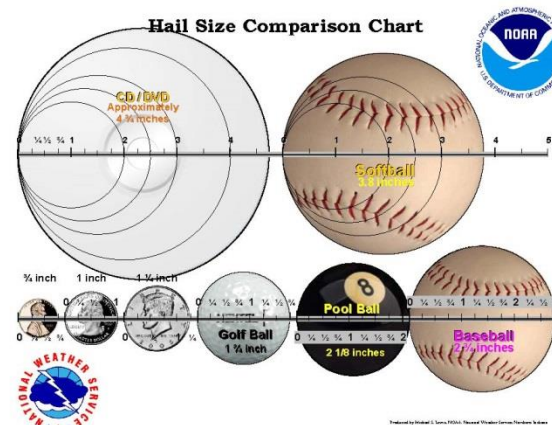
Potential Future High Wind Event Damage

It is impossible to predict where a tornado or downburst will occur or what damage it will inflict. If a high wind event occurred it could affect a specific location or the entire town depending upon the size and power of the event. The Washington Committee does not recall tornadoes although a microburst around 2005-2006 occurred in Washington. The FEMA website places the State of NH in the Zone II Wind Zone which provides that a community shelter should be built to a 160 mph “design wind speed.” According to the State’s mitigation plan, Sullivan County has a high risk for tornadoes. The Committee determined there is a medium risk for tornadoes and downbursts in Washington.

Thunderstorms/Lightning/Hail



A thunderstorm is a rain shower during which you hear thunder. Since thunder comes from lightning, all thunderstorms have lightning. A thunderstorm is classified as "severe" when it contains one or more of the following: hail three-quarter inch or greater, winds gusting in excess of 50 knots (57.5 mph), tornado. Hail is a form of precipitation that occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze into ice. When the hail particle becomes heavy enough to resist the updraft, it falls to the ground. The resulting wind and hail can cause death, injury, and property damage. Below is a comparison charge for the various sizes of hail.

Figure III-1: HAIL SIZE COMPARISON CHART

An average thunderstorm is 15 miles in diameter and lasts an average of 30 minutes. Winter thunderstorms are rare because the air is more stable, strong updrafts cannot form because the surface temperatures during the winter are colder.

Lightning is a giant spark of electricity that occurs within the atmosphere or between the atmosphere and the ground. As lightning passes through the air, it heats the air to a temperature of about 50,000 degrees Fahrenheit, considerably hotter than the surface of the sun. Fires are a likely result of lightning strikes, and lightning strikes can cause death, injury, and property damage. It is impossible to predict where lightning will strike.

A lightning activity level has been developed by the National Weather Service and is shown below:

Table III-7: LIGHTNING ACTIVITY LEVEL

Lightning Activity Level	Description
1	No thunderstorms
2	Isolated thunderstorms: Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five minute period.
3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5 minute period.
4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a 5 minute period.
5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a 5 minute period.
6	Dry lightning (same as LAL3, but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.

Source: <http://graphical.weather.gov/definitions/defineLAL.html>

Past Thunderstorm Events

A thunderstorm with lightning or hail could impact the entire town, although lightning is more likely in isolated areas where there would be no impact on structures. The 2014 flood damage report is the result of flash flooding associated with severe thunderstorms that hit Washington.

Potential Future Thunderstorm Damage

It is inevitable that thunderstorms will occur in Washington's future. Lightning, hail, or wind from a thunderstorm could impact anywhere in town. It is not possible to estimate possible damage. According to the State's mitigation plan, Sullivan County has a low risk of a lightning hazard. The risk for future thunderstorm damage was determined by the Committee to be low/medium risk in Washington.

Table III-8: THUNDERSTORM/LIGHTNING/HAIL

Hazard	Date	Location	Description of Areas Impacted	Damages
Hail	June 16, 2007	Washington	A severe thunderstorm produced large hail (.75 in) in southwestern New Hampshire.	No damage reported in Washington
Hail	August 3, 2007	Washington	An isolated thunderstorm produced large hail in Sullivan County with .75 inch hail.	No damage reported in Washington
Lightning	May 2021	Washington	Lightning hit transformer outside Fire Station and alarm had to be recalculated	No significant damage in Washington

Drought



Droughts or abnormally low precipitation leading to a shortage of water are generally not as damaging or disruptive as floods, but are more difficult to define. A drought is a natural hazard that evolves over months or even years and can last as long as several years or only a few months. Fortunately, droughts are rare in New Hampshire. The severity of the water deficit is gauged by the degree of moisture deficiency, its duration, and the size of the area affected. The effects of drought are indicated through measurements of soil moisture, groundwater levels and stream flow; however, not all of these indicators will be low during a drought. 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 stream flow.

Low stream flow correlates with low ground water level because it is ground water discharge to streams and rivers that maintain stream flow during extended dry periods. Low stream flow and low ground water levels commonly cause diminished water supply.

New Hampshire breaks the State into five Drought Management Areas, with one in the north, one across the central region, and three along the southern portion of the State. The National Oceanic and Atmospheric Administration (NOAA) and the US government use the Palmer Drought Survey Index for conditions of the nation. The Palmer Drought Management areas divide the State into two areas and use the Palmer Drought Severity Index which is based on rainfall, temperature, and historic data. The Town of Washington is in Area 2. The NH Drought Management Team, coordinated by the NH Department of Environmental Services Dam Bureau, uses these maps to help determine which areas are hardest hit.

Figure III-2: DROUGHT MAPS

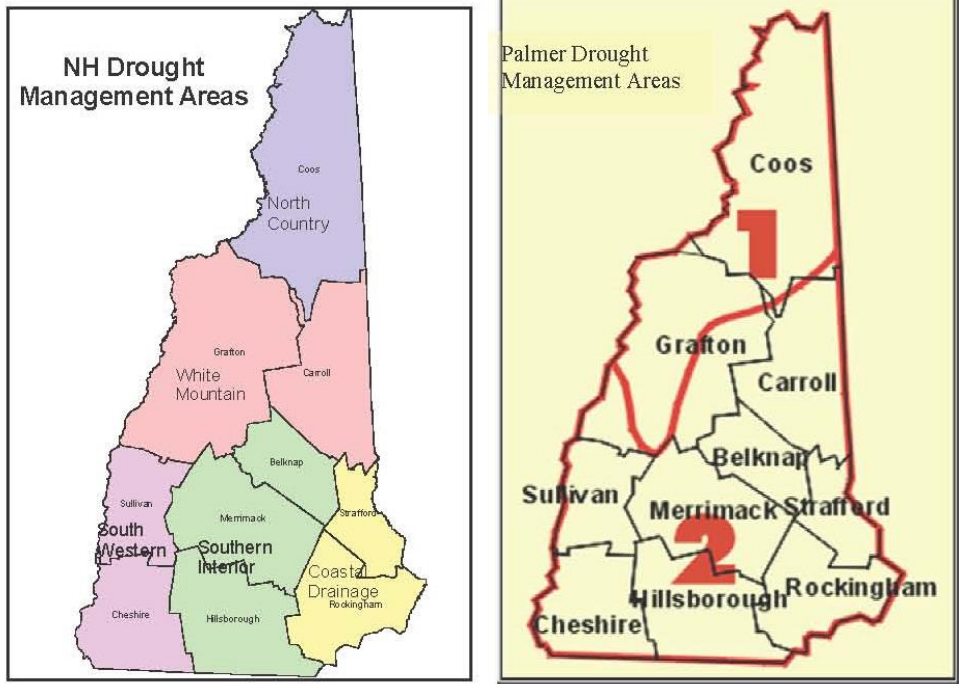







Figure III-3: PALMER DROUGHT INDEX

	D0 - Abnormally Dry <ul style="list-style-type: none">• Short-term dryness slowing planting, growth of crops• Some lingering water deficits• Pastures or crops not fully recovered	60.0% of State	60.0% D0-D4
	D1 - Moderate Drought <ul style="list-style-type: none">• Some damage to crops, pastures• Some water shortages developing• Voluntary water-use restrictions requested	0.0% of State	0.0% D1-D4
	D2 - Severe Drought <ul style="list-style-type: none">• Crop or pasture loss likely• Water shortages common• Water restrictions imposed	0.0% of State	0.0% D2-D4
	D3 - Extreme Drought <ul style="list-style-type: none">• Major crop/pasture losses• Widespread water shortages or restrictions	0.0% of State	0.0% D3-D4
	D4 - Exceptional Drought <ul style="list-style-type: none">• Exceptional and widespread crop/pasture losses• Shortages of water creating water emergencies	0.0% of State	

Past Drought Events

Around 2001-2002, Washington and other nearby towns had drought issues. This occurred again in 2010 and hay yields were down in 2020 due to lack of rain.

Table III-9: DROUGHT

Date	Location	Description	Damages
1929-1936	Statewide	Regional. Recurrence Interval 10 to > 25 years	Unknown; No damage reported in Washington
1939-1944	Statewide	Severe in SE and moderate elsewhere. Recurrence Interval 10 to > 25 years	Unknown; No damage reported in Washington
1947-1950	Statewide	Moderate. Recurrence Interval 10 to > 25 years	Unknown; No damage reported in Washington
1960-1969	Statewide	Regional longest recorded continuous spell of less than normal precipitation. Encompassed most of the Northeastern US. Recurrence Interval > 25 years	Unknown; No damage reported in Washington
2001-2002	Statewide	Affected residential wells and agricultural water sources; third worst drought on record, exceeded only by the drought of 1956-1966 and 1941-1942; recurrence level not determined yet	Unknown; No damage reported in Washington
2010	Most southerly counties	Affected dug well and those in hillsides	Unknown; No damage reported in Washington
2015	Southern & Central NH	Concord currently 5.17" below the average precipitation from Mar1 to May 21, 2015; considered a "moderate drought" by the US Dept of Agriculture	Minor impact in Washington with a few wells reported drying up
2016-2017	Statewide	Water systems and private wells were adversely impacted. Impact to agricultural crops; Hundreds of private wells failed.	Extreme drought declared
2020	Statewide	Below average and infrequent rainfall from May through September 2020 led to an extreme hydrologic drought across much of New England, with some areas experiencing a flash drought, reflecting its quick onset.	Extreme drought declared; low hay yields in Washington

Source: NH DES through 2002; Concord Monitor August 22, 2010; NH Multi-Hazard Mitigation Plan 2018: <https://www.drought.gov/states/new-hampshire>

Potential Future Drought Damage

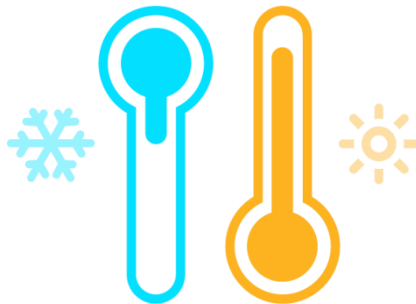
Drought may affect the entire town. The damage will depend upon the crops being grown at the time of the drought. No cost has been assigned to residential wells going dry though new wells may have to be dug or drilled. According to the State's mitigation plan, Sullivan County has a low risk for drought. The Committee determined that drought is a low/medium risk in Washington.

Table III-10: DROUGHT MEASUREMENT

D0	Short-term dryness that is typical with the onset of drought; can slow crop growth and elevate fire risk to above average. Scientists may consider D) level areas to be dry, and not necessarily experiencing drought conditions.
D1	An area where damage to crops and pastures can be expected and where fire risk is high, while stream, reservoir, or well levels are low. (Moderate)
D2	An area where crop or pasture losses are likely, fire risk is very high, water shortages are common, and water restrictions are typically voluntary or mandated. (Severe)
D3	An area where major crop and pasture losses are common, fire risk is extreme, and widespread water shortages can be expected requiring restrictions. (Extreme)
D4	An area experiencing exceptional and widespread crop and pasture losses, fire risk, and water shortages that result in water emergencies. (Exceptional)

Source: ncdc.noaa.gov/news/drought-degrees-drought-reveal-true-picture

Extreme Temperatures



Extreme temperatures are characterized by abnormally high and low temperatures and/or longer than average time periods of high or low temperatures. Events can damage or kill crops and animals (wild, farm, or domesticated), potentially presenting a risk to the economy.

Extreme cold events occur during meteorological cold waves, also known as cold snaps caused by the southern transport of arctic air masses to the Northeast. The effect is exacerbated when there are winds present (wind chill) that effectively lower the temperature and reduces core body temperature. Frostbite occurs when uncovered skin is exposed to extreme cold and the body tissue is either injured or killed. Hypothermia is when the body is unable to heat itself at the rate it is being cooled to maintain adequate body temperature.

Extreme heat events occur as a result of above normal temperatures, which often coincide with high relative humidity increasing the likelihood of heat disorders. Heat related disorders include heat cramps, heat exhaustion, and heat stroke.

Figure III-4: HEAT INDEX

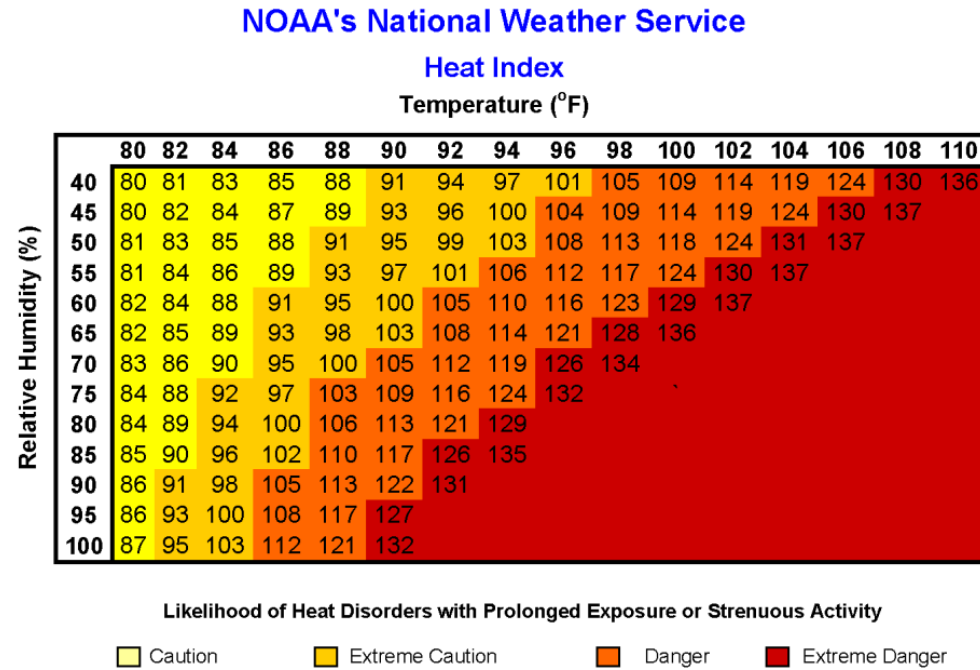
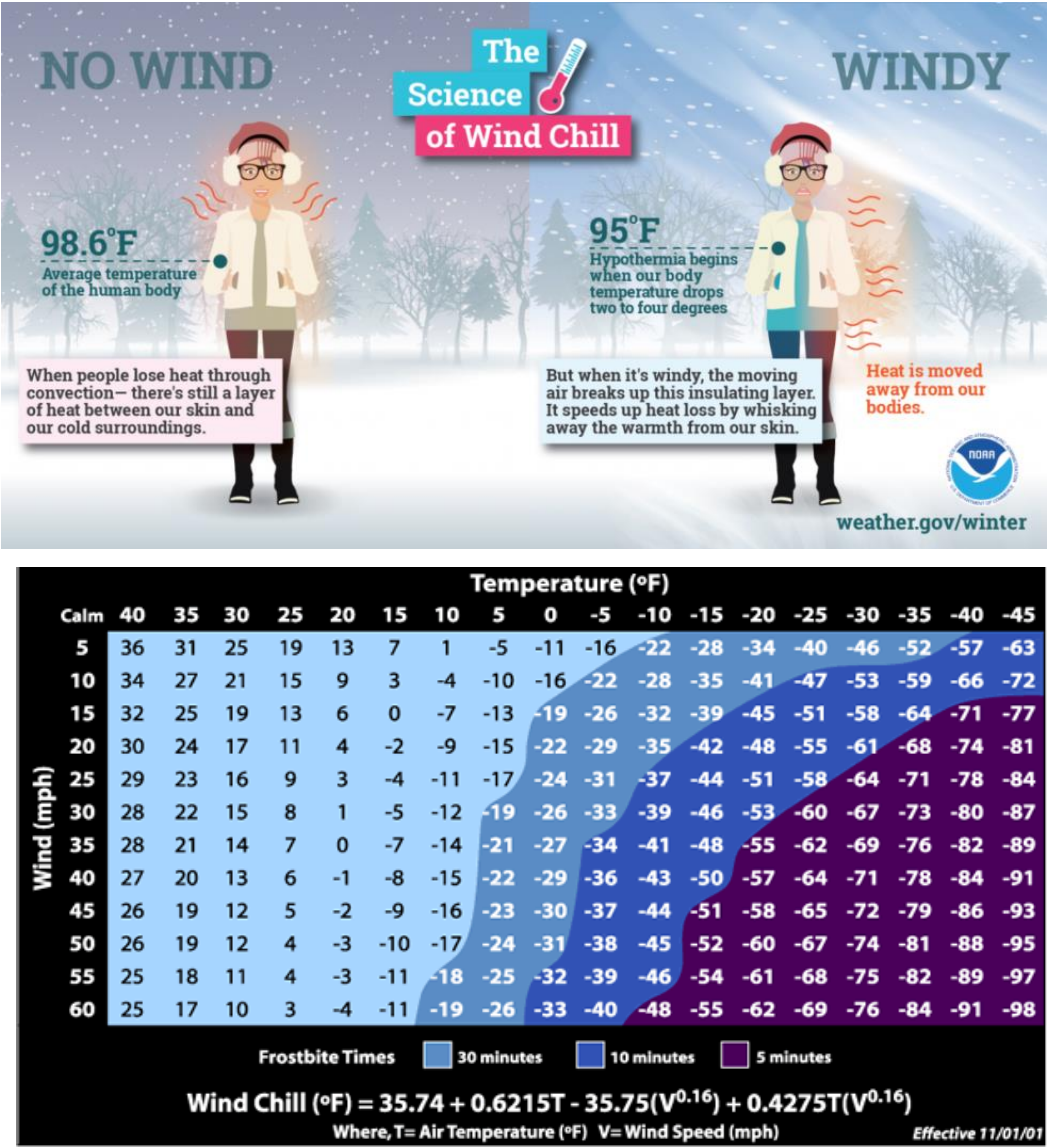


