Multi-Hazard Mitigation Plan Update 2017

Town of Nottingham, NH

Al Fernald Bridge on McCrillis Road, April 2007 Flooding Event

Adopted 2006
Updated November, 2012
Updated April, 2017

Submitted to the New Hampshire Homeland Security & Emergency Management

By the

Town of Nottingham, NH
with Strafford Regional Planning Commission

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The 2006 and 2012 Nottingham Multi-Hazard Mitigation Committee
New Hampshire Homeland Security Emergency Management (HSEM)
Town of Nottingham

The 2017 Town of Nottingham Multi-Hazard Mitigation Planning Committee

Eight people have attended meetings and/or been instrumental in completing this plan:

- John Fernald Jr. — Road Agent, Town of Nottingham
- Chris Sterndale — Town Administrator, Town of Nottingham
- Charlene Andersen — Board of Selectmen, Town of Nottingham
- Gunnar Foss — Police Chief, Town of Nottingham
- Paul Colby — Code Enforcement Officer, Town of Nottingham
- Teresa Bascom — Planning Board, Town of Nottingham
- Torey O'Brien — Fire Department, Town of Nottingham
- Chris D'Eon — Fire Department. Town of Nottingham
- Zach Gagnon — Fire Department, Town of Nottingham

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Cover: Al Fernald Bridge on McCrillis Road, April 2007 Flooding Event
Photo credit: Charlie A. Brown, Former Town Administrator

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Executive Summary

This Plan was revised and updated to meet statutory requirements and to assist the Town of Nottingham in reducing and mitigating future losses from natural and man-made hazardous events. An initial edition of this Plan was developed and presented to FEMA in 2006. The plan was revised in 2012, and was updated in 2017 to reflect the most recent information obtained through the evolution of the hazard mitigation program at the State. This update was developed by Strafford Regional Planning Commission (SRPC) and participants from the Multi-Hazard Mitigation Planning Team, which was made up by the Town Administrator, Road Agent, Police Chief, Code Enforcement Officer, Fire/Rescue personnel, and members from both the Planning Board and Select Board.

The Plan references historical events, as well as identifies specific vulnerabilities that are likely to impact the Town. Overall threats include:

- ∴ Three high hazard vulnerabilities – flooding, hurricane and tropical storms, wildfire, and drought;
- ∴ Three moderate hazard vulnerabilities – tornado and downburst, winter storms, and severe thunderstorms;
- ∴ Four low hazard vulnerabilities – earthquake and landslide, extreme temperatures, public health threats, and hazardous materials.

Each hazard was provided with a description and information on the hazard's extent, past events and impacts, potential future impacts to the community, and potential loss estimates. As part of this analysis, the planning team reviewed past and existing mitigation strategies and made updates for improvement. Lastly, the planning team developed a series of new mitigation actions to be completed over the course of this plan's five-year cycle. Each mitigation action was prioritized using the STAPLEE Method and responsibilities for implementation were identified.

This plan provides an updated list of Critical Infrastructure and Key Resources (CI/KR) categorized as follows: Emergency Response Services (ERS), Non-Emergency Response Facilities (NERS), Critical Infrastructure (CI), and Water Resources (WR). All critical assets were inventoried and mapped.

The revision process included reviewing other Town Hazard Plans, technical manuals, federal and state laws, the State Hazard Mitigation Plan, research data, and other available mitigation documents from multiple sources. Combining elements from these sources, the Planning Team was able to produce this integrated multi-hazards plan and recognizes that such a plan must be considered a work in progress.

The Town of Nottingham received conditional approval on 3/17/2017, 2017. A public meeting was held and the plan was adopted by the Select Board on April 10, 2017. The Plan received formal approval from FEMA on April 20, 2017.

In addition to periodic reviews there are three specific situations, which require a formal review of the plan. The plan will be reviewed:

- ∴ Annually to assess whether the existing and suggested mitigation strategies have been successful and remain current in light of any changes in federal state and local regulations and statutes. This review will address the Plan's effectiveness, accuracy and completeness in regard to the implementation strategy. The review will address any recommended improvements to the Plan, and address any weaknesses identified that the Plan did not adequately address. This report will be filed with the Board of Selectmen. Every Five Years the Plan will be thoroughly reviewed, revised and updated using the same criteria outlined above. At that time it is expected to be thoroughly reviewed and updated as necessary. The public will be allowed and encouraged to participate in that five year revision process.
- ∴ After any declared emergency event, the EMD using the same criteria outlined above.
- ∴ If the Town adopts any major modifications to its land use planning documents, the jurisdiction will conduct a Plan review and make changes as applicable.

Nottingham Municipal Offices, April 2007 Flooding Event

Chapter 1: Multi-Hazard Mitigation Planning Process

Authority

Nottingham's original Multi-Hazard Mitigation Plan was prepared pursuant to Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Act), herein enacted by Section 104 of the Disaster Mitigation Act of 2000 (DMA) (P.L. 106-390). This Act provides new and revitalized approaches to mitigation planning. Section 322 of DMA 2000 emphasizes the need for State, local and tribal entities to closely coordinate mitigation planning and implementation efforts. This revised multi-hazard plan will be referred to as the "Plan". Nottingham's Plan has been prepared by the Multi-Hazard Mitigation Planning Team with the assistance and professional services of Strafford Regional Planning Commission (SRPC) under contract with New Hampshire Homeland Security Emergency Management (HSEM) operating under the guidance of Section 206.405 of 44 CFR Chapter 1 (10-1-2010 Edition). This plan is funded, in part, by HSEM through grants from FEMA (Federal Emergency Management Agency). Funds from Town dues and matching funds for team member's time are also part of the funding formula.

Purpose and History

The ultimate purpose of Disaster Mitigation Act of 2000 (DMA) is to:

- *establish a national disaster hazard mitigation program –*
- *reduce the loss of life and property, human suffering, economic disruption and disaster assistance costs resulting from natural disasters; and*
- *provide a source of pre-disaster hazard mitigation funding that will assist States and local governments (including Indian tribes) in implementing effective hazard mitigation measures that are designed to ensure the continued functionality of critical services and facilities after a natural disaster.*

DMA 2000 amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act by, among other things, adding a new section "322 – Mitigation Planning" which states:

As a condition of a receipt of an increased Federal share for hazard mitigation measures under subsection (e), a State, local, or tribal government shall develop and submit for approval to the President a mitigation plan that outlines processes for identifying the natural hazards, risks, and vulnerabilities of the area under the jurisdiction of the government.

HSEM's goal is for all New Hampshire communities to complete a local multi-hazard plan as a means to reduce future losses from natural and man-made events before, during, or after they occur. HSEM has outlined a process whereby communities throughout the state may become eligible for grants and other assistance upon completion of this multi-hazard plan. The state's regional planning commissions are charged with providing assistance to selected communities to help develop local plans.

Nottingham's Multi-Hazard Mitigation Plan is a planning tool for reducing future losses from natural and man-made disasters as required by the Disaster Mitigation Act of 2000.

The DMA places new emphasis on local mitigation planning. It requires local a local jurisdiction to prepare and adopt a FEMA or HSEM approved jurisdiction-wide Hazard Mitigation Plan as a condition for receiving Hazard Mitigation Assistance (HMA) project grants and other grants every five years. In addition to updating their plans every five years to continue program eligibility, local governments should review the plan yearly.

Jurisdiction and Scope of the Plan

This Plan addresses only one jurisdiction: the Town of Nottingham, NH. The Plan addresses 11 types of natural and man-made hazards that may affect the Town:

- Flooding
- Hurricane & Tropical Storm
- Tornado & Downburst
- Winter Weather Events
- Severe Thunderstorms
- Wildfire
- Earthquake/Landslide
- Extreme Heat
- Drought
- Public Health Threats
- Hazardous Material

It describes each hazard and identifies past occurrences of hazard events and assesses probability of future hazard events in the Town. The Plan assesses the vulnerability of key infrastructure and critical facilities; existing residential buildings and other structures within Nottingham; and future development. The Plan also addresses the administrative, technical, and physical capacity of emergency response services and response coordination between federal, state, and local entities.