Figure III-5: WIND CHILL



Past Extreme Temperature Events

The following table lists the extreme heat events in the past which included the Northeast and New Hampshire. The Committee recalls heat waves and winter cold waves impacting the Town, especially more heat waves in recent years since the last plan update including the 2017 event and the 2018 event. These were not extensive enough to open cooling stations however. The town offices are being connected for air conditioning in 2021.

Table III-11: EXTREME TEMPERATURE EVENTS

Date	Event	Location	Additional Information
July 1911	Heat Wave	New England	11-day heat wave in New Hampshire
Late June to September, 1936	Heat Wave	North America	Temps to mid 90s in the northeast
June - August, 1999	Heat Wave	Northeast	Mean temperatures well above long-term average
Early August, 2001	Heat Wave	New Hampshire	Mid 90s and high humidity
August 2-4, 2006	Heat Wave	New Hampshire	Regional heat wave and severe storms
July 2010	Heat Wave	Northeast	Regional heat wave
September 2017	Heat Wave	New Hampshire	High temperature records
December 2017	Cold Wave	New Hampshire	Record low temperatures; wind chill warnings
February 2018	One Day Heat Wave	New Hampshire	Record high winter temperatures

Potential Future Extreme Temperature Events

Extreme temperature events would impact the entire town though those with air conditioning and adequate heat in their homes would have less impact. The costs of extreme temperatures are most likely to be in human life. The elderly are especially susceptible to extreme temperatures. The State Plan determined that extreme temperature risk is low in Sullivan county. The Committee determined extreme temperatures to be a low/medium risk in Washington.

Wildfire



Wildfire is defined as any unwanted and unplanned fire burning in the forest, shrub or grass. Wildfires are frequently referred to as forest fires, shrub fires or grass fires, depending on their location. They often occur during drought and when woody debris on the forest floor is readily available to fuel the fire. The threat of wildfires is greatest where vegetation patterns have been altered by past unsafe land-use practices, fire suppression and fire exclusion. Vegetation buildup can lead to more severe wildfires.

Increased severity over recent years has decreased capability to extinguish wildfires. Wildfires are unpredictable and usually destructive, causing both personal property damage and damage to community infrastructure, cultural and economic resources. Negative short-term effects of wildfires include destruction of timber, forage, wildlife habitats, scenic vistas and watersheds. Some long-term effects include erosion and lowered water quality.

There are many types and causes of fires. Wildfires, arson, accidental fires and others all pose a unique danger to communities and individuals. Since 1985, approximately 9,000 homes have been lost to urban/wild land interface fires across the United States (Northeast States Emergency Consortium: www.nesec.org). The majority of wildfires usually occur in April and May, when home owners are cleaning up from the winter months, and when the majority of vegetation is void of any appreciable moisture making them highly flammable.

The threat of wildfires for people living near wildland areas or using recreational facilities in wilderness areas is real. Dry conditions at various times of the year and in various parts of the United States greatly increase the potential for wildfires. Advance planning and knowing how to protect buildings in these areas can lessen the devastation of a wildfire. To reduce the risk to wildfire, it is necessary to consider the fire resistance of structures, the topography of property and the nature of the vegetation in the area.

According to the National Wildfire Coordination Group, there are categories of wildfire based upon size: Class A - one-fourth acre or less; Class B - more than one-fourth acre, but less than 10 acres; Class C - 10 acres or more, but less than 100 acres; Class D - 100 acres or more, but less than 300 acres; Class E - 300 acres or more, but less than 1,000 acres; Class F - 1,000 acres or more, but less than 5,000 acres; Class G - 5,000 acres or more.

Past Wildfire Events

Washington has experienced wildfire and brush fires in the past, but there were no fires that caused significant and notable damage.

Potential Future Wildfire Events

There are many large, contiguous forest tracts in Washington. Due to the vast areas of forest the hazard could impact any part of Washington, with no one area determined to be at a great risk than another. Where development interfaces with the forested areas is called the “urban interface.” These are the areas where structures could be impacted by a wildfire; these areas are scattered throughout the town. The most likely areas for wildfire are where ice storm impact downs trees and branches providing fuel for a fire. According to the State’s mitigation plan, Sullivan County has substantial debris to fuel a wildfire remaining from the ice storm of 1998 and 2008 and heavy forest cover. The plan gives the county a high risk of wildfire. The Committee determined that the risk of wild and structure fire risk in Washington is medium.

Severe Winter Weather



Ice and snow events typically occur during the winter months and can cause loss of life, property damage, and tree damage.

Heavy Snow Storms A heavy snowstorm is generally considered to be one which deposits four or more inches of snow in a twelve-hour period. A blizzard is a sustained wind or frequent gusts greater than or equal to 35 miles per hour accompanied by falling and/or blowing snow, frequently reducing visibility to less than ¼ mile for three hours or more (NOAA National Weather Service). Therefore, intense Nor’easters, which occur in the winter months, are often referred to as blizzards. The definition includes the conditions under which dry snow, which has previously fallen, is whipped into the air and diminishes visual range. Such conditions, when extreme enough, are called “white outs.”

Ice Storms Freezing rain occurs when snowflakes descend into a warmer layer of air and melt completely. When these liquid water drops fall through another thin layer of freezing air just above the surface, they don't have enough time to refreeze before reaching the ground. Because they are "supercooled," they instantly refreeze upon contact with anything that is at or below 0 degrees C, creating a glaze of ice on the ground, trees, power lines, or other objects. A significant accumulation of freezing rain lasting several hours or more is called an ice storm. This condition may strain branches of trees, power lines and even transmission towers to the breaking point and often creates treacherous conditions for highway travel and aviation. Debris impacted roads make emergency access, repair and cleanup extremely difficult.

The National Weather Service has developed a Scaled Predictive Ice Storm Aftermath (SPIA) Index. The potential impacts are scaled from 0 to 5 and suggest potential electrical outage coverage and duration. Current ice storm warnings are based on forecast of ice accumulation only. SPIA reports on the combined effects of the predicted ice and wind. Below is a chart of the SPIA index levels.

Figure III-6: SCALED PREDICTIVE ICE STORM AFTERMATH INDEX

Ice & Wind: Average Ice in Inches and Wind in Miles per hour	<15 mph	15-25 mph	25-35 mph	≥35 mph
0.10 – 0.25 inches	0	1	2	3
0.25 – 0.50 inches	1	2	3	4
0.50 – 0.75 inches	2	3	4	5
0.75 – 1.00 inches	3	4	5	5
1.00 – 1.50 inches	4	5	5	5
>1.50 inches	5	5	5	5

“Nor’easters” Nor’easters can occur in the eastern United States any time between October and April, when moisture and cold air are plentiful. They are known for dumping heavy amounts of rain and snow, producing hurricane-force winds, and creating high surfs that cause severe beach erosion and coastal flooding. A Nor’easter is named for the winds that blow in from the northeast and drive the storm up the east coast along the Gulf Stream, a band of warm water that lies off the Atlantic coast.

There are two main components to a Nor’easter: Gulf Stream low-pressure system (counter-clockwise winds) generate off the coast of Florida. The air above the Gulf Stream warms and spawns a low-pressure system. This low circulates off the southeastern U.S. coast, gathering warm air and moisture from the Atlantic. Strong northeasterly winds at the leading edge of the storm pull it up the east coast. As the strong northeasterly winds pull the storm up the east coast, it meets with cold Arctic high-pressure system (clockwise winds) blowing down from Canada. When the two systems collide, the moisture and cold air produce a mix of precipitation.

Winter conditions make Nor’easters a normal occurrence, but only a handful actually gather the force and power to cause problems inland. The resulting precipitation depends on how close you are to the converging point of the two storms. Nor’easter events which occur toward the end of a winter season may exacerbate the spring flooding conditions by depositing significant snow pack at a time of the season when spring rains are poised to initiate rapid snow pack melting.

Past Extreme Winter Weather Events

The following table provides a list of past extreme winter weather events in New Hampshire and Washington. In 2013, the Town of Washington received \$10,000 in aid following Winter Storm NEMO, DR 4105. The money was provided to the town to cover costs of plowing and snow removal/response. The most extensive damages from the storm, other than heavy snowfall, included minor downed limbs.

Table III-12: SEVERE WINTER WEATHER

Hazard	Date	Location	Description of Areas Impacted	Damages
Ice Storm	December 17-20, 1929	New Hampshire	Unprecedented disruption and damage to telephone, telegraph and power system. Comparable to 1998 Ice Storm (see below)	Unknown
Blizzard	February 14-17, 1958	New Hampshire	20-30 inches of snow in parts of New Hampshire	Unknown
Snow Storm	March 18-21, 1958	New Hampshire	Up to 22 inches of snow in south central NH	Unknown
Snow Storm	December 10-13, 1960	New Hampshire	Up to 17 inches of snow in southern NH	No damage reported in Washington
Snow Storm	January 18-20, 1961	New Hampshire	Up to 25 inches of snow in southern NH	No damage reported in Washington
Snow Storm	February 2-5, 1961	New Hampshire	Up to 18 inches of snow in southern NH	No damage reported in Washington
Snow Storm	January 11-16, 1964	New Hampshire	Up to 12 inches of snow in southern NH	No damage reported in Washington
Blizzard	January 29-31, 1966	New Hampshire	Third and most severe storm of 3 that occurred over a 10-day period. Up to 10 inches of snow across central NH	No damage reported in Washington
Snow Storm	December 26-28, 1969	New Hampshire	Up to 41 inches of snow in west central NH	No damage reported in Washington
Snow Storm	February 18-20, 1972	New Hampshire	Up to 19 inches of snow in southern NH	No damage reported in Washington
Snow Storm	January 19-21, 1978	New Hampshire	Up to 16 inches of snow in southern NH	No damage reported in Washington
Blizzard	February 5-7, 1978	New Hampshire	New England-wide. Up to 25 inches of snow in central NH	No damage reported in Washington

Hazard	Date	Location	Description of Areas Impacted	Damages
Snow Storm	February, 1979	New Hampshire	President's Day storm	No damage reported in Washington
Ice Storm	January 8-25, 1979	New Hampshire	Major disruptions to power and transportation	No damage reported in Washington
Snow Storm	April 5-7, 1982	New Hampshire	Up to 18 inches of snow in southern NH	No damage reported in Washington
Ice Storm	February 14, 1986	New Hampshire	Fiercest ice storm in 30 yrs in the higher elevations in the Monadnock region. It covered a swath about 10 miles wide from the MA border to New London NH	No damage reported in Washington
Extreme Cold	November-December, 1988	New Hampshire	Temperature was below 0 degrees F for a month	No damage reported in Washington
Ice Storm	March 3-6, 1991	New Hampshire	Numerous outages from ice-laden power lines in southern NH	No damage reported in Washington
Snow Storm	1996	Regional	Two major storms with five feet of snow in a week	No damage reported in Washington
Snow Storm	1997	New Hampshire	Power outages throughout region due to heavy snowfall	No damage reported in Washington
Ice Storm	January 15, 1998	New Hampshire; Substantial power outages in Washington	Federal disaster declaration DR-1199-NH, 20 major road closures, 67,586 without electricity, 2,310 without phone service, \$17+ million in damages to Public Service of NH alone	No damage reported in Washington
Snow Storm	2000	Regional	Heavy snow	No damage reported in Washington
Snow Storm	March 5-7, 2001	New Hampshire	Heavy snow.	No damage reported in Washington
Snow Storm	December 6-7, 2003	New Hampshire	Heavy snow. Federal Disaster Declaration FEMA-3193-NH	No damage reported in Washington
Snow Storm	February 10-12, 2005	New Hampshire	Heavy snow. Federal Disaster Declaration FEMA-3208-NH	No damage reported in Washington
Ice Storm	December 2008	New Hampshire	Debris removal. FEMA DR-1812; power outages in Washington for up to 10 days; downed trees blocked roads and damaged utility lines	\$15 Million; some Washington residents were without power for several days caused by downed lines and trees

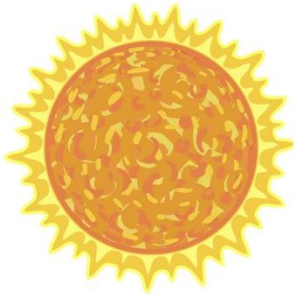
Hazard	Date	Location	Description of Areas Impacted	Damages
Wind Storm	February 23 – March 3, 2010	New Hampshire	FEMA DR-1892; Federal funding to Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan Counties; power loss	\$2 Million; No damage reported in Washington
Snow Storm	October 29-30, 2011	Statewide	EM-3344; FEMA-4049 Hillsborough & Rockingham Counties	Heavy snow throughout the town with minor trees and limbs down
Ice Storm	January 27, 2012	Region	Isolated power outages in Washington; several limbs down	Higher elevations in Washington experienced scattered power outages but were not widespread
Snow Storm	February 8-10, 2013	New Hampshire	Heavy Snow. FEMA DR-4105	Washington received \$10,000 for snow removal and response
Heavy Snow	January 2 – 3, 2014	New Hampshire	6-14 inches of snow across much of the state	No reported damage in Washington
Heavy Snow	February 5, 2014	New Hampshire	Low pressure moving off the mid-Atlantic coast intensified as it moved over Nantucket.	No reported damage in Washington
Snow Storm	November 2014	New Hampshire	Snow storm	Washington experienced some power outages on this Thanksgiving Day storm, but no other major damages were reported.
Heavy Snow	January 26-29, 2015	New Hampshire	6-14 inches with lower amounts in the Connecticut River Valley; storm resulted in DR-4209	No major damage reported in Washington, typical response
Heavy Snow	February 14, 2015	New Hampshire	6-12 inches	No reported damage in Washington
Heavy Snow	December 29, 2016	New Hampshire	6-16 inches with lesser amounts in the Connecticut River Valley. More than 11,000 homes and businesses saw outages due to this storm	No reported damage in Washington
Heavy Snow	February 9, 2017	New Hampshire	Several to 15 inches	No reported damage in Washington
Heavy Snow	March 14, 2017	New Hampshire	High winds and/or heavy snow downed trees and created power outages; 12-20 inches. This storm resulted in DR-4316	No reported damage in Washington
Heavy Snow	January 4, 2018	New Hampshire	10-15 inches with lesser amounts in the Connecticut River Valley	No reported damage in Washington

Hazard	Date	Location	Description of Areas Impacted	Damages
Snow	March 1-9, 2018	New Hampshire	This storm resulted in DR-4370.	No reported damage in Washington
Heavy Snow	March 13, 2018	New Hampshire	15-29 inches; this storm resulted in DR-4371	No reported damage in Washington

Potential Future Severe Winter Damage:

There is the potential for severe winter damage every year. An event would affect the entire town, but Town officials feel they are well prepared for major snow storms. According to the State's mitigation plan, Sullivan County has a high risk for severe winter weather. The Committee determined severe winter weather to be a low/medium risk in Washington.