Al Fernald Bridge on McCrillis Road, April 2007 Flooding Event

Multi-Hazard Mitigation Goals

The Town's multi-hazard goals are based on the State of New Hampshire Multi-Hazard Mitigation Plan (2013) goals and include:

- *Ensure the protection of the general population, citizens and guests of Nottingham New Hampshire, before during and after a hazard.*
- *Protect existing properties and structures through mitigation activities.*
- *Provide resources to residents of Nottingham, when needed, to become more resilient to hazards that impact the Town's critical support services, critical facilities, infrastructure, economy, environment, historical & cultural treasures and private property.*
- *Support the Presidential Policy Directive (PPD-8) through prevention, mitigation, preparedness, and response and recovery actions.*
- *Work regionally to identify, introduce and implement cost effective hazard mitigation measures in order to accomplish the Town's goals.*
- *Develop and implement programs to promote hazard mitigation to protect infrastructure throughout the Town to reduce liability with respect to natural and human-caused hazards generally.*
- *To address the challenges posed by climate change as they pertain to increasing risks in the Town's infrastructure and natural environment.*

Multi-Hazard Mitigation Planning Process

Overview

The Plan was developed and updated with substantial local, state, and federal coordination. The completion of this new multi-hazard plan required significant planning preparation and represents the collaborative efforts of the Town of Nottingham, an ad-hoc local Multi-Hazard Mitigation Planning Committee, and SRPC. The Committee followed an established ten step multi-hazard mitigation planning process (see box, right).

The Committee met four times over a five month period to discuss the range of hazards included in this plan as well as brainstorm mitigation needs and strategies to address these hazards and their impacts on people, business, and infrastructure in the Town. All meetings were geared to accommodate brainstorming, open discussion, and an increased awareness of potential threats to the Town. This process results in significant cross talk regarding all types of natural and man-made hazards.

Ten Step Multi-Hazard Mitigation Planning Process

1. Establish and Orient a Hazard Mitigation Planning Committee
2. Identify Past and Potential Hazards
3. Identify of Hazards and Critical Facilities
4. Assess Vulnerability – Estimating Potential Losses
5. Analyze Development Trends
6. Identify Existing Mitigation Strategies and Proposed Improvements
7. Develop Specific Mitigation Measures
8. Prioritize Mitigation Measures
9. Prepare Mitigation Action Plan
10. Adopt and Implement the Plan

Committee Meetings

The Plan is being developed with substantial local, state and federal coordination; completion of this new multi-hazard plan required significant planning preparation. All meetings are geared to accommodate brainstorming, open discussion and an increased awareness of potential threats to the City. Below is a brief summary of each meeting. Full meeting agendas and sign-in sheets are included in the Plan's Appendix B.

Meeting # 1: November 30, 2016

Members present: Gunnar Foss (Chief of Police), John Fernald (Road Agent), Chris Sterndale (Town Administrator), and Teresa Bascom (Planning Board)

During this meeting, Strafford Regional Planning Commission staff went over the review process and discussed the responsibilities of the committee, in-kind match documentation, and the steps towards successful adoption. The planning committee then reviewed and updated all existing and past mitigation strategies that were identified in their current 2012 plan. Lastly, the planning committee reviewed any past federally declared disasters or emergency declarations.

Meeting # 2: December 21, 2016

Members present: Gunnar Foss (Chief of Police), John Fernald (Road Agent), Chris Sterndale (Town Administrator), Paul Colby (Code Enforcement Officer), Torey O'Brien (Fire/Rescue), Chris D'Eon (Fire/Rescue) and Teresa Bascom (Planning Board).

During this meeting, Strafford Regional Planning Commission staff finished up reviewing gaps in the existing and past mitigation strategies. The planning committee then reviewed their complete list of critical facilities in Town to ensure consistency and accuracy. Lastly, the planning committee reviewed all hazards in order to: discuss extent and impact of each hazard; complete a vulnerability assessment tool; develop actions; and determine responsibilities for implementation.

Meeting # 3: January 11, 2017

Members present: Gunnar Foss (Chief of Police), Chris Sterndale (Town Administrator), Paul Colby (Code Enforcement Officer), Torey O'Brien (Fire/Rescue), Zach Gagnon (Fire/Rescue), and Charlene Andersen (Select Board).

During this meeting, Strafford Regional Planning Commission staff finished any unfinished business from the previous meeting. The planning committee then reviewed and completed the STAPLEE method to prioritize mitigation actions. Lastly, the planning committee reviewed all their critical facilities and hazard maps to determine which structures were vulnerable to future events.

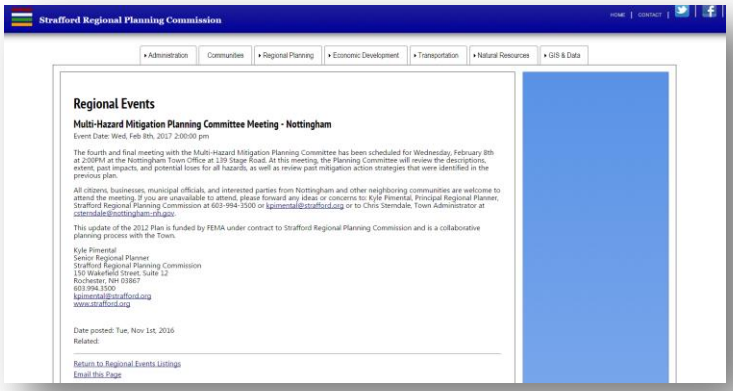
Meeting # 4: February 8, 2017

Members present: Chris Sterndale (Town Administrator), Paul Colby (Code Enforcement Officer), Torey O'Brien (Fire/Rescue), Chris D'Eon (Fire/Rescue) and Teresa Bascom (Planning Board).

During this meeting, Strafford Regional Planning Commission staff reviewed the write ups for all the hazards, which included the description, extent, past events and impacts, potential future impacts, and estimated potential losses. Next, the Planning Committee reviewed all past mitigation strategies and determined which ones had been accomplished and which ones were either ongoing or not completed. Lastly, SRPC staff led a discussion on next steps on finalizing the plan and receiving the appropriate approval letters. The meeting concluded with a timeframe given as to when the community could expect to plan for a public meeting to adopt the plan at a Select Board's meeting.

Public Involvement

Public involvement is an important part of the planning process. A local Multi-Hazard Mitigation Planning Committee (the Committee) was formed to guide and oversee the development of this Plan. Board of Selectmen; administrative staff; Conservation Commission members; Planning and Zoning Board of Adjustment Members; the Police, Fire, and Highway Departments; and local business owners, interested organizations, and residents of Nottingham were invited to participate on the Committee. Community officials were encouraged to contact as many people as they could to participate in the planning process. Members of the public and other stakeholders from neighboring communities were also informed of and encouraged to attend the Committee's meetings.



To build awareness of the Plan and opportunity to be involved, an announcement about the Plan update was included on the Strafford Regional Planning Commission's website and information about the Plan was included in SRPC's news updates in order to ensure that adjacent communities were aware of Nottingham's committee meetings and had the opportunity to attend. A public notice, stressing the public nature of the process, was posted on the Town's website and notices were hung at the Town Hall for a one week period one week in advance of each Committee meeting. The Committee met four times between November 30, 2016 and February 8, 2017. All feedback from participants of the planning committee was incorporated into the Plan. There was no participation from surrounding communities. There was no other public participation in the plan update process.

The public will have the opportunity for future involvement as the Plan will be periodically reviewed and the public will be invited to participate in all future reviews and updates to this plan. There will also be a public meeting before each formal review and before any change/update is sent to HSEM.

Once final approval by HSEM has been received, copies of the Plan will be distributed to the relevant Town Departments and personnel, HSEM, and FEMA and other state and local governmental entities; the Plan will then be distributed by these entities per requirements. Copies of the Plan will remain on file at the Strafford Regional Planning Commission (SRPC) in both digital and paper format.

Adoption and Integration

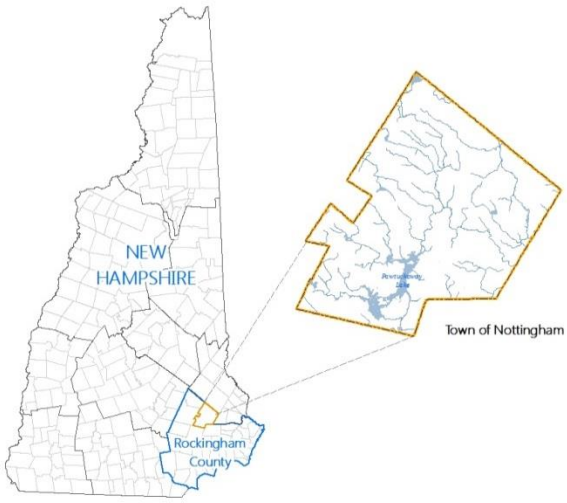
Once approved by the Planning Committee, the Plan will be forwarded to HSEM for Conditional Approval. Upon review and conditional approval by HSEM, the Board of Selectmen will hold a public meeting, to consider public comments and must promulgate a signed Resolution to Adopt the Plan.

Elements of the Plan will be incorporated into other planning processes and documents, such as the Town's Master Plan, Capital Improvement Plan, and Emergency Operations Plan. The Town will refer to this Multi-Hazard Mitigation, as appropriate, in other documents.

Chapter 2: Community Profile

Overview

The Town of Nottingham is located in southeastern NH within Rockingham County. The towns bordering Nottingham are: Barrington to the north, Raymond to the south, Lee to the east, Epping to the southeast, Deerfield to the west and Northwood to the northwest. With a population of 4,878 (according to the 2015 American Community Survey), Nottingham has experienced roughly a 30% increase in total population since 2000, making it one of the largest population percent increases in the region.



Map 1: Nottingham Locus Map (Source: SRPC, 2017)

Nottingham is geographically large with limited development. The Town is roughly 30,996 total acres (48.4 square miles), which includes 26,225 acres of land (40.9 square miles) and 4,771 acres of water/wetlands (7.4 square miles)[1]. A significant portion of land in Nottingham remains undeveloped. Most developed lands are for single family residential use with only scattered commercial and public uses. In general, the pattern of developed uses is so dispersed that it requires driving to get around, except perhaps for the relatively few people living in the Town center. Commuting out of town to work is also clearly a necessity for the majority of people given the relatively small number of commercial land uses in Nottingham. The Town center, which includes the Town Hall, Police Station, Library, and recreation fields, is not densely settled, and maintains a rural in scale.

Remaining development naturally follows along the road networks. The dispersed nature of roads, however, has kept density low. There is no municipal water or sewer, and the Town controls density based on the ability of soils to provide for sanitary water supply and sewage disposal. Pawtuckaway Lake is partially surrounded by homes and camps. Similar, though somewhat less extensive development has occurred at some of the other lakes and ponds in Nottingham. Nottingham contains a variety of wetland areas. The major wetland in Nottingham is Burnham's Marshes. Major floodplains are located along the Little River, North River, Bean River, and Elliot River.

[1] 2015 Land Use Data. NH GRANIT, Earth Systems, Research Center, Institute for the Study of Earth, Oceans, and Space. University of New Hampshire.

Housing

In the period between 2010 and 2015, Nottingham experienced an increase of 51 total housing units (roughly 2.6%). Nottingham experienced the lowest number of total housing units in 2010, and the highest in 2013 and 2014 respectively. According to housing tenure data for that same 5-year time period, the total renter-occupied unit counts decreased by 45.7% while owner-occupied housing units increased by 10.2%. During this time period, the vacant housing units decreased by 18.7% and occupied housing units increased by 45.9%. As of 2015, Nottingham's occupied housing units are roughly 96.1% owner-occupied and 3.9% renter occupied. Vacant housing units varied from a high of 368 in 2013 to a low of 209 in 2015. Currently, the Town exhibits a 10.5% vacancy rate.

Table 1: Housing Data 2010 - 2015

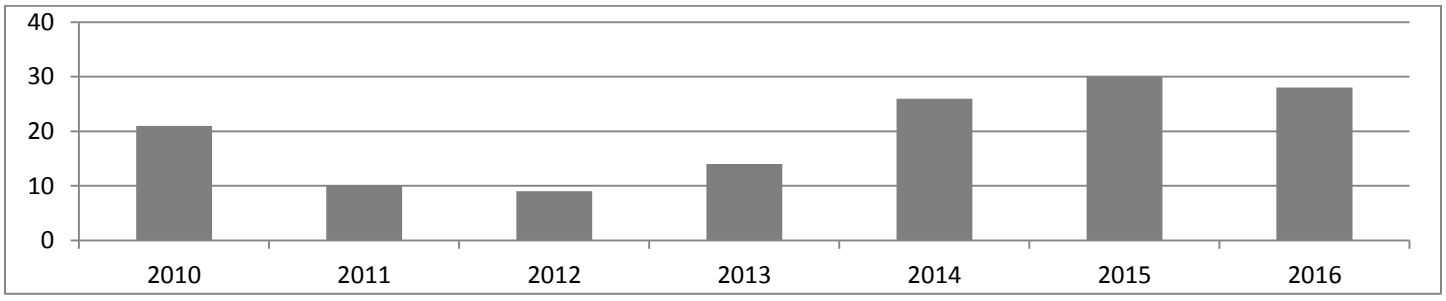
	2010	2011	2012	2013	2014	2015	% Change 2010-2015
Total Housing Units	1,941	2,039	2,091	2,155	2,115	1,992	2.6%
Occupied Housing Units	1,684	1,750	1,785	1,787	1,824	1,783	5.9%
Owner Occupied Housing Units	1,555	1,607	1,644	1,677	1,748	1,713	10.2%
Renter Occupied Housing Units	129	143	141	110	76	70	-45.7%
Vacant Housing Units	257	289	306	368	291	209	-18.7%

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates

Building Permit Data

A total of 138 building permits have been issued from 2010 through 2016. This data shows that within this time period, the net number of permits issued has steadily increased from a low of 9 in 2012 to a high of 30 in 2015. The past three years (2014-2016) have remained relatively consistent with 26, 30, and 28 permits being issued. This data represents the best available information at the time of the preparation of the Plan; however, it should be noted that the issuance of a building permit does not directly correlate with new development. Many of these permits may have been issued for additions or replacement of existing structures – not new development.

Figure 1: New Building Permits 2010 - 2016

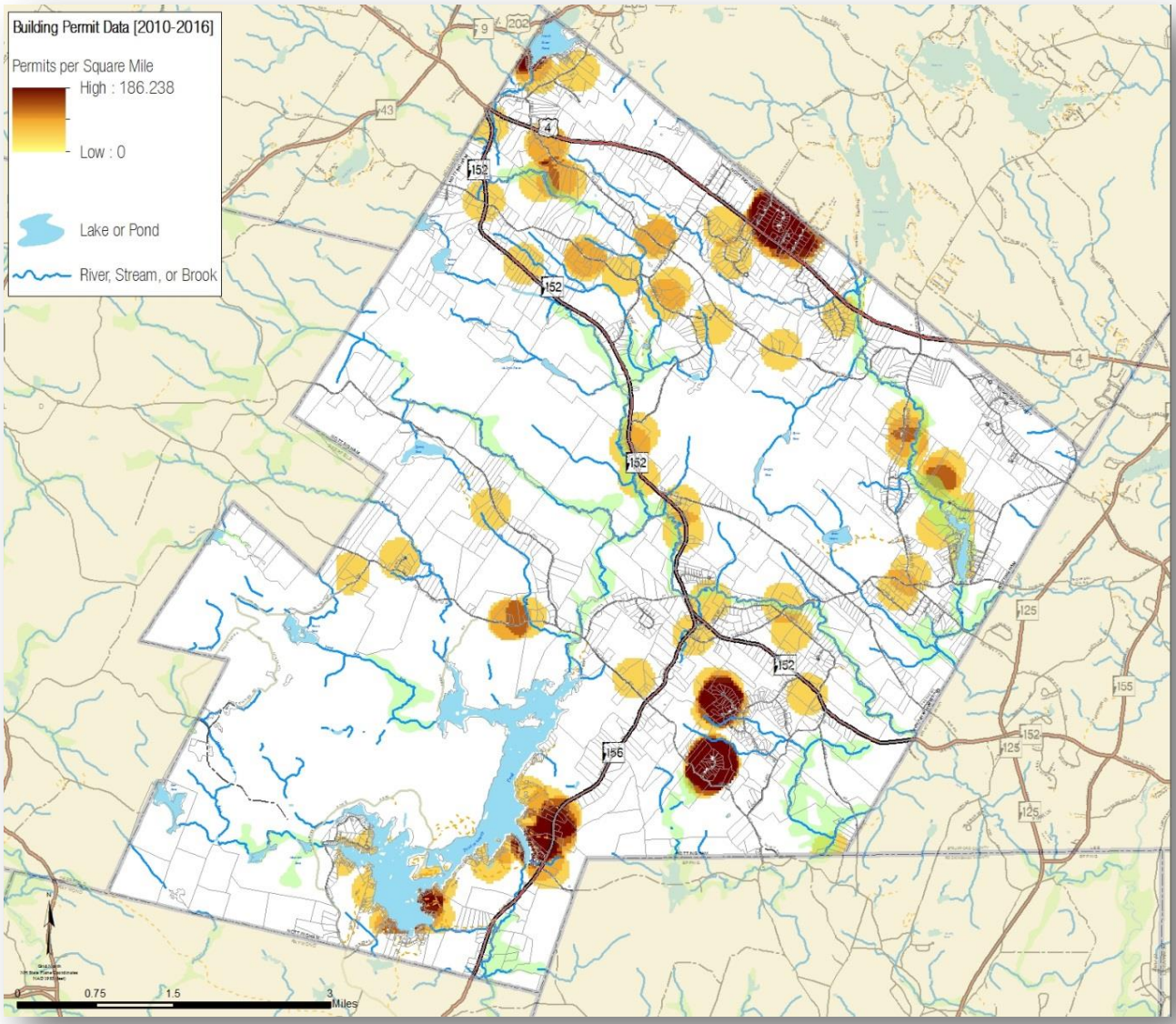


Source: Nottingham's Building/Code/Health Inspector Department

Development Trends

A GIS density analysis was completed using building permit data collected from 2010 – 2016 in order to identify and map clusters of development. The results show high concentrations of development occurring in three newer residential subdivisions on Merry Hill Road/Gerrior Drive, Rocky Hill Road, and Anna Lisa Way/O'Brien Way. Other areas that have experienced a higher number of permits are located on North River Lake Road, Raymond Road (Route 156), and Lamprey Drive; however, it is suspected that many of the permits issues in these areas were for existing structures along the southern and eastern portions of Pawtuckaway Lake and the southwestern parts of North River Pond.