Solar Storms and Space Weather



Activity on the sun's surface creates "space weather." and solar storms. Although the sun is 93 million miles from the earth, this space weather can affect our planet. As we become increasingly reliant on electronics and technology, our lives can become disrupted by solar storms and space weather: disrupt communications, damage or destroy electronic components, corrode gas and oil pipelines, and cause significant damage to spacecraft and satellites outside the Earth's protective atmosphere. Radio signals can be partially or completely blocked. In NH there is the potential for loss of communications, power, and GPS. In March 1989, Quebec, Canada experienced a 9-hour blackout when solar winds caused a fluctuation in the Earth's magnetic field and caused Hydro-Quebec's transmission to go down. Since communication systems can be affected by space weather, this would have a potentially town wide impact.

The National Oceanic and Atmospheric Association (NOAA) Space Weather Scales were introduced as a way to communicate to the general public the current and future space weather conditions and their possible effects on people and systems. Many of the Space Weather Prediction Center products describe the space environment, but few have described the effects that can be experienced as the result of environmental disturbances. These scales are useful to users of our products and those who are interested in space weather effects. The scales describe the environmental disturbances for three event types: geomagnetic storms, solar radiation storms, and radio blackouts. The scales have numbered levels, analogous to hurricanes, tornadoes, and earthquakes that convey severity. They list possible effects at each level. They also show how often such events happen, and give a measure of the intensity of the physical causes. The following table shows the NOAA scale for radio blackouts.

Past Solar Storm and Space Weather Events:

The Committee recalled solar flares and sunspots causing poor emergency communication reception a few times a year.

Future Solar Storm and Space Weather Events:

It is unpredictable but inevitable that the communications and electrical infrastructure will be impacted in the future. The Committee felt it is important to raise awareness about this potential hazard. The State plan determined that Sullivan County is at low risk for solar storm and space weather events. The Committee determined solar storm and space weather events to be a low risk in Washington.

Figure III-7: RADIO BLACKOUTS SCALE

Scale	Description	Effect	Physical measure	Average Frequency (1 cycle = 11 years)
R 5	Extreme	HF Radio: Complete HF (high frequency) radio blackout on the entire sunlit side of the Earth lasting for a number of hours. This results in no HF radio contact with mariners and en route aviators in this sector. Navigation: Low-frequency navigation signals used by maritime and general aviation systems experience outages on the sunlit side of the Earth for many hours, causing loss in positioning. Increased satellite navigation errors in positioning for several hours on the sunlit side of Earth, which may spread into the night side.	X20 (2×10^{-3})	Less than 1 per cycle
R 4	Severe	HF Radio: HF radio communication blackout on most of the sunlit side of Earth for one to two hours. HF radio contact lost during this time. Navigation: Outages of low-frequency navigation signals cause increased error in positioning for one to two hours. Minor disruptions of satellite navigation possible on the sunlit side of Earth.	X10 (10^{-3})	8 per cycle (8 days per cycle)
R 3	Strong	HF Radio: Wide area blackout of HF radio communication, loss of radio contact for about an hour on sunlit side of Earth. Navigation: Low-frequency navigation signals degraded for about an hour.	X1 (10^{-4})	175 per cycle (140 days per cycle)
R 2	Moderate	HF Radio: Limited blackout of HF radio communication on sunlit side, loss of radio contact for tens of minutes. Navigation: Degradation of low-frequency navigation signals for tens of minutes.	M5 (5×10^{-5})	350 per cycle (300 days per cycle)
R 1	Minor	HF Radio: Weak or minor degradation of HF radio communication on sunlit side, occasional loss of radio contact. Navigation: Low-frequency navigation signals degraded for brief intervals.	M1 (10^{-5})	2000 per cycle (950 days per cycle)



Earthquake

An earthquake is any sudden shaking of the ground caused by the passage of seismic waves through Earth's rocks. Seismic waves are produced when some form of energy stored in Earth's crust is suddenly released, usually when masses of rock straining against one another suddenly fracture and "slip." Earthquakes occur most often along geologic faults, narrow zones where rock masses move in relation to one another. The major fault lines of the world are located at the fringes of the huge tectonic plates that make up Earth's crust.

Table III-13: RICHTER SCALE and MERCALLI INTENSITY

Richter Scale	Modified Mercalli Intensity	Average Earthquake Effects
1.0-3.0	I	I – Not felt except by a very few under especially favorable conditions.
3.0-3.9	II-III	II – Felt only by a few persons at rest, especially on upper floors of buildings. III – Felt quite noticeably by persons indoors. Standing motor cars may rock slightly.
4.0-4.9	IV-V	IV – Felt indoors by many, outdoors by few during the day. Dishes, windows, doors disturbed; walls make cracking sound. V – Felt by nearly everyone; many awakened. Some dishes, windows broken.
5.0-5.9	VI-VII	VI – Felt by all. Some heavy furniture moved; a few instances of fallen plaster. VII – Damage negligible in buildings of good design and construction, considerable damage in poorly built or badly designed structures; some chimneys broken.
6.0-6.9	VII-IX	IX – Damage considerable in specially designed structures; damage great in substantial buildings, with partial collapse.
7.0 and higher	VIII or higher	VIII and higher: damage slight in specially designed structures. Fall of chimneys, factory stacks, columns, monuments, walls. X – Some well-built wooden structures destroyed, most masonry and frame structures destroyed with foundations. XI – Few if any masonry structures remain standing. Bridges destroyed. XII – Total damage. Lines of sight and level are distorted. Objects thrown in air.

Past Earthquake Damage:

Below is a table of past earthquakes in the region. The Committee does not recall any impact by an earthquake in Washington.

Table III-14: EARTHQUAKES

Date	Location	Magnitude	Damage
1638	Central NH	6.5-7	
October 29, 1727	Off NH/MA coast	NA	Widespread damage Massachusetts to Maine: cost unknown; no damage in Washington
December 29, 1727	Off NH/MA coast	NA	Widespread damage Massachusetts to Maine: cost unknown; no damage in Washington
November 18, 1755	Cape Ann, MA	6.0	Much damage: cost unknown; no damage in Washington
1800s	Statewide	83 felt earthquake in NH	Unknown; no damage in Washington
1900s	Statewide	200 felt earthquake in NH	Unknown; no damage in Washington
March 18, 1926	Manchester, NH	Felt in Hillsborough Co	Unknown; no damage in Washington
Dec 20, 1940	Ossipee, NH	Both earthquakes 5.5	Damage to homes, water main rupture: cost unknown.
December 24, 1940	Ossipee, NH	NA	Unknown; no damage in Washington
December 28, 1947	Dover-Foxcroft, ME	4.5	Unknown; no damage in Washington
June 10, 1951	Kingston, RI	4.6	Unknown; no damage in Washington
April 26, 1957	Portland, ME	4.7	Unknown; no damage in Washington
April 10, 1962	Middlebury, VT	4.2	Unknown; no damage in Washington
June 15, 1973	Near Quebec Border	4.8	Unknown; no damage in Washington
Summer 1977-1978*	Centered in Franklin	NA	Unknown; no damage in Washington
January 19, 1982	West of Laconia	4.5	Structure damage 15 miles away in Concord: cost unknown
October 20, 1988	Near Berlin, NH	4	Unknown; no damage in Washington
September 26, 2010	New Hampshire	3.4	Centered in Boscawen, NH; committee remembers feels quake, but no damage
August 23, 2011	Central Virginia, E Coast	5.8	Unknown; no damage in Washington
September 18, 2012	Concord, NH	1.2	Epicenter was Concord, NH and quake felt in capital region; no damage reported in Washington
October 16, 2012	Southern Maine	4.0	Felt through out area and into southern NH; no damage reported in Washington

Source: earthquake.usgs.gov/earthquakes/states/new_hampshire/history.php for earthquakes through 1964. NH Multi-Hazard Mitigation Plan, 2010 for 1973-1982; earthquake.usgs.gov/earthquakes (12/13/11)

*Committee recollection

Potential Future Earthquake Damage:

A United States Geographic Survey mapping tool on the web (geohazards.cr.usgs.gov/projects) projects a 5 – 6 peak ground acceleration (pga) with 10% probability of exceedance in 50 years for the Town of Washington. This pga rating is equivalent to a Modified Mercalli Intensity of “V” with moderate perceived shaking and very light potential damage. An earthquake event would impact the entire town. According to the State’s mitigation plan, Sullivan County has a low risk for earthquakes. The Committee determined the risk to be low in Washington.



Natural Water & Air Contaminants

Radium, radon and uranium are grouped together because they are radionuclides, unstable elements that emit ionizing radiation. These three particular substances are a health risk only if taken into the body by ingestion or inhalation. They occur naturally in the environment, uranium and radium as solids in rock while radon exists as a gas. Radionuclides are undetectable by taste, odor, or color, so only analytical testing can determine if they are present in water. Because they are associated with rock, wells drilled into bedrock are more likely to contain elevated levels of radionuclides than shallow or dug wells.

Radon gas can also be found in the soil. Openings between the soil and buildings, such as foundation cracks and where pipes enter, provide conduits for radon to move into structures. The difference in air pressure, caused by heated indoor air moving up and out of buildings, results in a flow of soil gas toward the indoors, allowing radon to potentially accumulate in structures. Air quality in a home can also be tested for radon. Following is a map of New Hampshire by the U.S. EPA to show radon zones.

There are many other natural contaminants which can render drinking water unsafe such as arsenic. The Drinking Water and Groundwater Bureau of the NH Department of Environmental Services has several fact sheets available to address these natural materials and suggests which materials to be included in testing. See their list of fact sheets at <https://www.des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm>.

Past Natural Water & Air Contaminant Events

There have been no known events related to natural water and air contamination in Washington. It is also anticipated that although no one is aware of any radon contamination, given that we are in the “Granite State,” it is likely that some homes are affected by radon.

Table III-15: RADON

Summary Table of Short-term Indoor Radon Test Results in NH's Radon Database 11/04/2003)					
County	# Tests	G. Mean	Maximum	% > 4.0 pCi/l	% > 12.0 pCi/l
Belknap	744	1.3	22.3	14.4	1.3
Carroll	1042	3.5	478.9	45.4	18
Cheshire	964	1.3	131.2	15.6	2.3
Coos	1072	3.2	261.5	41	17
Grafton	1286	2.0	174.3	23.2	5.2
Hillsborough	2741	2.1	202.3	29.6	6.8
Merrimack	1961	2.0	152.8	25.2	6
Rockingham	3909	3.0	155.3	40	9.5
Strafford	1645	3.4	122.8	44	13
Sullivan	466	1.4	29.4	15.7	2.1
STATEWIDE	15860	2.4 pCi/L	478.9 pCi/L	32.4	8.6

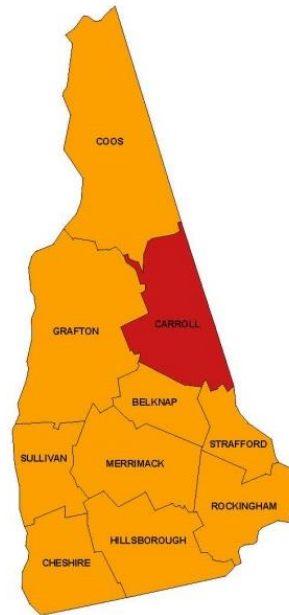
Figure III-8: MAP OF RADON ZONES**NEW HAMPSHIRE - EPA Map of Radon Zones**<http://www.epa.gov/radon/zonemap.html>

The purpose of this map is to assist National, State and local organizations to target their resources and to implement radon-resistant building codes.

This map is not intended to determine if a home in a given zone should be tested for radon. Homes with elevated levels of radon have been found in all three zones.

All homes should be tested, regardless of zone designation.

IMPORTANT: Consult the publication entitled "Preliminary Geologic Radon Potential Assessment of New Hampshire" (USGS Open-file Report 93-292-A) before using this map. <http://energy.usgs.gov/radon/grpinfo.html> This document contains information on radon potential variations within counties. EPA also recommends that this map be supplemented with any available local data in order to further understand and predict the radon potential of a specific area.



Zone 1 counties have a predicted average indoor radon screening level greater than 4 pCi/L (picocuries per liter) (red zones) **Highest Potential**

Zone 2 counties have a predicted average indoor radon screening level between 2 and 4 pCi/L (orange zones) **Moderate Potential**

Zone 3 counties have a predicted average indoor radon screening level less than 2 pCi/L (yellow zones) **Low Potential**

Potential Future Natural Air & Water Contaminant Damage:

Although there are no known records of illness that can be attributed to radium, radon, or uranium or other contaminants in Washington, residents should be aware that they are present. Houses with granite and dirt cellars are at increased risk to radon gas infiltration. According to the table above, Sullivan County radon levels are below average for the State. According to the State's mitigation plan, Sullivan County has a low probability of a radon related hazard.

In addition, radium, radon, and uranium as well as other natural materials can be present in drinking water. Residents, especially with bedrock wells, should be aware of the possibility of water contamination and the availability of testing and remediation. The Committee determined that the risk of natural contaminants is low/medium.

Hazardous Materials Spills



Hazardous materials spills or releases can cause loss of life and damage to property. Short or long-term evacuation of local residents and businesses may be required, depending on the nature and extent of the incident. The spills may occur on-site at hazardous waste generators or in transport through town.

In Washington, there are seven potential hazardous waste generators listed on the NH Department of Environmental Services (DES) “one-stop” list (May 2021): none generate significant amounts of hazardous waste.

Past Hazardous Waste Spill Events

No known significant spills have occurred in Washington, and there are no large hazardous waste generators in the Town.

Potential Future Hazardous Waste Spill Damage

Although there have not been any significant spills in Washington, hazardous materials spills could occur along the NH Route 10 or NH Route 31. In addition, heating fuel is delivered to homes on many of the town’s roads: spills could occur at storage tanks during the filling of the tanks. There conceivably could be spills near any home in Washington due to home heating fuel delivery. The property owner is responsible for clean-up. The State oversees these reported spills.

The State did not determine county risk for hazardous waste spills in the *NH Multi-Hazard Mitigation Plan Update 2013*. The Committee determined a hazardous waste spill is a low/medium risk.

Terrorism



Terrorism has been defined in many ways. The word terrorism is derived from the Latin term “terrere” which means to frighten. Section 802 of the USA Patriot Act expanded the definition of terrorism to cover “domestic,” as opposed to international terrorism. A person engages in domestic terrorism if they do an act “dangerous to human life” that is a violation of the criminal laws of a state or the United States, if the act appears to be intended to: (i) to intimidate or coerce a civilian population; (ii) to influence the policy of a government by intimidation or coercion; or (iii) to affect the conduct of a government by mass destruction, assassination, or kidnapping; and (C) occur primarily within the territorial jurisdiction of the United States.”

Past Terrorism Events

There have been no terrorism events within Washington in the past.

Future Terrorism Events

Terrorism is not considered a major risk, although vandalism is an occasional problem. The Committee determined that the risk of terrorism is a low risk in Washington.

Infectious Diseases



Infectious diseases are disorders caused by organisms — such as bacteria, viruses, fungi or parasites. Many organisms live in and on our bodies. They're normally harmless or even helpful. But under certain conditions, some organisms may cause disease.

Some infectious diseases can be passed from person to person. Some are transmitted by insects or other animals. And you may get others by consuming contaminated food or water or being exposed to organisms in the environment.

According to the US National Institutes of Health (NIH; Bethesda, MD, USA), 16 new infectious diseases have been identified in the past two decades (NIH 2008; Fauci et al, 2005); five others have been identified as re-emerging. The word ‘new’ refers to the recent discovery of the disease; many of these agents might have long existed as non-pathogenic organisms, but have only just mutated into a

pathogenic form. In fact, we are witnessing a slow realization among public-health experts and the general public that infectious diseases are back with a vengeance. With the discovery of antibiotics in the early twentieth century and the successful eradication of smallpox in 1979, it seemed that humanity was about to finally rid itself of infectious diseases. During the past couple of decades, however, microbes have shown a tenacious ability to adapt, re-adapt, survive and challenge human ingenuity.