By looking at these past development trends the Town recognizes that it will continue to grow in the coming years and will continue to improve their floodplain management regulations for all subdivisions and proposals for other developments in order to reduce or eliminate flood damage.



Map 2: Development Density Map (Source: SPRC/Nottingham Code Enforcement Officer, 2017)

Development within the FEMA Floodplain

Of all the building permits issued over the course of the last seven years (2010 – 2016), there have been only six homes identified to be within the FEMA floodplain. It is important to note building permit data does not always correlate directly with new construction; permits may refer to renovations or additions to existing structures.

The majority of building permits within the FEMA floodplain are located around Nottingham Lake and along the Little River. The two remaining permits are located on McCrillis Road along the North River and on Rollins Drive along Rollins Brook.

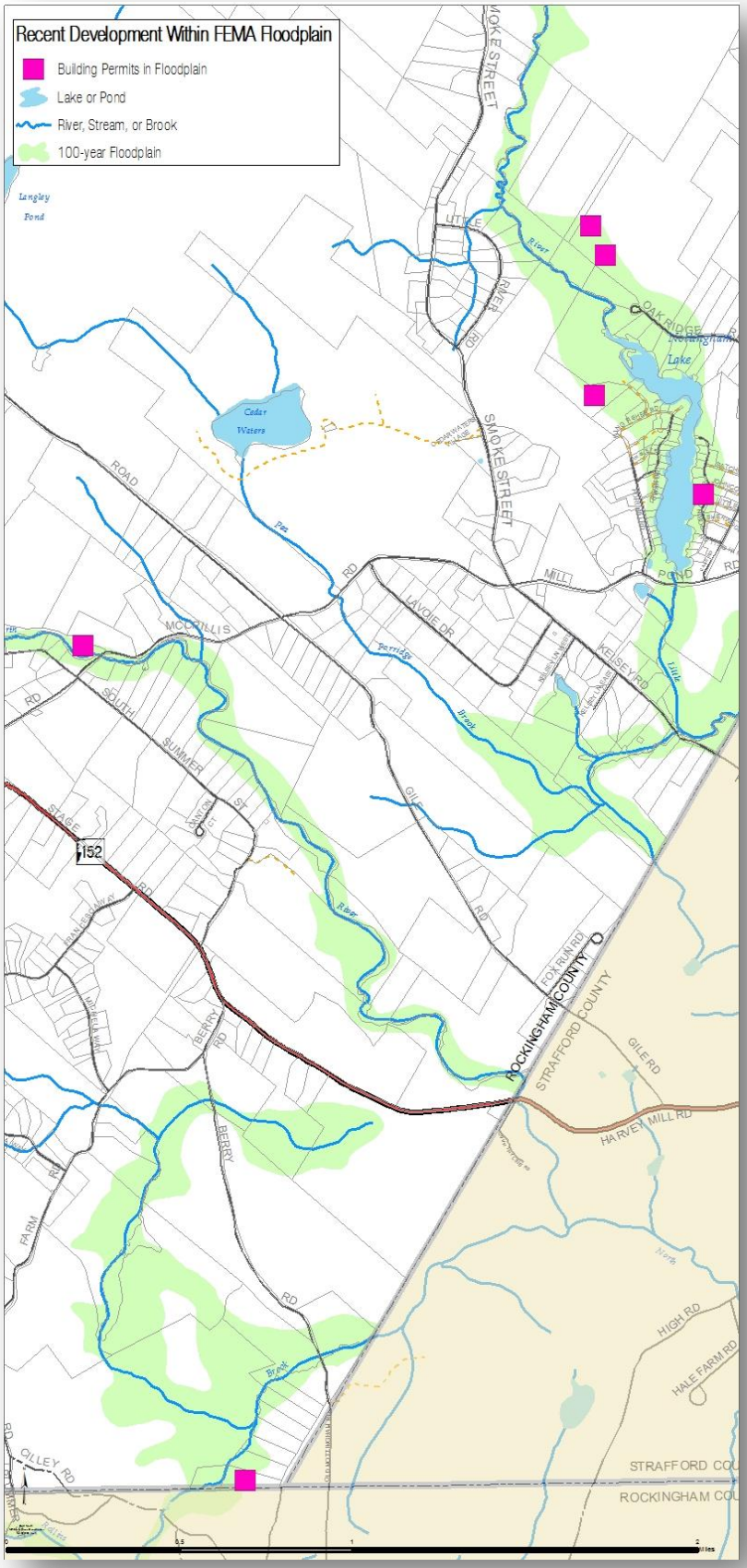
Table 2: Building Permits Within Floodplain

	Year	Type
Kingfisher Rd	2014	Single Family
Maple Ridge	2016	Single Family
Maple Ridge	2016	Single Family
Robinhood Dr	2016	Single Family
Rollins Dr	2016	Single Family
McCrillis Rd	2016	Single Family

[Source: Town of Nottingham, 2016]

Nottingham has successfully steered the majority of residential developments into existing crossroads, out of rural countryside, and away from potential flooding dangers. Therefore, the community's vulnerability has remained the same.

The Town will use this Plan as a guide to determine where past hazards have been documented and try to steer potential development away from these hazard areas.



Map 3: Building Permits within the FEMA Floodplain (Source: SRPC/OEP, 2017)

Land Use Changes

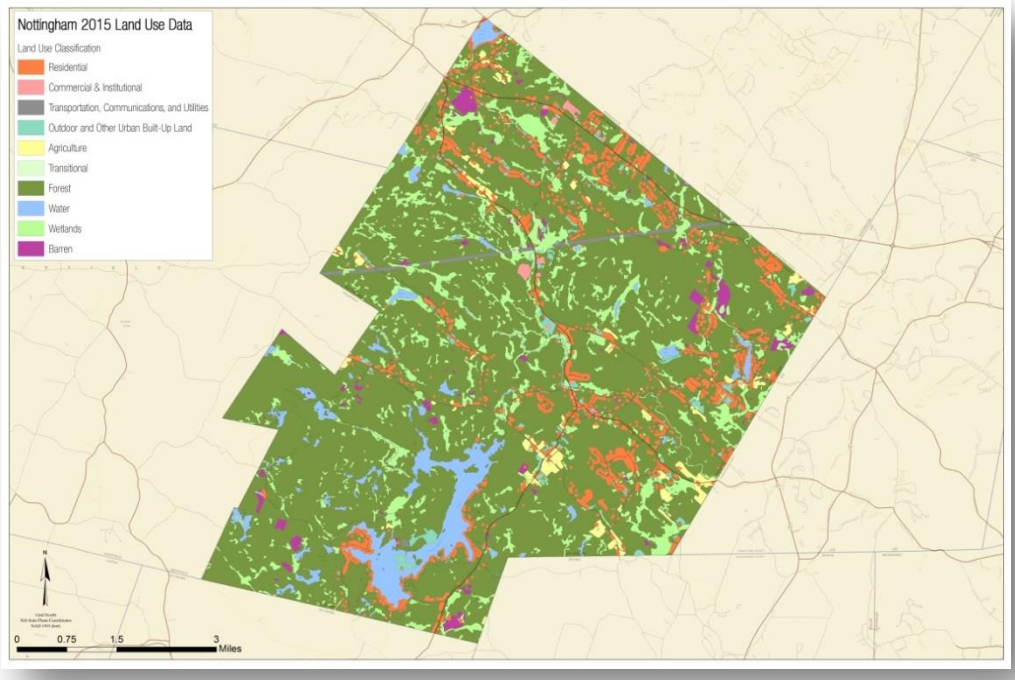
It is much easier to identify and analyze regional land use trends, compared to strictly looking at land use conversion changes at the local level; however, this data remains an important component of long-term planning efforts. As previously mentioned, Nottingham has experienced a significant increase in population over the course of the last decade. This has resulted in an increase in the amount of land converted to residential use over the span of the last fifteen years.

Table 3: Land Use Data 2010 - 2015

Land Use Classification	Acres (2010)	% of total acreage	Acres (2015)	% of total acreage	5-year (+/-) % change
Residential	2,301.1	7.4%	2,384.1	7.7%	+0.3%
Commercial & Industrial	90.4	0.3%	90.7	0.3%	0.0%
Agriculture	493.2	1.6%	493.2	1.6%	0.0%
Forest Land	22,369.7	72.2%	22,058.7	71.2%	-1.0%
Wetlands	3,613.5	11.7%	3,331.3	10.7	-0.9%
TOTAL	28,867.9	93.1%	28,358.0	91.5%	N/a

This analysis does not include: transportation, communications, and utilities; outdoor and other urban built-up land; transitional; open water; and barren lands, which together make up the remaining 7-8%.

According to the 2015 regional land use layer, roughly 8% (2,384 acres) of the Town's total acreage is currently classified as residential. Nottingham did not experience a substantial increase in residential land use conversion in the last five years. Nor did the Town see any major changes in commercial and industrial uses, agriculture, forest, or wetlands.



Map 4: 2015 Land Use Data (Source: GRANIT, 2015)

Chapter 3: Asset Inventory

Critical Facilities and Key Resources

This chapter includes Critical Facilities and Key Resources (CF/KR) within the Town of Nottingham that were identified by the Committee during the update of this plan.

FEMA describes the term 'critical facilities' as all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.[2] These facilities include all public and private facilities that a community considers essential for the delivery of vital services for the protection of the community, such as emergency operations centers, shelters, or utilities. [3]

"Critical facilities, and the functions they perform, are the most significant components of the system that protects the health, safety, and well-being of communities at risk."

-FEMA Critical Facility Design Considerations

Table 4 includes a list of CF/KR, including the type of facility and building, and the address of the CF/KR, if available. Maps, which are located in the Appendix, display the location of these facilities.

Table 4: Emergency Response Facilities (ERF)

ERF's are primary facilities and resources that may be needed during an emergency response

Facility	Type	Address
Police Station	Emergency Operations Center (EOC)	139 Stage Road (Route152)
Fire Station	Primary EOC	235 Stage Road (Route152)
Public Works/Highway Dept.	Emergency Fuel	3 Flutter Street
Town Hall	Emergency Shelter	139 Stage Road (Route 152)
Potential Helipad Locations	Medical Evacuation	393 Stage Road Community Center Field Nottingham Square/ Ledge Farm Road Pawtuckaway State Park Administration Building Parking Lot Elementary School Parking Lot Higher Ground Baptist Church Mill Pond Road at Case Road

[2] https://www.fema.gov/media-library-data/20130726-1557-20490-2839/fema543_chapter1.pdf
[3] Ibid

Table 5: Non-Emergency Response Facilities (NERF)

NERF's are facilities considered essential, that although critical, not necessary for the immediate emergency response effort.

Facility	Type	Address
Cell Tower(s)	Communication Functions	McDaniel Road at Town Line Route 4 (near #164) Route 156/French Road
Switching Station(s)	Communication Functions	Raymond Road/Highland Ave. Raymond Road/South side of cemetery McCrillis Road near Route 152 Route 152 and Lucas Pond Road Route 4 at Lincoln Drive
Power Substation	Power Station	Cate Road (Deerfield, NH)
Nottingham School	School (Potential long-term Red Cross shelter)	245 Stage Road (Route 152)
Highway Department	Gravel Pit	Smoke Street

Table 6: Critical Infrastructure (CI)

CI are important structures that may be vulnerable during a hazardous event

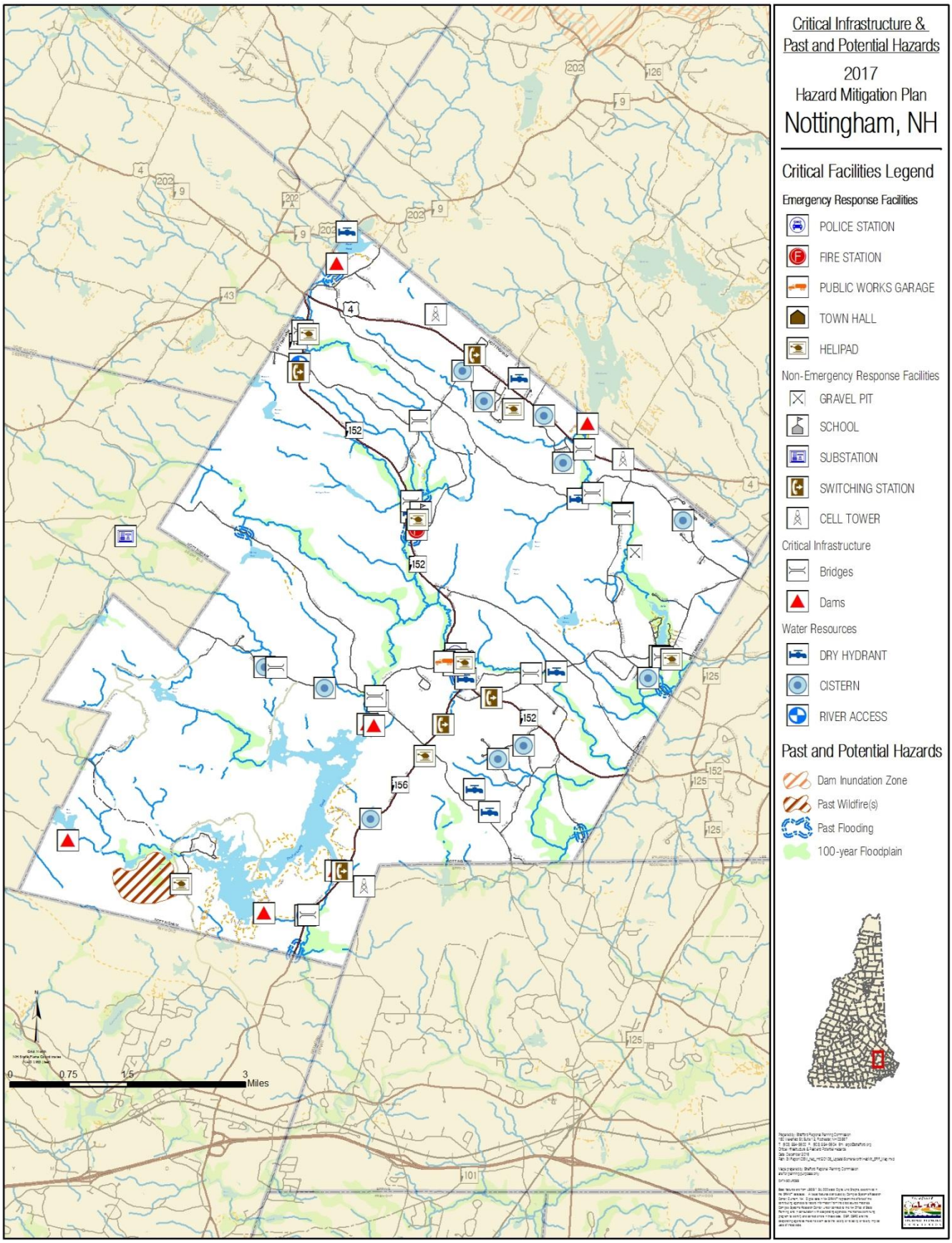
Facility	Type	Address
Pawtuckaway Lake/Dollof Dams	*High Hazard	Pawtuckaway River
Mendums Pond Dam	High Hazard	Little River
Pawtuckaway Lake/Gove Dike Dike	**Significant Hazard	Tributary to Pawtuckaway River
Pawtuckaway Lake/Drowns Pond Dam	Significant Hazard	Tributary to Bean River
Nottingham Lake Dam	***Low Hazard	Little River
Pawtuckaway Lake/Drowns Dike	Low Hazard	Pawtuckaway Lake
North River Pond Dam	Low Hazard	North River
Deer Pond Dam	Low Hazard	Tributary to Mountain Brook

* A high hazard dam has a high hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in probable loss of human life.
** A significant hazard dam has a significant hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no probable loss of lives but major economic loss to structures or property.
*** A Low Hazard dam has a low hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no possible loss of life and low economic loss to structures/property.