Past Infectious Disease Events

The Committee does not recall any past major outbreaks. There have been over 40 COVID-19 cases in Washington and one death as of June 2021.

Future Infectious Disease Events

Although there have been no serious outbreaks in Washington in the past several years, the potential is there with the elementary school, town offices, commercial establishments like the general store, the Montfort Retreat, campgrounds, and churches. The State plan determined that Sullivan County is at low risk for infectious disease events. The Committee determined infectious disease events to be a low/medium risk in Washington.

Table III-16: INFECTIOUS DISEASE MEASUREMENT

Infectious Disease Extent	Description
Endemic	Constant presence and/or unusual prevalence of a disease or infection agent in a population within a geographic area
Hyper-endemic	The persistent, high levels of disease occurrence
Cluster	Aggregation of cases grouped in place and time that are suspected to be greater than the number expected even though the expected number may not be known
Epidemic	An increase, usually sudden, in the number of cases of a disease above what is normally expected
Outbreak	The same as epidemic, but over a much smaller geographical area
Pandemic	Epidemic that has spread over several countries or continents, usually affecting many people

Table III-17: ACTIONS TO REDUCE RISK OF INFECTIOUS DISEASE**Hand washing**

Always wash hands before, during and after preparing food, before eating, after using the bathroom or changing nappies, and after handling animals or animal waste. Simple hand washing has been found to reduce the bacterial load by up to 50%. Lather hands and scrub for 20 seconds.

Masks and social distancing

Wear a mask over the nose and mouth and stay 6' away from others especially in indoor areas around people who don't live with you.

Routinely cleaning and disinfecting surfaces

Cleaning with soap and water removes dirt and most germs. A disinfectant like hydrogen peroxide or white vinegar kills additional germs, however, the Center for Disease Control should be consulted for particular outbreaks. It is important to thoroughly clean areas where germs are likely to be transmitted, such as the kitchen and bathroom.

Handling and preparing food safely

Buy and refrigerate perishable foods quickly. Store food correctly. Do not allow juices from meat, seafood, poultry or eggs to drip onto other rarely eaten foods. Wash hands, kitchen surfaces and utensils after preparing food. Wash raw fruits and vegetables. Do not eat raw eggs. Use different plates for raw foods and cooked foods. Keep cold foods cold and hot foods hot. Do not leave leftovers out for more than 2 hours.

Immunization and vaccines

Children, adolescents and adults need immunizations. Make sure family members get the correct vaccines at the correct times. Keep immunization records for the whole family to ensure appropriate follow-up.

Correct use of antibiotics

Unnecessary use of antibiotics can be harmful and causes bacteria to become resistant. Antibiotics do not work against viral diseases such as colds or influenza. Use antibiotics exactly as prescribed—the correct dosage, at the correct time, for the correct duration—while respecting all necessary accompanying dietetic and hygienic regulations

Animal safety

Keep pets healthy by following veterinary recommendations. Clean litter boxes daily and do not let children play where animals urinate or defecate. Cover sandboxes. Use insect repellent during outdoor activities. Avoid contact with wild animals.

Safe sexual habits

The best ways of preventing the transmission of sexually transmitted diseases, in descending order of efficacy, are abstinence, fidelity to an uninfected partner and the use of condoms.

Safe blood transfusion

Blood transfusions should be used only for cases that absolutely require it as a live-saving measure. Even then, blood should be systematically screened for commonly known and frequent blood-transmitted infectious diseases.

Table III-18: INFECTIOUS DISEASE EVENTS

Date	Description	Impacts	Location	Additional Information
2005	Hepatitis A	82 cases	Statewide	30% higher than previous four years
2009	H1N1 Influenza	754 Hospitalizations and 10 Deaths	Statewide	WHO Level 1 Pandemic “swine flu” Division of Public Health Services processed 4,192 specimens and 786 cases
2014	Enterovirus D-68	>40 children in NH: some with paralysis	Statewide	A rare strain of enterovirus resulted in debilitating infections in children nationwide
2014-2015	Ebola virus disease	>100 people in NH monitored for potential Ebola virus symptoms	Statewide	Travel to West Africa during unprecedented outbreak of Ebola virus. No actual cases occurred in NH
2016	Gonorrhea	465 people infected	Statewide	250% higher than previous years
2017-2018	Seasonal influenza outbreak	As of April 2018, 63 adult influenza related deaths in NH	Statewide	A particularly virulent flu season. The overall effectiveness of the flu vaccine estimated at 36%.
Annually	Foodborne outbreaks	Ill individuals	Statewide	5-10 outbreaks per year
Annually	Influenza and other respiratory virus outbreaks	Ill individuals	Statewide	25-50 outbreaks per year primarily occurring in long-term care facilities and schools
Annually	Norovirus and other gastrointestinal virus outbreaks	Ill individuals	Statewide	60-80 outbreaks per year primarily occurring in long-term care facilities and schools
2019 & continuing	COVID-19 coronavirus Pandemic	As of June 2021, over 600,000 people have died in the US from COVID; over 40 people in Washington contracted COVID and one person died	Worldwide	Center for Disease Control (CDC) is responding to an outbreak of respiratory disease caused by a novel (new) coronavirus that was first detected in Wuhan City, Hubei Province, China and which has now been detected in most countries around the world. On January 30, 2020, the International Health Regulations Emergency Committee of the World Health Organization declared the outbreak a public health emergency of international concern. This disease causes respiratory disease. NH DR-4516: Incident period January 20, 2020 and continuing; Major Disaster Declaration declared on April 3, 2020.

Source: NH Multi-Hazard Mitigation Plan 2018 and 03/27/20 Newsweek regarding COVID-19.

C. HAZARD RISK RATINGS

The Town of Washington Hazard Mitigation Committee reviewed each potential hazard and rated the probability of occurrence and vulnerability (cost if the hazard actually occurs) to come up with an overall risk rating. These ratings were reevaluated and changed in 2021. The ratings were based on past occurrences of hazards affecting the State of New Hampshire, Sullivan County, and the Town of Washington. The two highest risks in Washington were determined to be Dam Failure and Flooding.

Assessing Probability

The process involved assigning a number to each hazard type based on its potential of occurring determined using the committee's knowledge of past events:

- 1 – Low: may occur after 25 years
- 2 – Medium: may occur within 10-25 years
- 3 – High: may occur within 10 years

An n/a score was given if there was insufficient evidence to make a decision. To ensure some balance with a more scientific measurement, the plan also identifies the probability of occurrence from the State Hazard Plan as shown in Table III-10. For comparative purposes the Low rating was given a designation of “1,” the Medium rating a designation of “2,” and the High rating a designation of “3.” These figures are shown in Table III-21 and III-22.

Table III-19: RISK AND PROBABILITY OF HAZARD IN SULLIVAN COUNTY - 2018 NH NATURAL HAZARDS MITIGATION PLAN

	Natural Hazard												
	Avalanche	Flooding	Drought	Earthquake	Extreme Temps	High Wind	Infectious Diseases	Landslide	Lightning	Severe Winter Weather	Solar Storm and Space Weather	Tropical Storms	Wildfires
Risk	L	H	L	L	L	H	L	L	L	H	L	M	L
Probability	M	H	M	M	H	H	M	H	H	H	L	M	M
Sullivan County listed at risk?	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Assessing Vulnerability

A relative scale of 1 to 3 was used to determine the impact and cost for human death and injury, property losses and damages, and business/agricultural impact: 1 – limited damage and cost; 2 - moderate amount of damage and cost, and 3 – high damage and cost.

Table III-20: VULNERABILITY OF EXISTING DEVELOPED AREAS

Committee Assessment of Vulnerability	Human Impact	Property Impact	Economic Impact	Vulnerability
	Probability of death or injury	Physical losses and damages	Cottage businesses & agriculture	Avg. of human/ property/ business impact
Dam Failure	1	1	1	1.00
Flooding	1	2	1	1.33
Erosion	1	2	1	1.33
Tropical Storms	2	3	2	2.33
High Wind	3	3	1	2.33
Thunderstorm/Lightning/Hail	1	1	1	1.00
Drought	1	1	1	1.00
Extreme Temperatures	1	1	1	1.00
Wildfire	1	3	2	2.00
Severe Winter/Ice Storms	1	2	1	1.33
Solar Storms and Space Weather	1	1	1	1.00
Earthquake	1	1	1	1.00
Natural Contaminants	1	1	1	1.00
HazMat Spills	1	1	1	1.00
Terrorism	3	1	1	1.67
Infectious Disease	3	1	1	1.67

Assessing Risk

The averages of each vulnerability and probability were multiplied to arrive at the overall risk the hazard has on the community. The overall risk or threat posed by a hazard over the next 25 years was determined to be high, medium, or low.

HIGH: There is strong potential for a disaster of major proportions during the next 25 years; or (2) history suggests the occurrence of multiple disasters of moderate proportions during the next 25 years. The threat is significant enough to warrant major program effort to prepare for, respond to, recover from, and mitigate against this hazard. This hazard should be a major focus of the town's emergency management training and exercise program.

MEDIUM: There is moderate potential for a disaster of less than major proportions during the next 25 years. The threat is great enough to warrant modest effort to prepare for, respond to, recover from, and mitigate this hazard. This hazard should be included in the town's emergency management training and exercise program.

LOW: There is little potential for a disaster during the next 25 years. The threat is such as to warrant no special effort to prepare for, respond to, recover from, or mitigate this hazard. This hazard need not be specifically addressed in the town's emergency management training and exercise program except as generally dealt with during hazard awareness training.

Table III-21: RISK ASSESSMENT

Risk Assessment				
0-1.9 Low 2-3.9 Low/Med 4-5.9 Med 6-7.9 Med-High 8-9 High				
Hazards	Probability based on Committee Review	Vulnerability based on Committee Review	Risk Rating (Probability x Vulnerability)	Risk
Dam Failure	1	1.00	1.00	Low
Flooding	2	1.33	2.66	Low/Medium
Erosion	2	1.33	2.66	Low/Medium
Tropical Storms	2	2.33	4.66	Medium
High Wind Events	2	2.33	4.66	Medium
Thunderstorm/Lightning/Hail	3	1.00	3.00	Low/Medium
Drought	2	1.00	2.00	Low/Medium
Extreme Temperatures	2	1.00	2.00	Low/Medium
Wildfire	2	2.00	4.00	Medium
Severe Winter	2	1.33	2.66	Low/Medium
Solar Storms and Space Weather	1	1.00	1.00	Low
Earthquake	1	1.00	1.00	Low
Natural Contaminants	2	1.00	2.00	Low/Medium
HazMat	2	1.00	2.00	Low/Medium
Terrorism	1	1.67	1.67	Low
Infectious Disease	2	1.67	3.34	Low/Medium

IV. CRITICAL FACILITIES/LOCATIONS

The Critical Facilities list, identified by the Washington Hazard Mitigation Committee, is divided into three categories. The first category contains facilities needed for emergency response in the event of a disaster. The second category contains non-emergency response facilities that are not required in an event, but that are considered essential for the everyday operation of the Town of Washington. The third category contains facilities/populations that the Committee wishes to protect in the event of a disaster. Values for all properties in this document were obtained from town tax records for 2020. This is for land and improvements such as buildings.

Table IV-1: EMERGENCY RESPONSE FACILITIES, SERVICES & STRUCTURES

Critical Facility	Hazard Vulnerability	Value	Tax Map/Lot
Public Works Garage	Winter storms; high winds, earthquake		
Police Station	Winter storms; tropical storms, high winds, earthquake		
Center Fire & Rescue Station-EOC	Winter storms; tropical storms, high winds, earthquake		
East Washington Fire Station	Winter storms; tropical storms, high winds, earthquake		
Camp Morgan Lodge (full service primary shelter)	Winter storms; tropical storms, high winds, earthquake, terrorism, infectious disease (truss roof not up to code for snow load)		
Elementary School (full service secondary shelter)	Winter storms; tropical storms, high winds, earthquake, Terrorism; Infectious Disease		
Town Hall (shelter only) & Town Offices (cooling & warming station)	Winter storms; tropical storms, high winds, earthquake, terrorism		
Granite State Telephone Switch Station (911 notifications)	Winter storms; tropical storms, high winds, earthquake		
Evacuation Routes & Bridges: Route 31, East Washington Road, Lempster Mt. Road, Ashuelot Lake (via boat or snowmobile)	Winter storms; tropical storms, high winds, earthquake		

Table IV-2: NON-EMERGENCY RESPONSE FACILITIES & STRUCTURES

Critical Facility	Hazard Vulnerability	Value	Tax Map/Lot
Roads & Bridges (non-evacuation)	Dam Failure, Flooding, Erosion, Earthquake, Severe Winter		
Washington General Store (food & gas)	Winter storms; tropical storms, high winds, earthquake		
Eccard Farm (farm stand, dairy)			
Beach House (Lake Ashuelot Estates)	Winter storms; tropical storms; high winds; earthquake		

Table IV-3: FACILITIES & POPULATIONS TO PROTECT

Critical Facility	Hazard Vulnerability	Value	Tax Map/Lot
Camp Morgan beach & recreation area	Winter storms; tropical storms, high winds, earthquake, flooding		
Pillsbury State Park	Winter storms; tropical storms, high winds, earthquake		
Joe's Hideaway Campground	Winter storms; tropical storms, high winds, earthquake		
Sunapee-Monadnock Greenway	Winter storms; tropical storms, high winds, earthquake		
Shedd Library (brick)	Winter storms; tropical storms, high winds, earthquake		
Congregational Church	Winter storms; tropical storms, high winds, earthquake		
Seventh Day Adventist Church	Winter storms; tropical storms, high winds, earthquake		
Purling Beck Grange	Winter storms; tropical storms, high winds, earthquake		
East Washington Baptist Church	Winter storms; tropical storms, high winds, earthquake		
Montfort Retreat (King Street, residential summer camp)	Winter storms; tropical storms, high winds, earthquake		
Water Resources inc. aquifers (see Natural Resources Inventory)	HazMat spills; Natural contaminants		
All non-residential/All homes	All Hazards		

V. DETERMINING HOW MUCH WILL BE AFFECTED

A. IDENTIFYING VULNERABLE FACILITIES

It is important to determine which critical facilities and other structures are the most vulnerable and to estimate potential losses. The first step is to identify the facilities most likely to be damaged in a hazard event. To do this, the locations of critical facilities were compared to the location of past and potential hazard events. Facilities and structures located in federally and locally determined flood areas, dam inundation areas, etc. were identified and included in the analysis. There is neither large land areas slated for potential development nor large development projects in the works, so vulnerability of undeveloped land was not analyzed except to note logical future development areas.

Table V-1: VULNERABILITY OF EXISTING DEVELOPED AREAS

Area	Hazard	Critical Facilities	Buildings (residential & non-residential)	Infrastructure	Natural Resources	Total Known Building Value
A Flood Zone	Flooding	None	234 buildings at \$23 Million	Unknown	Unknown	\$23 M
Dam Inundation Areas	Dam Failure	None	170 buildings at \$16.7 million	Unknown	Unknown	\$16.7 M

Table V-2: VULNERABILITY OF POTENTIAL DEVELOPMENT

Area	Hazard	Critical Facilities	Projected Buildings	Projected Infrastructure	Projected Value
None Known	All Hazards	None	N/A	N/A	N/A

B. IDENTIFYING VULNERABLE SPECIAL POPULATIONS

There are few centers of special populations in town including such as the regional elementary school, the town offices, the town hall during special meetings, and the library. The elderly and physically or mentally impaired residents are also residing throughout the town in their homes.

C. POTENTIAL LOSS ESTIMATES

This section identifies areas in town that are most vulnerable to hazard events and estimates potential losses from these events. It is difficult to ascertain the amount of damage caused by a natural hazard because the damage will depend on the hazard's extent and severity, making each hazard event quite unique. In addition, human loss of life was not included in the potential loss estimates, but could be expected to occur. FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses* (August 2001) was used in estimating loss evaluations. The value of structures was determined by using 2020 town records: total value of all structures is \$118,114,200. The Town's tax maps were used to determine land parcels within the dam failure and flood hazard areas. The land damage cost, structure content loss costs, and function loss cost were not determined. The average building value in Washington in 2020 is \$98,183.

Dam Failure – Low Risk - \$4.7 Million Estimated Cost

There are approximately 170 parcels within the dam inundation areas with an estimated total building value of \$16.7 million. The cost of Dam Failure is estimated to be \$4.7 million which is 28% of the structure value. The impact of the dam failure and subsequent inundation can be similar to those of flooding with road, and infrastructure damage, building and home damage, and general destruction.

Flooding – Low/Medium Risk - \$6.4 Million Estimated Cost

There are approximately 234 parcels within the FEMA designated Special Flood Hazard areas with an estimated total building value of \$23 million. These areas are all "Zone A and AE." Assuming a 28% structural damage to the buildings, the damage would total close to \$6.4 million. There are nine town and state bridges and several sections of road in these flood areas. No value estimate has been done for these structures. No estimate for contents of buildings was done.

Erosion – Low/Medium Risk – No Recorded or Estimated Cost

Development on steep slopes can cause substantial erosion in the adjacent area. This can impact the adjacent roads in the area by making them more susceptible to erosion and washout. Construction itself can cause erosion if best management practices are not used to control run-off from disturbed soils, and the rooftops of buildings displace water which would have gone into the ground. This is then exacerbated by the steep slopes where the run-off moves more quickly and can cause more damage.

Tropical/Post-Tropical Storms – Medium Risk – \$1.2 Million Estimated Cost

Damage caused by tropical storms can be severe and expensive. Washington has been impacted in the past by both wind and flooding damage as a result of tropical storms. The total assessed value of all structures within Washington is approximately \$118 million. It is

random which structures would be impacted and how much. There is no standard loss estimation available and no record of past costs. If 10% of the buildings received 10% damage, the damage cost would be about \$1.2 million.

High Wind Events –Medium Risk – \$1.2 Million Estimated Cost

Tornadoes, downbursts, and microbursts are relatively uncommon natural hazards in New Hampshire, although microbursts in 2007 caused substantial damage. On average, about six tornado events strike each year. In the State of NH, the average annual cost of tornadoes between 1950 and 1995 was \$197,000 (The Disaster Center). These wind events occur in specific areas, so calculating potential town-wide losses is difficult. An estimated loss of 1% of the total structure value equates to an estimated cost of \$1.2 Million; however, the randomness of a tornado or downburst can significantly impact the total cost and if the storms hit a more developed area, the cost could be significantly higher.

Thunderstorm/Lightning/Hail –Low/Medium Risk – No Recorded or Estimated Cost

According to the Federal Alliance for Safe Homes, in an average year, hail causes more than \$1.6 billion worth of damage to residential roofs in the United States, making it, year in and year out, one of the most costly natural disasters. Lightning is one of the most underrated severe weather hazards, yet it ranks as the second-leading weather killer in the United States. More deadly than tropical storms or tornadoes, lightning strikes in America each year killing an average of 73 people and injuring 300 others, according to the National Weather Service. There is no cost estimation model for thunderstorms due to their random nature. The cost can vary significantly due to the wide range of damage that the storms can cause, including electrical issues and flooding.

Drought – Low/Medium Risk – No Recorded or Estimated Cost

A long drought would cause damage to crops and dry up wells. There is no cost estimate for this hazard in Washington.

Extreme Temperatures – Low/Medium Risk – No Recorded or Estimated Cost

Excessive temperatures kills more people in the U.S. than tornadoes, tropical storms, floods, and lightning combined. The elderly, very young, obese and those who work outdoors or have substance abuse problems are most at risk from succumbing to extreme temperatures. Additionally, people in urban areas are more susceptible as asphalt and cement tend to hold in heat throughout the night (Federal Alliance of Safe Homes website). The costs for this hazard are in terms of human suffering. It is not anticipated that there would be any structural or infrastructure costs.

Wildfire – Medium Risk – \$590,000 Estimated Cost

The risk of fire is difficult to predict based on location. Forest fires are more likely to occur during drought years. In addition, areas and structures that are surrounded by dry vegetation that has not been suitably cleared are at high risk. Fire danger is generally universal,

however, and can occur practically at any time. Dollar damage would depend on the extent of the fire and the number and type of buildings burned. Since the entire developed area of Washington interfaces with forest, all structures are potentially vulnerable to wildfire. The estimated 2020 value of all structures in the Town is approximately \$118 million. If 1% of the structures received 50% damage, the total estimated cost would be about \$590,000.

According to the Sullivan County Forester, big wildfires are uncommon in Sullivan County as the weather here is generally not favorable for a high probability of ignition and rapid spread. Additionally, there are enough roads and people in the county that fires are generally spotted and addressed before they are too large. Occasionally weather conditions are more favorable as was seen in the 1950s on Croydon Mountain.

Severe Winter Weather – Low/Medium Risk – No Recorded or Estimated Cost

Ice storms often cause widespread power outages by downing power lines, and these storms can also cause severe damage to trees. New England usually experiences at least one or two severe snowstorms, with varying degrees of severity, each year. All of these impacts are a risk to the community and put all residents, especially the elderly, at risk.

According to a study done for the Institute for Catastrophic Loss Reduction (Canada) and the Institute for Business and Home Safety (U.S.), the 1998 Ice Storm inflicted \$1.2 billion (U.S.) worth of damage in the U.S. and Canada. In New Hampshire alone, over 67,000 people were without power (http://www.meteo.mcgill.ca/extreme/Research_Paper_No_1.pdf). U.S. average insurance claim was \$1,325 for personal property, \$1,980 for commercial property, and \$1,371 for automobiles.

Solar Storms and Space Weather - Low Risk - No Recorded or Estimated Costs

The daily U.S. economic cost from solar storm-induced electricity blackouts could be in the tens of billions of dollars, with more than half the loss from indirect costs outside the blackout zone. Previous studies have focused on direct economic costs within the blackout zone, failing to take account of indirect domestic and international supply chain loss from extreme space weather.

On average the direct economic cost incurred from disruption to electricity represents only 49% of the total potential macroeconomic costs reported in a paper published in *Space Weather*, a journal of the American Geophysical Union. Under the study's most extreme blackout scenario, affecting 66 per cent of the U.S. population, the daily domestic economic loss could total \$41.5 billion plus an additional \$7 billion loss through the international supply chain.

Earthquake – Low Risk - \$1.3 million Estimated Cost if All Buildings Impacted

Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and precipitate landslide and flash flood events. Four earthquakes in NH between 1924 and 1989 had a magnitude of 4.2 or more. Two of these occurred in Ossipee, one west of

Laconia, and one near the Quebec border. Buildings have not been subject to any seismic design level requirement for construction and would be susceptible to structural damage. The dams, bridges, and roads would be vulnerable to a sizable earthquake event.

FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Costs*, August 2001 provides that an earthquake with a 5% peak ground acceleration (as determined by the US Geologic Survey for the area) could cause damage to single family residences by around 10% of the structural value. If 10% of buildings in Washington were impacted by an earthquake, the estimated damage could be around \$1.3 million.

Natural Contaminants – Low/Medium Risk – No Recorded or Estimated Cost

The cost of a radon hazard would be the health of individuals exposed to radon. No cost estimate is provided for this hazard.

Hazardous Material Spills –Low/Medium Risk – No Recorded or Estimated Cost

The cost of a hazardous material spill would depend upon the extent of the spill, the location of the spill in relation to population, structures, infrastructure, and natural resources, as well as the type of hazardous material. The cost of any clean-up would be imposed upon the owner of the material. However, other less tangible costs such as loss of water quality might be borne by the community. No cost estimate has been provided for this possible hazard.

Terrorism – Low Risk – No Recorded or Estimated Cost

The cost of any terrorism event is unpredictable and not estimated in this document. The Committee does not feel that terrorism is a substantial threat in Washington.

Infectious Disease – Low/Medium - No Recorded or Estimated Cost

The cost of infectious disease is unpredictable and difficult to define. The impact of these diseases is immense and is felt across the world. In addition to affecting the health of individuals directly, infectious diseases are also having an impact on whole societies, economies and political systems. In the developing world in particular, crucial sectors for sustained development such as health and education, have seen a marked loss of qualified personnel, most notably to human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS), tuberculosis (TB) and malaria. These and other infectious agents not only take an enormous physical toll on humanity, but also cause significant economic losses both directly in the developing world and less directly in the developed world.

The COVID-19 virus of 2021 shows us that everyday businesses like restaurants and banks close due to potential spread of disease. This impacts the owners as well as the workers. The potential for infectious disease is ever present in any community. The Town of Washington's public facilities, schools, churches, and stores are potential sources for an outbreak.

VI. MITIGATION PROGRAMS AND ACTIONS

A. MITIGATION ASSESSMENT AND ACTION NEEDS

The Washington Hazard Mitigation Committee evaluated each potential hazard that could affect the Town in terms of how the Town could mitigate or eliminate those hazards. This was done first so the Committee could determine the success of achieving hazard mitigation in existing programs (on-going formalized activities) to see where improvements can be made; and also determine what actions could be taken within the next five years to complement existing programs and achieve better hazard mitigation.

Table VI-1: COMMITTEE ASSESSMENT FOR HAZARD MITIGATION ACTIONS

Hazard	Committee Ideas and Assessment
All Hazards	Community education. Improve emergency communication on Town website.
Dam Failure	Most of the dams are privately owned, the committee feels that the state inspections are adequate and that there are not additional actions they can take at this time. Currently working with owner of private Robinson Pond Dam as dam failure could impact public right of way.
Flooding	Flooding often creates problems on town roads where culverts and bridges are not large enough – the town has identified projects to complete, bridge on King Street.
Tropical Storms	The committee feels that the result of most hurricanes in Washington is flooding which they have designated mitigation actions to address. The town will continue to trim trees to prevent damage; the DPW keeps an annual list of trees to be trimmed.
High Winds	The committee feels the wind damage would be very similar to that of a hurricane which they addressed.
Thunderstorm/Lightning/Hail	The town has installed lightning rods on the town hall due to past strikes. They do not feel that any other town buildings are at risk. The wind resulting would be similar to that of High Winds and Tropical Storms. Surge protectors will be installed on all town computers and electrical equipment.
Severe Winter Weather	The tree trimming would aid in winter storm. The committee did not think there were additional actions that could be taken to reduce the impacts of severe winter weather.
Earthquake	The committee did not feel that there were any additional mitigation actions that were feasible for the town.
Drought	Notice of drought is publicized when needed.
Extreme Temperatures	Cooling and heating station availability is noticed when needed.
Erosion	The erosion issues are many times part of the culvert and drainage projects. The committee felt that they already identified projects to address all of the current erosion issues they have.
Wildfire	The town recently started inspecting each fire ring that was being issued for a fire permit. Doing on-line permitting; can now send emails for nonburn days. Look at all Class VI fire lanes and culverts for maintenance needs.

Hazard	Committee Ideas and Assessment
Natural Water & Air Contaminants	The committee did not feel that there were any additional mitigation actions that were feasible for the town.
Hazardous Material Spills	Currently members of Southwest Mutual Aid and contracting with Capital Area Fire Alarm. They did not feel they needed to take additional action.
Terrorism	Terrorism is not seen to be a large concern at this time in Washington. Though the committee recognizes the sometimes random and unexpected nature of terrorism.
Infectious Disease	Provide educational materials on web site through NH Ready.
Solar Storms/Space Weather	The committee did not feel there is anything they can do.

B. HAZARD MITIGATION PROGRAM ASSESSMENT

The following table provides the existing and proposed mitigation actions in Washington. New actions and improved existing program actions were developed after assessment of each hazard as shown in the above table. The first column lists existing mitigation practices/programs and if there were recommendations for improvement in the previous hazard mitigation plan. The second column indicates if those recommendations were put into action or not and if not, why. The final column provides either an update of the mitigation action or proposed improvements that are currently being recommended for the future.

Table VI-2: EXISTING HAZARD MITIGATION PROGRAMS

Existing Mitigation Action & Description	Hazard Type/Service Area	Responsible Local Agent	Effectiveness (Low, Average, High)	Future Proposed ACTIONS to Improve Program
Town Master Plan	All Hazards/Entire Town	Planning Board	Average	None
National Flood Insurance Program	Flooding/Entire Town	Select Board	High	None
Land Use Ordinance	Flooding, Erosion/Entire Town	Planning Board and Select Board	High	None
Best Management Practices for Erosions/Sediment Control	Erosions/Entire Town	Select Board	Average	None
Flood Zone Land Protection	Flooding/Entire Town	Conservation Commission	Average	None

Public Education Program	All Hazards/Entire Town	Select Board	Average	None
Tree Trimming	All Hazards/Entire Town	DPW Director	Average	None

C. EXISTING AND PROPOSED HAZARD MITIGATION ACTIONS

The following table provides a list and evaluation of the proposed mitigation actions for Washington. The first column lists mitigation actions. The second column indicates if those recommendations were proposed in the previous hazard mitigation plan and if they were put into action or not and if not, why. They are each designated as follows:

Completed – Action completed since the last plan update and no longer an action item.

Deleted – Action was deemed no longer an action item for this current plan.

Deferred – A portion or all of this action will continue in the current plan update.

Continuing – Action continually in process such as tree trimming whenever there is a storm; there is not an end date.

New – This is a new action proposed during the current planning process.

The final column provides either an update of the mitigation action or proposed improvements that are currently being recommended for the future. The latter will be evaluated further in upcoming chapters of this plan.

Table VI-3: EXISTING AND PROPOSED MITIGATION ACTIONS

Mitigation Action & Description	Status since 2016 Plan: New, Completed, In Progress, Deleted, or Deferred	Explanation
Lovell Mountain Road – Replace culvert inadequate for water flow with larger culvert on summer maintenance section of Class V road.	DEFERRED due to lack of resources	Materials purchase has been scheduled. This will be completed in fall of 2021
Millen Pond Road – replace culvert inadequate for water flow with larger culvert at Camp Morgan entrance	DEFERRED due to lack of resources	Scheduled for 2023
Halfmoon Pond Road – Replace culvert for water flow with larger culvert after boat landing	DEFERRED due to lack of resources	Scheduled for 2023
Bear Hill Road – Improve drainage with ditches and blasting	DEFERRED due to lack of resources	Scheduled for 2024

Mitigation Action & Description	Status since 2016 Plan: New, Completed, In Progress, Deleted, or Deferred	Explanation
Halfmoon Pond Road – Improve drainage with ditch work and tree work, but do not pave the steep hill	DELETE	Completed during last plan
Old Marlow Road – Improve drainage with ditch work and tree work, but do not pave steep hill	DELETE	Completed during last plan
Farnsworth Hill Road – Pave road to prevent clogging of drainage on very steep grade	DELETED due to lack of resources	Deleting project as only two houses on road
Wildfire Water Source for Firefighting - Map and assess water sites and other resources along woods roads and trails for wildfire fighting	DEFERRED due to lack of resources	Scheduled for 2021; working with GIS person to map all water sources
Fire Suppression at Dry Hydrants, Washington Drive Dam Area – Install dry hydrant to provide year-round access to water	DELETE for now	Will consider again after mapping and assessment of water sources
Public Education and Outreach – Keep website up to date for hazard mitigation education	COMPLETED and continuing	Added ReadyNH.gov to town website for public educational information; continue evaluating for potential increased outreach
Faxon Hill Road – Upsize culvert at Fire Pond	COMPLETED in 2018	NA
King Street Culvert – Increase capacity of undersized culvert	DEFERRED due to lack of resources	Scheduled for 2026.
Tree Trimming – Execute a tree trimming plan town wide to prevent storm damage from downed limbs	COMPLETED and continuing	NA
Electrical Equipment – Install and maintain surge protection on critical electronic equipment at all town facilities	Partly COMPLETED and DEFERRED	Completed in school, DPW, town hall, and fire station. Deferred at library, Camp Morgan Lodge, and Police Station: to be completed in 2021
Culvert Inventory – Inventory all culverts in Town	DEFERRED due to lack of resources	In discussions now with regional planning commission for culvert inventory through State program
Cooling/Warming Stations – Assess viable options for cooling and warming stations around Town	NEW	Added air conditioning to part of the town offices which can be used for a cooling station; will complete the A/C of the entire town offices in 2021; Evaluate other options for cooling/warming stations

Mitigation Action & Description	Status since 2016 Plan: New, Completed, In Progress, Deleted, or Deferred	Explanation
Robinson Pond Dam – Discussions with owner of private dam as failure could inundate public right of way	NEW; IN PROGRESS	Town currently talking with owner and design build firm to mitigate potential dam inundation impact on public right of way.
Class VI Road Access Signage – Alert drivers to lack of maintenance	NEW; IN PROGRESS	Searching for standard sign to alert drivers not to use Class VI road for transportation needs; these are for recreational use and wildfire access—not through roads; have had trucks travel out Class VI roads damaging culverts
Assess Class VI Fire Lanes – Assess for maintenance and traffic signage	NEW	Inventory and assess Class VI fire lanes to maintain roads/bridges for firefighting access
Emergency Communication Upgrade – Replace failing equipment	NEW	Need portable radios and pagers as some are starting to fail; improve coverage area; bought mobile repeaters
Town Master Plan – 2015/2016 Master Plan Update will incorporate the Hazard Mitigation Plan	DELETE - THESE PROGRAMS WERE INCLUDED IN THE ACTIONS TABLE IN THE LAST HAZARD MITIGATION PLAN. THEY WILL BE DELETED FROM THE ACTION TABLE IN THE NEXT PLAN AND ONLY INCLUDED IN THE PROGRAM ASSESSMENT TABLE.	
National Flood Insurance Program – Continue to provide information through public outreach and participate in NFIP trainings when available		
Land Use Ordinance		
Best Management Practices for Erosion and Sediment Control		
Flood Zone Protection		

The Town of Washington will provide a public education and outreach program by using brochures and the town website to reach their citizens. A link on the web site is provided for a Citizen's Guide to Hazard Mitigation and Emergency Preparedness: NH Ready. There will also be one-on-one outreach as appropriate. Below is a table showing the potential topics and outreach methods. Dam failure is not included as this is performed by the State Dam Bureau in their assessment of all dams in the State.