State Owned Bridge #108/020	****Transportation	NH 156 over Pawtuckaway River
State Owned Bridge #115/172	Transportation	NH 152 over North River
State Owned Bridge #141/127	Transportation	NH 152 over North River
State Owned Bridge #149/085	Transportation	NH 152 over North River
State Owned Bridge #168/080	Transportation	NH 152 over North River
State Owned Bridge #185/139	Transportation	US 4 over Little River
Town Bridge #187/126	Transportation	Kennard Road over Little River
Town Bridge #195/120	Transportation	Smoke Street over Little River
Facility	Type	Address
Town Bridge #204/082	Transportation	Mill Pond Road over Little River

Table 6: Critical Infrastructure (CI)		
Town Bridge #127/078	Transportation	Deerfield Road over Elliot River
Town Bridge #102/085	Transportation	Deerfield Road over Back Creek
Town Bridge #145/145	Transportation	Freeman Hall Rd over North River
**** Bridges have been identified by the NHDOT Bridge Design Bureau; Dams have been identified by the NHDES, Water Division		

Table 7: Water Resources		
Auxiliary Fire Aid		
Facility	Type	Address
Dry Hydrant #9	Dry Hydrant	Sunrise Lane, Northwood T/L
Dry Hydrant #4	Dry Hydrant	110 Kennard Road
Dry Hydrant #1	Dry Hydrant	139 Stage Road, Lower Parking lot
Dry Hydrant #2	Dry Hydrant	245 Stage Road, Across from School
Dry Hydrant #6	Dry Hydrant	44 McCrillis Road
Dry Hydrant #5	Dry Hydrant	Smoke Street / Little River
Dry Hydrant #19	Dry Hydrant	Ledge Farm Road
Dry Hydrant #7	Dry Hydrant	121 Stage Road
Dry Hydrant #20	Dry Hydrant	Deerfield Road/Flutter Street
Cistern	Cistern	85 Freeman Hall Road
Cistern	Cistern	Rocky Hill Road
Cistern	Cistern	Strawberry Lane
Cistern	Cistern	Route 4 and Sophia Way
Cistern	Cistern	Francesca Way/Michela Way
Cistern	Cistern	26 Francesca Way
Cistern	Cistern	Shannon Drive
Cistern	Cistern	129 Deerfield Road
Cistern	Cistern	Kelsey Road/ East Lane
Cistern	Cistern	Raymond Road, North of Barderry Lane
Cistern	Cistern	Route 4 East of Mendums Landing Road
Pond Access	Pond Access	Cooper Hill (Northwood)
Pond Access	Pond Access	Lucas Pond Road, Across From Demmons
River Access	Fire Aid	Nottingham Lake Dam
River Access	Fire Aid	South Pawtuckaway Lake/Dollof Dam



Map 5: Critical Infrastructure & Past and Potential Hazards (Source: SRPC, 2017)

Chapter 4: Vulnerable Structures and Potential Loss

Critical Facilities/Key Resources and Other Assets

It is important to identify critical facilities and other structures that are most likely to be damaged by hazards. A GIS-based analysis was completed to determine, spatially, which critical facilities and key resources (CF/KR) within the Town intersected with dam inundation zones, the FEMA floodplain, or identified past and potential flooding areas from previous hazard mitigation updates. Table 8 lists the 25 CF/KRs located within those areas with a potential loss value estimate of $13,486,700 at 100%.

Table 8: Vulnerable Critical Facilities/Key Resources

CF/KR and Other Assets	Hazard	100% of Structure Value
Emergency Response Facilities		
Police Station/Town Hall	Past Flooding	$1,433,400 (land and building values; 9-acre lot)
Fire Station	Past Flooding	$527,600.00 (land and building values; 3-acre lot)
Public Works/Highway Dept.	Dam Inundation Zone & FEMA Floodplain	$143,000.00
Helipad at Community Center Field	Past Flooding	Included in the Town Hall land value
Non- Emergency Response Facilities		
Nottingham School	Past flooding in surrounding areas	$6,296,700.00 (land and building values; 75-acre lot)
Critical Infrastructure		
Nottingham Lake Dam	FEMA Floodplain	According to Scott Boucier, P.E., (Dubois & King) the re-construction costs of this dam in 2007 was approximately $550,000.00.
Mendums Pond Dam	Dam Inundation Zone	The Dam Bureau at NHDES has looked into assessing values for state-owned dams with marginal success. They considered bond ratings, market value, and construction costs. They also developed a formula that calculated the cubic feet of water impounded as a monetary value. Because dams serve different purposes (recreational, hydro-power), assessed values are hard to estimate and cannot be determined.
Pawtuckaway Lake/Dollof Dam	Dam Inundation Zone	
State Owned Bridge #108/020	Dam Inundation Zone & FEMA Floodplain	$552,000 (23ft x 24ft x $1,000)

CF/KR and Other Assets	Hazard	100% of Structure Value
State Owned Bridge #141/127	Dam Inundation Zone, FEMA Floodplain; & Past Flooding	$552,000 (23ft x 24ft x $1,000)
State Owned Bridge #149/085	Dam Inundation Zone, FEMA Floodplain; & Past Flooding	$912,000 (38ft x 24ft x $1,000)
State Owned Bridge #168/080	Dam Inundation Zone & FEMA Floodplain	$528,000 (22ft x 24ft x $1,000)
State Owned Bridge #185/139	Dam Inundation Zone & FEMA Floodplain	$336,000 (14ft x 24ft x $1,000)
Town Bridge #187/126	Dam Inundation Zone, FEMA Floodplain; & Past Flooding	$264,000 (11ft x 24ft x $1,000)
Town Bridge #195/120	Dam Inundation Zone & FEMA Floodplain	$480,000 (20ft x 24ft x $1,000)
Town Bridge #204/082	Dam Inundation Zone & FEMA Floodplain	$528,000 (22ft x 24ft x $1,000
Town Bridge #127/078	Dam Inundation Zone, FEMA Floodplain; & Past Flooding	$384,000 (16ft x 24ft x $1,000)
Water Resources		
Dry Hydrant #7	Past Flooding	Dry hydrants and identified fire protection river access points are intentionally located in close proximity to waterbodies to allow fire trucks to draft water during an emergency; therefore, they will inherently be vulnerable to flooding issues. There is no feasible way to determine values for these resources.
Dry Hydrant #3	Past Flooding	
Dry Hydrant #2	Past Flooding	
Dry Hydrant #1	Past Flooding	
Dry Hydrant #5	Dam Inundation Zone	
Dry Hydrant #20	Dam Inundation & Past Flooding	
River Access	Dam Inundation Zone & FEMA Floodplain	
River Access	Dam Inundation Zone & FEMA Floodplain	
	TOTAL	$13,486,700

Note: The approximate assessed value for the bridges was calculated by multiplying $1,000.00 per square foot of bridge. This estimate was provided by the Bridge Design Bureau at NHDOT and includes all cost (engineering, consulting and in-house design, construction, etc.) to build a new bridge.

While not all are located in the FEMA 100-yr floodplain (only the public works/highway department building is in the FEMA floodplain), many of Nottingham's emergency and non-emergency response facilities have experienced past flooding issues – particularly at the police station/town hall, fire station, and school. It has been noted by the planning committee that none of the buildings have been damaged, but the low-lying roads and surrounding areas around these facilities have had serious flooding problems. This causes isolation challenges for emergency responders.

Nottingham's critical infrastructure includes dams and bridges. There are three dams vulnerable to flooding issues. They include: the Nottingham Lake Dam (newly built in 2007), Mendums Pond Dam, and the Pawtuckaway Lake/Dollof Dam. All three dams are either located within the FEMA floodplain or within an identified dam inundation zone. There are nine bridges vulnerable to flooding issues due to their proximity to waterbodies, location within the floodplain, or location within a dam inundation zone, including five state owned roads and four Town-owned roads.

There are eight water resources vulnerable to flooding, including six dry hydrants and two river access points. As previously mentioned, dry hydrants and identified fire protection river access points are intentionally located in close proximity to waterbodies to allow fire trucks to draft water during an emergency; therefore, they will inherently be vulnerable to flooding issues and do not raise big concerns for the Town.

Buildings and Utilities

It is difficult to ascertain the amount of damage that could be caused by a natural or man-made hazard because the damage will depend on the hazard's extent and severity, making each hazard event somewhat unique. The assumption used here when calculating the damage to property is equal to: 0-1%, 1-5%, or 5-10% of Nottingham's structures, depending on the nature of the hazard, whether or not the hazard is localized, and its economic impact.

The total local assessed value included in this analysis is $336,958,600, including $329,158,600 for buildings and $7,800,000 for utilities. Based on this assumption, the potential loss from any of the identified hazards under a low, medium, and high damage scenario of buildings and utilities would range from **$0 to $3,369,586 (low)** or **$3,369,586 to $16,847,930 (medium)** or **$16,847,930 to $33,695,860 (high)** based on the 2014 Nottingham Town valuation. Table 9 provides more detail on these estimated economic losses.

Table 9: Economic Loss Data

Local Assessed Valuation	Total Assessed Value (2014)	Economic Loss		
		Low 1% Damage	Medium 5% Damage	High 10% Damage
Buildings				
Residential	318,709,600	3,187,096	15,935,480	31,870,960
Manufactured Housing	3,451,200	34,512	172,560	345,120
Commercial Industrial	6,997,800	69,978	349,890	699,780
Total Buildings	**329,158,600**	**3,291,586**	**16,457,930**	**32,915,860**
Utilities				
Public Water	128,000	1,280	6,400	12,800
Electric	7,672,000	76,720	383,600	767,200
Total Utilities	**7,800,000**	**78,000**	**390,000**	**780,000**
Net Valuation Building and Utilities	**$336,958,600**	**$3,369,586**	**$16,847,930**	**$33,695,860**

Source: NH Department of Revenue Administration. 2015 Annual Report. Assessed value does not include value of land or local exemptions. (http://revenue.nh.gov/publications/reports/documents/ar-2015.pdf)

Human loss of life was not included in the potential loss estimates, but could be expected to occur, depending on the severity and type of the hazard.

Mill Pond Bridge, April 2007 Flooding Event

Chapter 5: National Flood Insurance Program (NFIP)

The Office of Energy & Planning (OEP) administers and coordinates the State's role in the National Flood Insurance Program (NFIP). The NFIP is a Federal program administered by the Federal Emergency Management Agency (FEMA) that allows property owners in participating communities to purchase insurance protection against losses from flooding. Communities that participate in the NFIP have adopted and enforce community floodplain regulations. One of the community's requirements is to require and obtain certain elevation data for all new and substantially improved structures located in a special flood hazard area. Community permitting officials must review this elevation data to ensure floodplain development complies with the regulations.[4] Currently 217 communities (92 percent) that participate in the NFIP have adopted at least the minimum standards of the NFIP.

Nottingham's National Flood Insurance Program Status

Nottingham has been a member of the National Flood Insurance Program (NFIP) since April 2, 1986. The Town does have significant portions of land in the 100-year floodplain along the North, Pawtuckaway, Bean, and Elliot Rivers; Rollins Mountain, and Porridge Brooks; Round and Mountain Ponds; and Nottingham Lake. There has been limited development within this floodplain according to available GIS Flood Insurance Rate Map (FIRM) data, available building permit data, and aerial imagery (2015).

Section 3.3 of Town's Zoning Ordinance (as amended on March 8, 2016) outlines the Town's floodplain regulations. These regulations apply to all lands designated as special flood hazard areas by the Federal Emergency Management Agency (FEMA) in its Flood Insurance Rate Maps dated May 17, 2005 for Rockingham County. The Town's floodplain regulations ensure all proposed development within the floodplain require a permit to determine whether proposed building sites will be reasonable safe from flooding.

According to information from the FEMA Community Overview (as of 8/31/2016) provided by NH OEP Assistant Planner and State Floodplain Program Assistant Coordinator Kellie Walsh, Nottingham has 15 total policies (all are single family homes) in the floodplain hazard area and has had 4 repetitive loss claims. Of the 15 total policies, nine are preferred risk and are not required. Preferred risk offers policies for buildings that are located in moderate-to-low areas (B, C, and X Zones). Table 10 provides more detail on Nottingham's insurance policies.

[4] (https://www.nh.gov/oep/planning/programs/fmp/documents/fs-2-elevation-certificate.pdf)

Table 10: Nottingham Insurance Zone Policies

Zone	Policies in Force	Premium	Insurance in Force	Number of Closed Paid Loses	$ of closed Paid Loses	Repetitive Loses
A Zones	6	$14,005	$1,132,500	10	$117,162.32	3
B,C & X Zone (Preferred Risk)	9	$3,439	$2,698,000	3	$12,363.81	1
TOTAL	15	$17,444	$3,827,500	13	$129,525.00	4

In order to remain NFIP compliant, Nottingham has implemented a number of actions, including:

∴ A FEMA Community Assistance Visit (CAV) was completed in 2009, which found only minor problems with the community's floodplain regulations. The several lacking definitions and recommendations that were suggested have been incorporated into the Town's planning documents, including amending instructions on the standard building permit to require a checkbox about whether the project is in the special floodplain hazard area. It will be recommended that the town schedule another CAV within the next cycle of this plan.

∴ Nottingham is currently part of the FEMA Discovery Floodplain Remapping Project to develop new DFIRMs for Rockingham/Strafford County. UNH, the Office of Energy and Planning, AECOM, and FEMA held a regional meeting in December, 2015 in which the Town's building inspector attended and participated by completing a data questionnaire.

∴ In 2011, the New Hampshire Geological Survey conducted a fluvial erosion assessment on reaches of the Lamprey River mainstem and its tributaries, including the Little, North, North Branch Lamprey, and the Piscassic Rivers (the North and Little Rivers are both located in Nottingham). The study evaluated the physical conditions, adjacent floodplain, and identified problematic areas such as crossings, culverts and locations where erosion may be a hazard. These zones will be mapped for the Town of Nottingham and will be used to identify areas most at risk to erosion, flooding and future river adjustments through an understanding of the physical condition of the river, and to identify priorities for the replacement and rehabilitation of problematic culverts, and river restoration projects.

∴ As part of this plan update process, there will be a new mitigation action for the town to consider revising criteria for new development and redevelopment of residential structures located within the special flood hazard areas to require an additional two (2) feet of freeboard to the base flood elevation as recommended by the New Hampshire Coastal Risk and Hazards Commission's Final Report and Recommendation (November, 2016).

Chapter 6: Hazards & Mitigation Strategies

Overview

This section describes the location and extent of hazards that could impact the Town of Nottingham, presents past hazard events in the Town or elsewhere in New Hampshire, and discusses their rank order placement. The Multi-Hazard Mitigation Planning Committee investigated past and potential hazards using a variety of sources and techniques, including but not necessarily limited to interviewing Town historians and other citizens; researching historical records archived at the Town Library; scanning old newspapers; reading published Town histories; consulting various hazard experts; and extracting data from the NH Hazard Mitigation Plan and other state and federal databases. Past and potential hazards were mapped where spatial data was available.

Rating Probability, Severity, and Overall Risk of Future Disasters

The nature of each hazard type and the quality and availability of corresponding data made the evaluation of hazard potential difficult. The Multi-Hazard Planning Committee considered what data was at hand and used its collective experience to formulate statements of impact or potential. Each hazard type was rated using a hazard vulnerability assessment tool (refer to Table 11).

This tool estimates the probability of occurrence, severity, and overall risk of an event using a projected number system answering questions, which answer High (3), Moderate (2), and Low (1). A zero (0) score meant that there is no likelihood the hazard would impact the Town in the next 25 years. The ranges established for the average to determine severity were:

- ∴ High = >3
- ∴ Moderate = 2
- ∴ Low = 1 or below

The overall risk is a numeric indication developed by multiplying the total numbers of the probability and the severity.

Probability of Occurrence

Probability is based on a limited objective appraisal of a hazard's probability using information provided by relevant sources, observations and trends. The Planning Committee discussed and rated probability of each hazard.

- ∴ High: There is a very strong likelihood (67-100% chance) that Nottingham will experience a hazardous event within the next 25 years. Score = 3
- ∴ Moderate: There is moderate likelihood (34-66% chance) that Nottingham will experience a hazardous event within the next 25 years. Score = 2
- ∴ Low: There is little likelihood (0-33% chance) that Nottingham will experience a hazardous event within the next 25 years. Score = 1

Severity

Severity is an estimate generally based on a hazard's impact human, property and business. The Planning Committee discussed the severity of each hazard. The severity was calculated by the average of human, property and business.

- ∴ High: The total population, property, commerce, infrastructure and services of the Town are uniformly exposed to the effects of a hazard of potentially great magnitude. In a worst case scenario there could be a disaster of major to catastrophic proportions. Score = 3
- ∴ Moderate: The total population, property, commerce, infrastructure and services of the Town are exposed to the effects of a hazard of moderate influence; or the total population, property, commerce, infrastructure and services of the community is exposed to the effects of a hazard, but not all to the same degree; or an important segment of population, property, commerce, infrastructure or service is exposed to the effects of a hazard. In a worst case scenario there could be a disaster of moderate to major, though not catastrophic, proportions. Score = 2
- ∴ Low: A limited area or segment of population, property, commerce, infrastructure or service is exposed to the effects of a hazard. In a worst case scenario there could be a disaster of minor to moderate proportions. Score = 1

Overall Risk

The risk number is one, which can help the Town weigh the hazards against one another to determine which hazard is most detrimental. This is calculated by multiplying the Probability of Occurrence score by the average of the Severity score (human, property, and business impacts).