Table VI-4: PUBLIC EDUCATION AND OUTREACH TOPICS

Natural Hazard	Educational Topics	Outreach Methods
Multi-Hazard	Shelters; evacuation routes; proper evacuation procedures; emergency kits and family plans; emergency alerts; mitigation techniques for all hazards	Town web site Town meeting display Brochures
Flooding	National Flood Insurance Program participation; building in a floodplain; stormwater runoff; driving on flooded roads; protecting natural systems which provide flood mitigation; securing property items such as propane tanks prior to a flood	Town web site Brochures
Erosion	High risk areas; stormwater management; bank stabilization; water body buffers	Town web site
Tropical/Post-Tropical Cyclones	Construction of safe rooms	Town web site
High Wind Events (Hurricane)	Wind retrofits such as shutters, hurricane clips; school and town official sheltering basics; resident and business sheltering basics; window coverings	Town web site
Thunderstorms/Lightning/Hail	Taking cover; staying inside when it thunders; lightning protection systems	Town web site
Drought	Water-saving measures; crop insurance; soil and water conservation practices by farmers	Town web site
Extreme Temperatures	Preparing for extreme temperatures; air conditioning; cooling and warming shelters	Town web site
Wildfire	Most vulnerable areas; reducing fuel for fires such as dry brush	Town web site; Fire Department and Fire Warden interactions
Severe Winter Weather	Installation of carbon monoxide monitor and alarms; ventilation of fuel-burning equipment; protecting water pipes	Town web site
Solar Storms and Space Weather	What are they and how they can affect us	Town web site
Earthquake	Structural and non-structural home retrofitting; securing furnishings	Town web site
Natural Contaminants	Testing for contaminants in air and water	Town web site
Hazardous Materials Spills	What to do if there's a fuel delivery spill	Town web site
Terrorism	What to do if there is a terrorist act	Town web site
Infectious Disease	Prevention	Town web site

Evaluation of the existing mitigation strategies and improvements revealed that new strategies could help meet the needs for hazard mitigation in the Town of Washington.

D. CRITICAL EVALUATION FOR IMPROVEMENTS TO EXISTING PROGRAMS AND NEW ACTIONS

The Washington Hazard Mitigation Committee reviewed each of the proposed improvements to existing programs and proposed new actions identified for existing mitigation programs using the following factors:

- Does it reduce disaster damage?
- Does it contribute to community objectives?
- Does it meet existing regulations?
- Can it be quickly implemented?
- Is it socially acceptable?
- Is it technically feasible?
- Is it administratively possible?
- Does the action offer reasonable benefits compared to cost of implementation?

Each mitigation strategy was evaluated and assigned a score (High – 3; Average – 2; and Low – 1) based on the criteria.

The Washington Hazard Mitigation Committee assigned the following scores to each strategy for its effectiveness related to the critical evaluation factors listed above, and actions had the following scores, with the highest scores suggesting the highest priority. These scores are re-evaluated during each update process for new and existing strategies.

Table VI-4: PRIORITIZING PROPOSED & EXISTING HAZARD MITIGATION IMPROVEMENTS TO EXISTING PROGRAMS

Rank	Strategy	Reduce Damage	Community Objectives	Existing Regulations	Quickly Implemented	Socially Acceptable	Technically Feasible	Administration. Possible	Benefit - Cost	TOTAL SCORE	Mitigate Existing or New Development or Both
1	Public Education – Continue providing mitigation/emergency management outreach	3	3	3	3	3	3	3	3	24	Both
1	Class VI road Access Signage – Better signage to keep out inappropriate	3	3	3	3	3	3	3	3	24	Both

Rank	Strategy	Reduce Damage	Community Objectives	Existing Regulations	Quickly Implemented	Socially Acceptable	Technically Feasible	Administration. Possible	Benefit - Cost	TOTAL SCORE	Mitigate Existing or New Development or Both
2	Cooling/Warming Stations – Assess viable options for cooling and warming stations around Town	1	3	3	3	3	3	3	3	23	Both
2	Robinson Pond Dam – Discussions with owner of private dam as failure could inundate public right of way. Needs feasibility study.	3	3	3	2	3	3	3	3	23	Both
3	Road and Bridge Improvements – Halfmoon Pond Road Replace culvert inadequate for water flow with larger culvert after boat landing	3	3	3	2	3	3	2	3	22	Both
3	Road and Bridge Improvements – Millen Pond Road – Replace culvert inadequate for water flow with larger culvert at Camp Morgan entrance	3	3	3	2	3	3	2	3	22	Both
3	Culvert Inventory – Entire town inventory	2	3	3	3	3	3	3	2	22	New
3	Emergency Communication Upgrade – Replace failing equipment	3	3	3	1	3	3	3	3	22	Both
4	Electrical Equipment – Install and maintain surge protection on critical electronic equipment at all town facilities	2	2	3	2	3	3	3	3	21	New
5	Tree Trimming – Execute a tree trimming plan town wide to prevent storm	1	2	3	3	3	2	2	3	19	Both
5	Class VI Fire Roads – Assess maintenance needs and traffic signage	3	3	1	1	3	3	3	2	19	Both
6	National Flood Insurance Program - Continue to provide information through	1	3	2	3	2	2	2	2	17	Both
7	Road and Bridge Improvements - King Street Culvert – Increase capacity of undersized culvert on King Street	1	2	3	2	2	2	2	2	16	New
7	Road and Bridge Improvements – Lovell Mountain Road Replace culvert inadequate for water flow with larger culvert on summer maintenance section of	1	2	3	2	2	2	2	2	16	Both
7	Road and Bridge Improvements – Bear Hill Road Improve drainage with ditches and blasting	1	2	3	2	2	2	2	2	16	Both
8	Wildfire – Water Source for Firefighting - Map and assess water sites and other	1	2	3	1	2	2	2	1	14	Both

E. PRIORITIZED IMPLEMENTATION SCHEDULE

The Washington Hazard Mitigation Committee created the following action plan for implementation of priority mitigation strategies:

Table VI-5: PRIORITIZED IMPLEMENTATION SCHEDULE FOR EXISTING AND PROPOSED PROGRAM IMPROVEMENTS

Location: Mitigation Action	Who (Leadership)	When	How (Funding Sources)	Cost (Estimated)
Public Education – continue public outreach for hazard mitigation and emergency preparedness	Select Board	2021	Taxes	Staff Time
Class VI road Access Signage – Better signage to keep out improper traffic	Select Board	2021	Taxes	\$1,500 for sign installations
Cooling/Warming Stations – Assess viable options for cooling and warming stations around Town	Select Board	2021	Taxes	Staff Time
Robinson Pond Dam – Discussions with owner of private dam as failure could inundate public right of way; need feasibility study	DPW Director; Select Board	2021	Taxes	Staff Time; \$5,000
Road and Bridge Improvements – Halfmoon Pond Road Replace culvert inadequate for water flow with larger culvert after boat landing	DPW Director	2022	Taxes, HMGP/PDM	\$35,000
Road and Bridge Improvements - Millen Pond Road – Replace culvert inadequate for water flow with larger culvert at Camp Morgan entrance	DPW Director	2026	Taxes, HMGP/PDM	\$60,000
Culvert Inventory – Entire town inventory	DPW Director; Select Board	2021-22	Taxes, State grant	\$10,000
Emergency Communication Upgrade – Replace failing equipment	EMD; Fire Chief; Police Chief	2021-22	Taxes, State grant	\$150,000 (new tower \$100,000)
Electrical Equipment – Complete installation and maintain surge protection on critical electronic equipment at all town facilities	Select Board	2021	Taxes, HMGP/PDM	\$5,000
Tree Trimming – Execute a tree trimming plan town wide to prevent storm damage from downed limbs	DPW Director	Ongoing, throughout the life of the plan.	Taxes	Staff Time

Location: Mitigation Action	Who (Leadership)	When	How (Funding Sources)	Cost (Estimated)
Class VI Fire Road Access Maintenance and Signage – Alert drivers to lack of year-round maintenance and repair roads for fire access	Select Board; DPW Director	2022	Taxes	Staff Time
NFIP - Continue to provide information through public outreach and participate in NFIP trainings when they are available.	Select board	Ongoing throughout life of plan	Taxes	Staff Time
Road and Bridge Improvements - King Street Culvert – Increase capacity of undersized culvert on King Street	DPW Director	2026	Taxes, HMGP/PDM	\$80,000
Road and Bridge Improvements – Lovell Mountain Road - Replace culvert inadequate for water flow with larger culvert on summer maintenance section of Class V road	DPW Director	2021	Taxes, HMGP/PDM	\$12,000
Road and Bridge Improvements – Bear Hill Road - Improve drainage with ditches and blasting	DPW Director	2024	Taxes, HMGP/PDM	\$5,000
Wildfire – Water Source for Firefighting - Map and assess water sites and other resources along woods roads and trails for wildland firefighting.	Fire Chief/ Fire Warden	2021-22	Taxes	\$5,000

VII. EMERGENCY PREPAREDNESS ACTIONS

Although this is a hazard mitigation plan, the Committee felt it was important to address new and proposed emergency preparedness actions. It is sometimes difficult to distinguish between hazard mitigation and emergency preparedness. Essentially, emergency preparedness is the preparation to act once a hazard has occurred. And as has been discussed previously, hazard mitigation includes actions to eliminate or reduce hazards before they happen. Table VII -1 below is a list of the emergency preparedness actions that the Committee felt should be addressed and included in this plan.

Table VII-1: EMERGENCY PREPAREDNESS ACTIONS & PROPOSED IMPROVEMENTS

Existing Action & Description	Type/Service Area	Responsible Local Agent	Effectiveness (Low, Average, High)	Recommendations in Previous Hazard Mitigation Plan/Actions Taken to Meet Recommendations or Not Met	Update/Future Proposed Improvements
Local Emergency Operations Plan – Plan to deal with emergencies	All Hazards/Entire Town	EMD	High	Receive more training / <i>Completed on an ongoing basis and during the 2014 LEOP update.</i>	No further actions required.
Haz/Mat Program – Southwest Mutual Aid	HazMat Spills/Entire Town	Fire Chief	High	Purchase more personal protection equipment and water recovery equipment; more training. / The town has continual been updating it's equipment.	Continue to update equipment as funds become available.
Dam Emergency Plans and Maintenance	Dam Failure/Dam Inundation Areas	NH Dam Bureau and Dam Owners	High	More Public Awareness through web site and notices to property owners in inundation areas / Started and education program	No Further actions required.
Mutual Aid - Police–	All hazards/Entire Town	Police Chief	High	No Actions recommended in previous plan	Continue to participate in Mutual Aid
Mutual Aid – Fire – Southwest Mutual Aid	All Hazards/Entire Town	Fire Chief	High	No Actions recommended in previous plan	Continue to participate in Mutual Aid
Mutual Aid – Public works	All Hazards/Entire Town	DPW Director	High	No New actions recommended in previous plan	Continue to participate in Mutual Aid
911 Numbering -	All Hazards/Entire Town	Police Chief	Low	Enforce numbering and require replacement of illegible numbers.	Continue replacement and enforcement policy.

Existing Action & Description	Type/Service Area	Responsible Local Agent	Effectiveness (Low, Average, High)	Recommendations in Previous Hazard Mitigation Plan/ <i>Actions Taken to Meet Recommendations or Not Met</i>	Update/Future Proposed Improvements
Source Water Protection	Flooding & Erosion / Entire Town	Planning Board and Conservation Commission		Develop water resource protection plan to address issues pertaining to water quantity and quality for the town's many water bodies / Attempted; lack of support from town residents	
ICS & NIMS	All Hazards/Entire Town	EMD	Average	Provide additional training to town office staff and school personnel.	Continue to provide the training as available.

VIII. ADOPTION & IMPLEMENTATION OF THE PLAN

A good plan needs to provide for periodic monitoring and evaluation of its successes and challenges, and to allow for updates of the Plan where necessary. In order to track progress and update the Mitigation Strategies identified in the Plan, the Town of Washington will revisit the Hazard Mitigation Plan *annually, or after a hazard event*. The Washington Emergency Management Director will initiate this review and should consult with the Hazard Mitigation Committee. Changes will be made to the plan to accommodate for projects that have failed, or that are not considered feasible after a review for their consistency with the evaluation criteria, the timeframe, the community's priorities, and funding resources. Priorities that were not ranked highest, but that were identified as potential mitigation strategies, will be reviewed as well during the monitoring and update of this plan, to determine feasibility for future implementation. The plan will be updated and submitted for FEMA approval at a minimum every five years as required by the Disaster Mitigation Act 2000.

A. IMPLEMENTATION THROUGH EXISTING PROGRAMS

The Hazard Mitigation Committee will meet annually to reassess the plan and to assure that they are accomplishing their goals. Additionally, the Hazard Mitigation Committee will revisit the plan within 90 days of a declared disaster to review and revise the goals and actions of the plan. The Town had not incorporated hazard mitigation into Town documents in the past. The Town Select Board, during the Capital Improvement Process, will review and include any proposed structural projects outlined in this plan. Reference will be made to the Hazard Mitigation Plan and Local Emergency Operations Plan as well as importance of hazard mitigation in appropriate Master Plan sections. In the past, the town has not formally reviewed the plan each year, but has used it informally as a planning tool. The town will also add hazard mitigation information to town web site.

Many municipalities have web sites where they can share information about hazard mitigation and emergency management. The use of the web site by its citizens is often dictated by the availability of broadband service to easily access the web. The Town of Washington will provide a link to the Regional Planning Commission's web page, "A Citizen's Guide to Hazard Mitigation and Emergency Management."

Municipalities have documents to convey town goals and objectives that are used to guide future programs. They can be used to promote and implement hazard mitigation. A Municipal Master Plan outlines how the community wants to grow and develop. It includes overall goals and objectives of the community and recommendations for ordinances and regulations to accomplish those goals.

A zoning ordinance is a common vehicle to implement goals of the master plan and regulates land use. It can be used to restrict development in flood zones, steep sloped areas, buffer zones around wetlands and water bodies, drinking water recharge areas, hillsides, and ridgelines. These areas may be “overlay districts” mapped out for protection. A zoning ordinance can also require best management practices in forestry and timber harvesting and stormwater management to prevent erosion. A floodplain management plan is part of the zoning ordinance and has typically followed a format recommended by the NH Flood Management Program. Washington has a Land Use Ordinance which is a zoning ordinance and was adopted in 2021.

Other municipal documents include regulations such as Curb Cut Regulations, Excavation Regulations, Subdivision Regulations and Site Plan Review Regulations. Curb Cut Regulations are used to make sure the culverts at the intersection of driveways and roads are adequate to handle runoff water or stream flow. Excavation Regulations are used to restrict the removal of earth including distance to seasonal high-water table and the requirements to restore the site once the excavation is completed. This is essential to make sure the area is graded and re-vegetated to reduce the chances of erosion. Subdivision Regulations determine how lots are to be laid out in a subdivision. This might include requirements for fire protection, stormwater runoff management, vegetated buffers, and reference back to the zoning ordinance where one exists. Site Plan Review Regulations are for multi-family housing and commercial development. The regulations can determine site specific development requirements such as parking, open space, vegetated buffers, and traffic flow.

Subdivision Regulations and Site Plan Review Regulations typically refer back to the Zoning Ordinance, so it may be more effective to amend the zoning ordinance to address hazard mitigation through specific restrictions though this can vary by municipality. In addition, these regulations do not apply to single lot development of single-family residential homes. When there is not zoning ordinance as in Washington, there is much less control to guide development away from hazard areas.

Another important municipal document is the Capital Improvements Program which is a “budget of the future” to consider potential capital expenditures such as new roads, equipment, schools, parks. This allows a systematic evaluation of potential projects. Any capital expenditures related to hazard mitigation will be incorporated into this document.

There are other regulations and ordinances that municipalities may adopt such as to regulate water use during a drought or restrict development in areas around drinking water sources. This all varies by municipality.

It should also be noted that many municipalities do not update these documents very often, and some towns do not have them at all. However, where they exist, they offer the potential to include hazard mitigation and emergency management topics.

In Washington, the most recent version of the Master Plan is 2015, Land Use Ordinance 2021, the latest version of Subdivision Regulations is 2010, and the Driveway Permit Application is 2014. The most critical documents to reference hazard mitigation are primarily the master plan and the zoning ordinance. Washington is undergoing a Master Plan update and a Hazards and Emergency Management Chapter is being referenced in the update. The town will continue to evaluate its documents to include hazard mitigation. The Town reviews their Capital Improvement Program annually and uses the actions in the Hazard Mitigation Plan as a tool to aid in the CIP process.

B. CONTINUED PUBLIC INVOLVEMENT

The public will continue to be involved in the hazard mitigation planning process. In future years, a public meeting will be held (separate from the adoption hearing) to inform and educate members of the public. Additionally, a press release will be distributed, and information will be posted on the Town website.

Copies of the Hazard Mitigation Plan have been or will be sent to the following parties for review and comment:

- Select Board Offices in neighboring towns
- NH Homeland Security & Emergency Management
- Washington Select Board, Conservation Commission, and Planning Board
- Upper Valley Lake Sunapee Regional Planning Commission

RESOURCES USED IN THE PREPARATION OF THIS PLAN

FEMA 386-1 *Getting Started: Building Support for Mitigation Planning*, September 2002

FEMA 386-2 *Understanding Your Risks: Identifying Hazards and Estimating Costs*, August 2001

FEMA 386-3 *Developing the Mitigation Plan: Identifying Mitigation Actions and Implementation Strategies*, April 2003

FEMA *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*, June 2017

FEMA *Local Mitigation Planning Handbook*, March 2013

Ice Storm '98 by Eugene L. Lecomte et al for the Institute for Catastrophic Loss Reduction (Canada) and the Institute for Business & Home Safety (U.S.), December 1998

Town of Washington Emergency Operations Plan, 2016

Town of Washington Master Plan, 2015

NH HSEM's *State of New Hampshire Multi-Hazard Mitigation Plan Update 2018*

APPENDICES

Appendix A:	Technical Resources
Appendix B:	Hazard Mitigation Assistance Grants
Appendix C:	Meeting Documentation
Appendix D:	Map of Hazard Areas and Critical Facilities
Appendix E:	Town Adoption & FEMA Approvals of Hazard Mitigation Plan

APPENDIX A:

Technical Resources

APPENDIX A: TECHNICAL RESOURCES

1) Agencies

New Hampshire Homeland Security and Emergency Management	
Hazard Mitigation Section	271-2231
Federal Emergency Management Agency	(617) 223-4175
NH Regional Planning Commissions:	
Upper Valley Lake Sunapee Regional Planning Commission	448-1680
NH Executive Department:	
Governor's Office of Energy and Community Services	271-2611
New Hampshire Office of State Planning	271-2155
NH Department of Cultural Affairs:	271-2540
Division of Historical Resources	271-3483
NH Department of Environmental Services:	271-3503
Air Resources	271-1370
Waste Management	271-2900
Water Resources	271-3406
Water Supply and Pollution Control	271-3504
Rivers Management and Protection Program	271-1152
NH Office of Energy and Planning	271-2155
NH Municipal Association	224-7447
NH Fish and Game Department	271-3421
NH Department of Resources and Economic Development:	271-2411
Natural Heritage Inventory	271-3623
Division of Forests and Lands	271-2214
Division of Parks and Recreation	271-3255
NH Department of Transportation	271-3734
Northeast States Emergency Consortium, Inc. (NESEC)	(781) 224-9876
US Department of Commerce:	
National Oceanic and Atmospheric Administration:	
National Weather Service; Gray, Maine	207-688-3216

US Department of the Interior:	
US Fish and Wildlife Service	225-1411
US Geological Survey	225-4681
US Army Corps of Engineers.....	(978) 318-8087
US Department of Agriculture:	
Natural Resource Conservation Service	868-7581

2) Mitigation Funding Resources

404 Hazard Mitigation Grant Program (HMGP)	NH Homeland Security and Emergency Management
406 Public Assistance and Hazard Mitigation	NH Homeland Security and Emergency Management
Community Development Block Grant (CDBG)	NH HSEM, NH OEP, also refer to RPC
Dam Safety Program	NH Department of Environmental Services
Disaster Preparedness Improvement Grant (DPIG)	NH Homeland Security and Emergency Management
Emergency Generators Program by NESEC†	NH Homeland Security and Emergency Management
Emergency Watershed Protection (EWP) Program	USDA, Natural Resources Conservation Service
Flood Mitigation Assistance Program (FMAP)	NH Homeland Security and Emergency Management
Flood Plain Management Services (FPMS)	US Army Corps of Engineers
Mitigation Assistance Planning (MAP)	NH Homeland Security and Emergency Management
Mutual Aid for Public Works	NH Municipal Association
National Flood Insurance Program (NFIP) †	NH Office of Energy and Planning
Power of Prevention Grant by NESEC†	NH Homeland Security and Emergency Management
Project Impact.....	NH Homeland Security and Emergency Management
Roadway Repair & Maintenance Program(s)	NH Department of Transportation
Section 14 Emergency Stream Bank Erosion & Shoreline Protection.....	US Army Corps of Engineers
Section 103 Beach Erosion.....	US Army Corps of Engineers
Section 205 Flood Damage Reduction.....	US Army Corps of Engineers
Section 208 Snagging and Clearing	US Army Corps of Engineers
Shoreland Protection Program.....	NH Department of Environmental Services
Various Forest and Lands Program(s).....	NH Department of Resources and Economic Development
Wetlands Programs.....	NH Department of Environmental Services

‡NESEC – Northeast States Emergency Consortium, Inc. is a 501(c)(3), not-for-profit natural disaster, multi-hazard mitigation and emergency management organization located in Wakefield, Massachusetts. Please, contact NH OEM for more information.

† Note regarding National Flood Insurance Program (NFIP) and Community Rating System (CRS):

The National Flood Insurance Program has developed suggested floodplain management activities for those communities who wish to more thoroughly manage or reduce the impact of flooding in their jurisdiction. Through use of a rating system (CRS rating), a community's floodplain management efforts can be evaluated for effectiveness. The rating, which indicates an above average floodplain management effort, is then factored into the premium cost for flood insurance policies sold in the community. The higher the rating achieved in that community, the greater the reduction in flood insurance premium costs for local property owners. The NH Office of State Planning can provide additional information regarding participation in the NFIP-CRS Program.

3) Websites

Sponsor	Internet Address	Summary of Contents
Natural Hazards Research Center, U. of Colorado	http://www.colorado.edu/litbase/hazards/	Searchable database of references and links to many disaster-related websites.
Atlantic Hurricane Tracking Data by Year	http://wxp.eas.purdue.edu/hurricane	Hurricane track maps for each year, 1886 – 1996
National Emergency Management Association	http://nemaweb.org	Association of state emergency management directors; list of mitigation projects.
NASA – Goddard Space Flight Center “Disaster Finder:	http://www.gsfc.nasa.gov/ndrd/disaster/	Searchable database of sites that encompass a wide range of natural disasters.
NASA Natural Disaster Reference Database	http://ltpwww.gsfc.nasa.gov/ndrd/main/html	Searchable database of worldwide natural disasters.
U.S. State & Local Gateway	http://www.statelocal.gov/	General information through the federal-state partnership.
National Weather Service	http://nws.noaa.gov/	Central page for National Weather Warnings, updated every 60 seconds.
USGS Real Time Hydrologic Data	http://h20.usgs.gov/public/realtime.html	Provisional hydrological data
Dartmouth Flood Observatory	http://www.dartmouth.edu/artsci/geog/floods/	Observations of flooding situations.
FEMA, National Flood Insurance Program, Community Status Book	http://www.fema.gov/fema/csb.htm	Searchable site for access of Community Status Books
Florida State University Atlantic Hurricane Site	http://www.met.fsu.edu/explores/tropical.html	Tracking and NWS warnings for Atlantic Tropical storms and other links

Sponsor	Internet Address	Summary of Contents
National Lightning Safety Institute	http://lightningsafety.com/	Information and listing of appropriate publications regarding lightning safety.
NASA Optical Transient Detector	http://www.ghcc.msfc.nasa.gov/otd.html	Space-based sensor of lightning strikes
LLNL Geologic & Atmospheric Hazards	http://wwwep.es.llnl.gov/wwwep/ghp.html	General hazard information developed for the Dept. of Energy.
The Tornado Project Online	http://www.tornadoobject.com/	Information on tornadoes, including details of recent impacts.
National Severe Storms Laboratory	http://www.nssl.uoknor.edu/	Information about and tracking of severe storms.
Independent Insurance Agents of America IIAA Natural Disaster Risk Map	http://www.iaa.iix.com/ndcmap.htm	A multi-disaster risk map.
Earth Satellite Corporation	http://www.earthsat.com/	Flood risk maps searchable by state.
USDA Forest Service Web	http://www.fs.fed.us/land	Information on forest fires and land management.

APPENDIX B:
Hazard Mitigation Assistance Grants

APPENDIX B: HAZARD MITIGATION ASSISTANCE GRANTS

Hazard Mitigation Assistance (HMA) grant programs of the Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA), present a critical opportunity for Washington to protect individuals and property from natural hazards while simultaneously reducing reliance on Federal disaster funds. The HMA programs provide pre-disaster mitigation grants annually to local communities. The statutory origins of the programs differ, but all share the common goal of reducing the loss of life and property due to natural hazards. Eligible applicants include State-level agencies including State institutions; Federally recognized Indian Tribal governments; Public or Tribal colleges or universities (PDM only); and Local jurisdictions.

All subapplicants for Flood Mitigation Assistance Program (FMA) must currently be participating in the National Flood Insurance Program (NFIP) to be eligible to apply for this grant. Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) mitigation project subapplications for projects sited within a special flood hazard area are eligible only if the jurisdiction in which the project is located is participating in the NFIP. There is no NFIP participation requirement for HMGP and PDM project subapplications located outside the special flood hazard area. Properties included in a project subapplication for FMA funding must be NFIP-insured at the time of the application submittal. Flood insurance must be maintained at least through completion of the mitigation activity.

The HMA grant assistance includes three programs:

1. *Hazard Mitigation Grant Program (HMGP)*: This program assists in the implementation of long-term hazard mitigation measures following a major disaster.
2. *The Pre-Disaster Mitigation (PDM) program*: This provides funds for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are awarded on a competitive basis.
3. *The Flood Mitigation Assistance (FMA) program*: This provides funds so that cost-effective measures can be taken to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insured under the NFIP. The long-term goal of FMA is to reduce or eliminate claims under the NFIP through mitigation activities.

Potential eligible projects are shown in the following table by grant program. For further information on these programs visit the following FEMA websites:

HMGP - <http://www.fema.gov/hazard-mitigation-grant-program>

PDM – www.fema.gov/government/grant/pdm/

FMA – www.fema.gov/government/grant/fma

Mitigation Project:	HMGP	PDM	FMA
1. Mitigation Projects	X	X	X
Property Acquisition and Structure Demolition	X	X	X
Property Acquisition and Structure Relocation	X	X	X
Structure Elevation	X	X	X
Mitigation Reconstruction			X
Dry Floodproofing of Historic Residential Structures	X	X	X
Dry Floodproofing of Non-residential Structures	X	X	X
Minor Localized Flood Reduction Projects	X	X	X
Structural Retrofitting of Existing Buildings	X	X	
Non-structural Retrofitting of Existing Buildings and Facilities	X	X	X
Safe Room Construction	X	X	
Wind Retrofit for One- and Two-Family Residences	X	X	
Infrastructure Retrofit	X	X	X
Soil Stabilization	X	X	X
Wildfire Mitigation	X	X	
Post-Disaster Code Enforcement	X		
Generators	X	X	
5% Initiative Projects	X		
Advance Assistance	X		
2. Hazard Mitigation Planning	X	X	X
3. Management Costs	X	X	X

OTHER HAZARD MITIGATION ASSISTANCE FUNDING

Environmental Protection Agency

The EPA makes available funds for water management and wetlands protection programs that help mitigate against future costs associated with hazard damage.

Mitigation Funding Sources Program	Details	Notes
Clean Water Act Section 319 Grants	Grants for water source management programs including technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and regulation. http://www.epa.gov/OWOW/NPS/cwact.html	Funds are provided only to designated state and tribal agencies
Clean Water State Revolving Funds	State grants to capitalize loan funds. States make loans to communities, individuals, and others for high-priority water-quality activities. http://www.epa.gov/owow/wetlands/initiative/srf.html	States and Puerto Rico
Wetland Program Development Grants	Funds for projects that promote research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution. http://www.epa.gov/owow/wetlands/initiative/#financial	See website

National Oceanic and Atmosphere Administration (NOAA)

NOAA is the major source for mitigation funding related to coastal zone management and other coastal protection projects.

Mitigation Funding Sources Program	Details	Notes
Coastal Services Center Cooperative Agreements	Funds for coastal wetlands management and protection, natural hazards management, public access improvement, reduction of marine debris, special area management planning, and ocean resource planning. http://www.csc.noaa.gov/funding/	May only be used to implement and enhance the states' approved Coastal Zone Management programs
Coastal Services Center Grant Opportunities	Formula and program enhancement grants for implementing and enhancing Coastal Zone Management programs that have been approved by the Secretary of Commerce. http://www.csc.noaa.gov/funding/	Formula grants require non-federal match
Coastal Zone Management Program	The Office of Ocean and Coastal Resource Management (OCRM) provides federal funding and technical assistance to better manage our coastal resources. http://coastalmanagement.noaa.gov/funding/welcome.html	Funding is reserved for the nation's 34 state and territory Coastal Zone Management Programs
Marine and Coastal Habitat Restoration	Funding for habitat restoration, including wetland restoration and dam removal. http://www.nmfs.noaa.gov/habitat/recovery/	Funding available for state, local and tribal governments and for- and non-profit organizations.

Floodplain, Wetland and Watershed Protection Programs

USACE and the U.S. Fish and Wildlife Service offer funding and technical support for programs designed to protect floodplains, wetlands, and watersheds.

Funding and Technical Assistance for Wetlands and Floodplains Program	Details	Notes
USACE Planning Assistance to States (PAS)	Fund plans for the development and conservation of water resources, dam safety, flood damage reduction and floodplain management. http://www.lre.usace.army.mil/planning/assist.html	50 percent non-federal match
USACE Flood Plain Management Services (FPMS)	Technical support for effective floodplain management. http://www.lrl.usace.army.mil/p3md-o/article.asp?id=9&MyCategory=126	See website
USACE Environmental Laboratory	Guidance for implementing environmental programs such as ecosystem restoration and reuse of dredged materials. http://el.erdc.usace.army.mil/index.cfm	See website
U.S. Fish & Wildlife Service Coastal Wetlands Conservation Grant Program	Matching grants to states for acquisition, restoration, management or enhancement of coastal wetlands. http://ecos.fws.gov/coastal_grants/viewContent.do?viewPage=home	States only. 50 percent federal share
U.S. Fish & Wildlife Service Partners for Fish and Wildlife Program	Program that provides financial and technical assistance to private landowners interested in restoring degraded wildlife habitat. http://ecos.fws.gov/partners/viewContent.do?viewPage=home	Funding for volunteer-based programs

Housing and Urban Development

The Community Development Block Grants (CDBG) administered by HUD can be used to fund hazard mitigation projects.

Mitigation Funding Sources Program	Details	Notes
Community Development Block Grants (CDBG)	Grants to develop viable communities, principally for low and moderate income persons. CDBG funds available through Disaster Recovery Initiative. http://www.hud.gov/offices/cpd/communitydevelopment/programs/	Disaster funds contingent upon Presidential disaster declaration
Disaster Recovery Assistance	Disaster relief and recovery assistance in the form of special mortgage financing for rehabilitation of impacted homes. http://www.hud.gov/offices/cpd/communitydevelopment/programs/dri/assistance.cfm	Individuals
Neighborhood Stabilization Program	Funding for the purchase and rehabilitation of foreclosed and vacant property in order to renew neighborhoods devastated by the economic crisis. http://www.hud.gov/offices/cpd/communitydevelopment/programs/neighborhoodspg/	State and local governments and non-profits

Bureau of Land Management

The Bureau of Land Management (BLM) has two technical assistance programs focused on fire mitigation strategies at the community level.

Mitigation Funding Sources Program	Details	Notes
Community Assistance and Protection Program	Focuses on mitigation/prevention, education, and outreach. National Fire Prevention and Education teams are sent to areas across the country at-risk for wildland fire to work with local residents. http://www.blm.gov/nifc/st/en/prog/fire/community_assistance.html	See website
Firewise Communities Program	Effort to involve homeowners, community leaders, planners, developers, and others in the effort to protect people, property, and natural resources from the risk of wildland fire before a fire starts. http://www.firewise.org/	See website

U.S. Department of Agriculture

There are multiple mitigation funding and technical assistance opportunities available from the USDA and its various sub-agencies: the Farm Service Agency, Forest Service, and Natural Resources Conservation Service.

Mitigation Funding Sources Agency Program	Details	Notes
USDA Smith-Lever Special Needs Funding	Grants to State Extension Services at 1862 Land-Grant Institutions to support education-based approaches to addressing emergency preparedness and disasters. http://www.csrees.usda.gov/funding/rfas/smith_lever.html	Population under 20,000
USDA Community Facilities Guaranteed Loan Program	This program provides an incentive for commercial lending that will develop essential community facilities, such as fire stations, police stations, and other public buildings. http://www.rurdev.usda.gov/rhs/cf/cp.htm	Population under 20,000
USDA Community Facilities Direct Loans	Loans for essential community facilities. http://www.rurdev.usda.gov/rhs/cf/cp.htm	Population of less than 20,000
USDA Community Facilities Direct Grants	Grants to develop essential community facilities. http://www.rurdev.usda.gov/rhs/cf/cp.htm	Population of less than 20,000
USDA Farm Service Agency Disaster Assistance Programs	Emergency funding and technical assistance for farmers and ranchers to rehabilitate farmland and livestock damaged by natural disasters. http://www.fsa.usda.gov/	Farmers and ranchers
USDA Forest Service National Fire Plan	Funding for organizing, training, and equipping fire districts through Volunteer, State and Rural Fire Assistance programs. Technical assistance for fire related mitigation. http://www.forestsandrangelands.gov/	See website
USDA Forest Service Economic Action Program	Funds for preparation of Fire Safe plans to reduce fire hazards and utilize byproducts of fuels management activities in a value-added fashion. http://www.fs.fed.us/spf/coop/programs/eap/	80% of total cost of project may be covered
USDA Natural Resources Conservation Service Emergency Watershed Protection Support Services	Funds for implementing emergency measures in watersheds in order to relieve imminent hazards to life and property created by a natural disaster. http://www.nrcs.usda.gov/programs/ewp/	See website

Mitigation Funding Sources Agency Program	Details	Notes
USDA Natural Resources Conservation Service Watershed Protection and Flood Prevention	Funds for soil conservation; flood prevention; conservation, development, utilization and disposal of water; and conservation and proper utilization of land. http://www.nrcs.usda.gov/programs/watershed/index.html	See website

Health and Economic Agencies

Alternative mitigation programs can be found through health and economic agencies that provide loans and grants aimed primarily at disaster relief.

Federal Loans and Grants for Disaster Relief Agency Program	Details	Notes
Department of Health & Human Services Disaster Assistance for State Units on Aging (SUAs)	Provide disaster relief funds to those SUAs and tribal organizations who are currently receiving a grant under Title VI of the Older Americans Act. http://www.aoa.gov/doingbus/fundopp/fundopp.asp	Areas designated in a Disaster Declaration issued by the President
Economic Development Administration (EDA) Economic Development Administration Investment Programs	Grants that support public works, economic adjustment assistance, and planning. Certain funds allocated for locations recently hit by major disasters. http://www.eda.gov/AboutEDA/Programs.xml	The maximum investment rate shall not exceed 50 percent of the project cost
U.S. Small Business Administration Small Business Administration Loan Program	Low-interest, fixed rate loans to small businesses for the purpose of implementing mitigation measures. Also available for disaster damaged property. http://www.sba.gov/services/financialassistance/index.html	Must meet SBA approved credit rating

Research Agencies

The United States Geological Survey (USGS) and the National Science Foundation (NSF) provide grant money for hazard mitigation-related research efforts.

Hazard Mitigation Research Grants Agency Program	Details	Notes
National Science Foundation (NSF) Decision, Risk, and Management Sciences Program (DRMS)	Grants for small-scale, exploratory, high-risk research having a severe urgency with regard to natural or anthropogenic disasters and similar unanticipated events. http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5423&org=SES	See website
U.S. Geological Survey (USGS) National Earthquake Hazards Reduction Program	The purpose of NEHRP is to provide products for earthquake loss reduction to the public and private sectors by carrying out research on earthquake occurrence and effects. http://www.usgs.gov/contracts/nehrrp/	Community with a population under 20,000

APPENDIX C:
Meeting Documentation

Work Plan

Meeting #1: Thursday, June 17, 2021 10:30 AM - Noon

- General discussion of requirements and in-kind match process
- Review goals of hazard mitigation plan and revise (hand out)
- Review hazards (see poster – Add hazards? Remove hazards?)
- Identify and map past/potential hazards (update map & lists in Chapter 2)
- Flooding – Are there any non-FEMA flood areas?
- Specific past and potential events of hazards not in 2016 plan (recent events)
- Potential development areas in town (compare with list in 2016 plan)
- Identify critical facilities (update map and list)
- Review Critical Facilities & hazard vulnerability
- Determine Vulnerability to Hazards for Town
- Determine Probability of Hazards for Town
- Discuss future meetings, public notice, stakeholders to be notified, notices to abutting towns

Meeting #2 Thursday, June 24, 2021, 10:30 AM - Noon

- Review previously determined potential mitigation efforts (were they implemented? If not, why not and are they still on the table to be implemented?)
- Brainstorm improvements to existing mitigation efforts
- Brainstorm potential new mitigation efforts
- Evaluate the past and potential mitigation efforts

Meeting #3 Thursday, July 17, 2021, 10:30 AM - Noon

- Develop a prioritized implementation schedule and discuss the adoption and monitoring of the plan
- Review and revise draft plan

Washington Hazard Mitigation Plan Update 2021 Meeting Attendance List

June 17, 2021

Dianne Craig, Town of Goshen Selectman
Cynthia Dressel, Town of Washington Emergency Management Director
Mark Dressel, Town of Washington Deputy EMD/Police Officer
Allan Dube, Town of Washington Selectman
Tom Marshall, Selectman
Donald Revane, Town of Washington Selectman
Edward Thayer, Town of Washington Public Works Director
Victoria Davis, UVLSRPC Planner

June 24, 2021

Shawn Atkins, Town of Washington Fire Chief
Cynthia Dressel, Town of Washington Emergency Management Director
Allan Dube, Town of Washington Selectman
Tom Marshall, Selectman
Donald Revane, Town of Washington Selectman
Edward Thayer, Town of Washington Public Works Director
Victoria Davis, UVLSRPC Planner

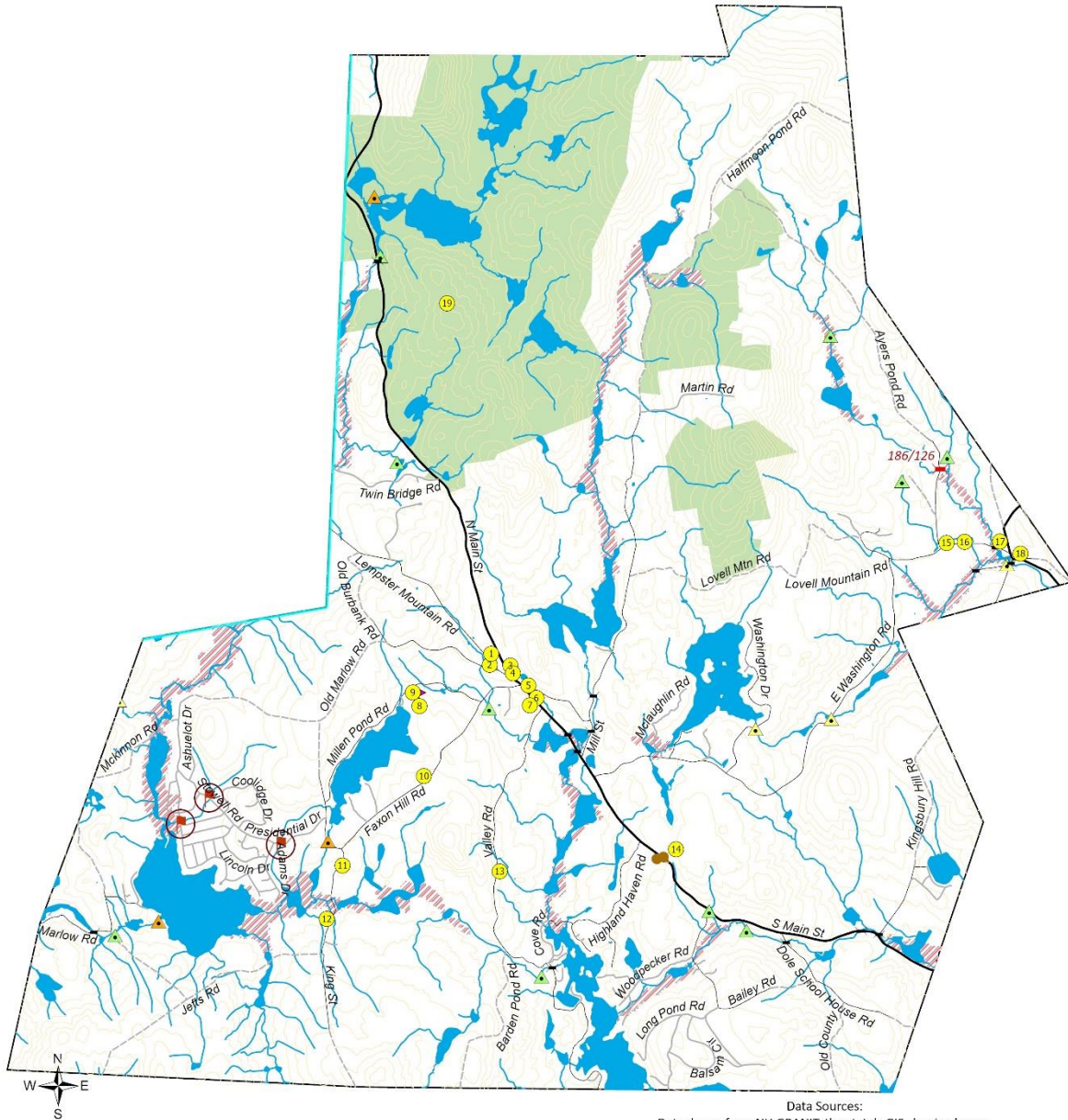
July 15, 2021

Shawn Atkins, Town of Washington Fire Chief
Cynthia Dressel, Town of Washington Emergency Management Director
Allan Dube, Town of Washington Selectman
Tom Marshall, Selectman
Donald Revane, Town of Washington Selectman
Edward Thayer, Town of Washington Public Works Director
Victoria Davis, UVLSRPC Planner

APPENDIX D:
Map of Hazard Areas and Critical Facilities

Town of Washington

Hazard Mitigation 2021



Data Sources:
 Data drawn from NH GRANIT, the state's GIS clearing house.
 Dam Inundation data from NH DES Dam Bureau, 1991. Bridge condition from NHDOT 2020.
 Critical Facilities and flood hazard areas from Washington Hazard Mitigation Committee, 2021.

Disclaimer: This map is for planning purposes only.

Map Created by UVLSRPC in 2021.



Legend

Town Features

- Critical Facility
- Schools
- Solid Waste Facility
- State Parks & Forests
- Contours 20m

Water Features

- Waterbody
- Streams & Rivers

FEMA Flood Zones

- Regulatory Floodway
- 100 Year Flood
- 500 Year Floor
- Flood Hazard

Dams by Hazard Class

- ▲ Significant hazard potential
- ▲ Low hazard potential
- ▲ Non Menace

Bridges

- Municipal Redlist
- Not on the Redlist

Roads

- State
- Local
- Not Maintained
- Private

ID

- | ID # | Critical Facility |
|------|--------------------------------|
| 1 | Post Office |
| 2 | Fire/Rescue |
| 3 | Shed Free Library |
| 4 | Congregational Church |
| 5 | Police |
| 6 | Town Hall |
| 7 | Telephone Switch |
| 8 | Camp Morgan Lodge |
| 9 | Elementary School |
| 10 | Radio Tower |
| 11 | 7-Day Adventist |
| 12 | Montfort Retreat |
| 13 | Joe's Hideaway |
| 14 | Highway Garage |
| 15 | East Washington School |
| 16 | East Washington Fire Station |
| 17 | Purling Beck Grange No. 268 |
| 18 | East Washington Baptist Church |
| 19 | Pillsbury State Park |

APPENDIX E:

FEMA Approvals and Town Adoption of Hazard Mitigation Plan

**Town of Washington, New Hampshire
Board of Selectmen
A Resolution Adopting the Washington Hazard Mitigation Plan Update 2021**

WHEREAS, the Town of Washington received assistance from the Upper Valley Lake Sunapee Regional Planning Commission through funding from the NH Homeland Security and Emergency Management to prepare a hazard mitigation updated plan; and

WHEREAS, several planning meetings to develop the hazard mitigation plan update were held in May through June 2019 and then presented to the Board of Selectmen for review and discussion on _____, 2021; and

WHEREAS, the Washington Hazard Mitigation Plan contains several potential future projects to mitigate the hazard damage in the Town of Washington; and

WHEREAS, the Board of Selectmen held a public meeting on _____, 2021 to formally approve and adopt the Washington Hazard Mitigation Plan.

NOW, THEREFORE BE IT RESOLVED that the Washington Board of Selectmen adopt the Washington Hazard Mitigation Plan Update 2021.

APPROVED and SIGNED this __ day of _____, 2021.

TOWN OF WASHINGTON
BOARD OF SELECTMEN

Chair

(seal)

ATTEST:

Member

Member

Town of Washington, New Hampshire
Board of Selectmen
A Resolution Adopting the Washington Hazard Mitigation Plan Update 2021

WHEREAS, the Town of Washington received assistance from the Upper Valley Lake Sunapee Regional Planning Commission through funding from the NH Homeland Security and Emergency Management to prepare a hazard mitigation updated plan; and

WHEREAS, several planning meetings to develop the hazard mitigation plan update were held in May through June 2019 and then presented to the Board of Selectmen for review and discussion on 6/17th, 2021; and

WHEREAS, the Washington Hazard Mitigation Plan contains several potential future projects to mitigate the hazard damage in the Town of Washington; and

WHEREAS, the Board of Selectmen held a public meeting on 6/13/21, 2021 to formally approve and adopt the Washington Hazard Mitigation Plan.

NOW, THEREFORE BE IT RESOLVED that the Washington Board of Selectmen adopt the Washington Hazard Mitigation Plan Update 2021.

APPROVED and SIGNED this 13th day of January, 2022.

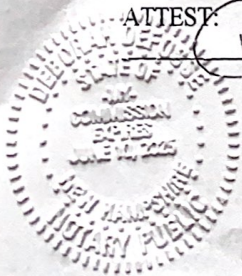
TOWN OF WASHINGTON
BOARD OF SELECTMEN

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