- ∴ High: There is a great risk of this hazard in Nottingham. Score = 4 or greater
- ∴ Moderate: There is moderate risk of this hazard in Nottingham. Score = 2-3
- ∴ Low: There is little risk of this hazard in Nottingham. Score = 1 or less

Overall summary of Hazards Ratings in Nottingham, NH

The Committee determined that the hazards are distributed as follows:

- ∴ 4 hazards rated as having a High overall risk in Nottingham: Flooding, Hurricane & Tropical Storms, Wildfire, and Drought
- ∴ 5 hazards rated as having a Moderate overall risk in Nottingham: Tornado & Downburst, Winter Storms, Extreme Temperatures, Hazardous Materials, and Severe Thunderstorms
- ∴ 2 hazards rated as having a Low overall risk in Nottingham: Earthquake & Landslides and Public Health Threats

Table 11 is the Town's vulnerability assessment tool, which provides more information on the multi-hazard threat analysis that was completed during a brainstorming session with the Planning Committee.

Hazard Vulnerability Table

Table 11: Hazard Vulnerability Assessment Tool – Town of Nottingham

Impact Rankings 0 – N/a 1-Low 2-Moderate 3-High	Human Impact *Probability of death or injury*	Property Impact *Physical losses and damages*	Business Impact *Interruption of service*	Severity *Average of human, property, and business impacts*	Probability *Likelihood this will occur within 25 years*	Overall Threat *Low = 0-1* *Moderate = 2-3* *High = > 4* *(Severity x probability)*
Hazard Event						
Flooding	1	2	2	1.7	3	5
Hurricane & Tropical Storms	1	2	2	1.7	3	5
Tornado & Downburst	1	2	2	1.7	2	3.3
Winter Storms	1	1	1	1	3	3
Severe Thunderstorms	1	1	1	1	3	3
Wildfire	1	2	1	1.3	3	4
Earthquake & Landslide	1	1	1	1	1	1
Extreme Temperatures	1	1	1	1	2	2
Drought	1	2	2	1.7	3	5
Public Health Threats	1	0	1	0.7	2	1.3
Hazardous Materials	1	1	1	1	2	2

Declared Disasters and Emergency Declarations

Table 12: Presidentially Declared Disasters (DR) 1990-October 2016 impacting the Town of Nottingham

Date Declared	Event	Date of Event	Source	Program	Amount (Statewide)	Remarks
September 9, 1991	Hurricane Bob	August 18-20, 1991	FEMA 917-DR	PA	$2,293,449	Severe storm and wind; no power; trees knocked down
October 29, 1996	Severe Storms & Flooding	Oct 20-23, 1996	FEMA 1144-DR	PA	$2,341,273	Severe storms, flooding
January 15, 1998	Ice Storm	January 7-35, 1998	FEMA 1199-DR	PA/IA	$12,446,202	Major tree damage, electric power interrupted for many days; schools were closed
May 25, 2006	Severe Storm & Flooding	May 12-23, 2006	FEMA 1643-DR	PA/IA	$17,691,586	Severe storm causing; massive flooding; road closures; dams breaching, evacuations
April 27, 2007	Severe Storm & Flooding	April 15-23, 2007	FEMA 1695-DR	PA/IA	$26,826,780	Severe storms and flooding.
August 11, 2008	Severe Storms, Tornado, & Flooding	July 24, 2008	FEMA 1782-DR	PA	$3,673,097	Severe storms; tornado; and wind damage
January 2, 2009	Severe Winter Storm	December 11-23, 2008	FEMA 1812-DR	DFA/PA	$14,898,663	Winter storm; snow removal; some people without power for a week
March 29, 2010	Severe Winter Storm	February 23-March 3, 2010	FEMA 1892-DR	PA	$6,841,093	Severe winter storm; minor power outages; no major damage

Date Declared	Event	Date of Event	Source	Program	Amount (Statewide)	Remarks
September 3, 2011	Tropical Storm Irene	August 26 – Sept 6, 2011	FEMA 4026-DR	PA	$17,684,244	Minor impacts; heavy rain; minor flooding in some areas
March 19, 2013	Severe Snow and Blizzard	February 9-11, 2013	FEMA 4105-DR	PA	$6,153,471	This storm resulted in a significant and expensive snow removal effort. Branches down led to sporadic power outages throughout town.
March 25, 2015	Severe Snow & Snowstorm	January 26-29, 2015	FEMA 4209-DR	PA	$4,799,048	This storm resulted in a significant and expensive snow removal effort. Branches down led to sporadic power outages throughout town.
11 declarations totaling approximately $115,648,906						
Program Key: PA: Public Assistance, IA: Individual Assistance, DFA: Direct Federal Assistance						

Table 13: Emergency Declaration (EM) 1990-October 2016 impacting the Town of Nottingham

Date Declared	Event	Date of Event	Source	Program	Amount (Statewide)	Remarks
March 16, 1993	Heavy Snow	March 13-17, 1993	FEMA 3101-EM	PA	$832,396	Snow removal; high winds.
March 28, 2001	Snow Emergency	March 5-7, 2001	FEMA 3166-EM	PA	$3,433,252	Snow removal
March 11, 2003	Snow Emergency	February 17-18, 2003	FEMA 3177-EM	PA	$2,288,671	Snow removal
March 30, 2005	Snow Emergency	January 22-23, 2005	FEMA 3207-EM	PA	$3,611,491	Snow removal
December 13, 2008	Severe Winter Storm	December 11-23, 2008	FEMA 3297-EM	DFA/PA	$900,000	Winter storm; snow removal
November 1, 2011	Severe Winter Storm	October 29-30, 2011	FEMA 3344-EM	PA	Data not available	Severe storm; power outages; carbon monoxide poisonings
October 30, 2012	Hurricane Sandy	October 26-31, 2012	FEMA 3360-EM	PA	$643,660	There were minor impacts including, some brush removal. There were also some trees down resulting in sporadic power outages throughout town.
7 emergency declarations totaling approximately $11,709,470						
Program Key: PA: Public Assistance, DFA: Direct Federal Assistance						

Flooding

Overview	
Hazard Type	Flooding
Location/Extent	Town-wide; Especially areas within the 100 year floodplain (along Route 152 at North River/ Flutter Street and just north of Priest Road, also Deerfield Road at Back Creek and at the bridge; along McCrillis Road also Kelsey Road and Route 156 at Dolloff Dam Road), downstream of dams, along river banks, near streams, wetlands, and other surface waters
Vulnerability	
Severity	1.7
Probability	3
Overall Threat	5 (High)

Description of the Hazard

Riverine flooding is the most common natural disaster to impact New Hampshire. Riverine flooding occurs when surface water runoff introduced into streams and rivers exceeds the capacity of the natural or constructed channels to accommodate the flow. As a result, water overflows the river banks and spills out into adjacent low lying areas.[5] Floods are most likely to occur in the spring due to the increase in rainfall and the melting of snow; however, floods can occur at any time of the year because of heavy rains, hurricane, or a Nor'easter.

New Hampshire's climate ranges from moderate coastal to severe continental, with annual precipitation ranging from about 35 inches in the Connecticut and Merrimack River valleys, to about 90 inches on top of Mount Washington. Localized street flooding occasionally results from severe thundershowers, or over larger areas, from more general rain such as tropical cyclones and coastal "nor'easters." More general and disastrous floods are rare, but some occur in the spring from large rainfall quantities combined with warm, humid winds that rapidly release water from the snowpack. Causes of flooding that could potentially affect Nottingham include:

The "100-year flood" Term:

The "100-year flood" is a term often used to describe a flood that has a 1% chance of occurring in any year. But the phrase is misleading, and often causes people to believe these floods happen every 100 years on average. The truth is, these floods can happen quite close together, or not for long stretches of time, but the risk of such a flood remains constant from year to year. The 100-year-flood term was originated to delineate areas on a map to determine what properties are subject to the National Flood Insurance Program. Properties within the 100-year-floodplain, as defined by the Federal Emergency Management Agency, have special requirements and mortgage holders will require owners to carry flood insurance on these properties.

[Source: The Nurture Nature Center: Focus on Floods]

- ∴ 100-year rainstorm event
- ∴ Severe tropical storm (hurricane or tropical storm) that can bring torrential rainfall in excess of that from a 500-year storm.
- ∴ Rapid snow pack melt in spring can be a significant potential flooding source, given the northern, relatively cold location and climate of Nottingham

[5] FEMA Training Chapter 2 Types of Floods and Floodplains (https://training.fema.gov/hiedu/docs/fmc/chapter%202%20-%20types%20of%20floods%20and%20floodplains.pdf)

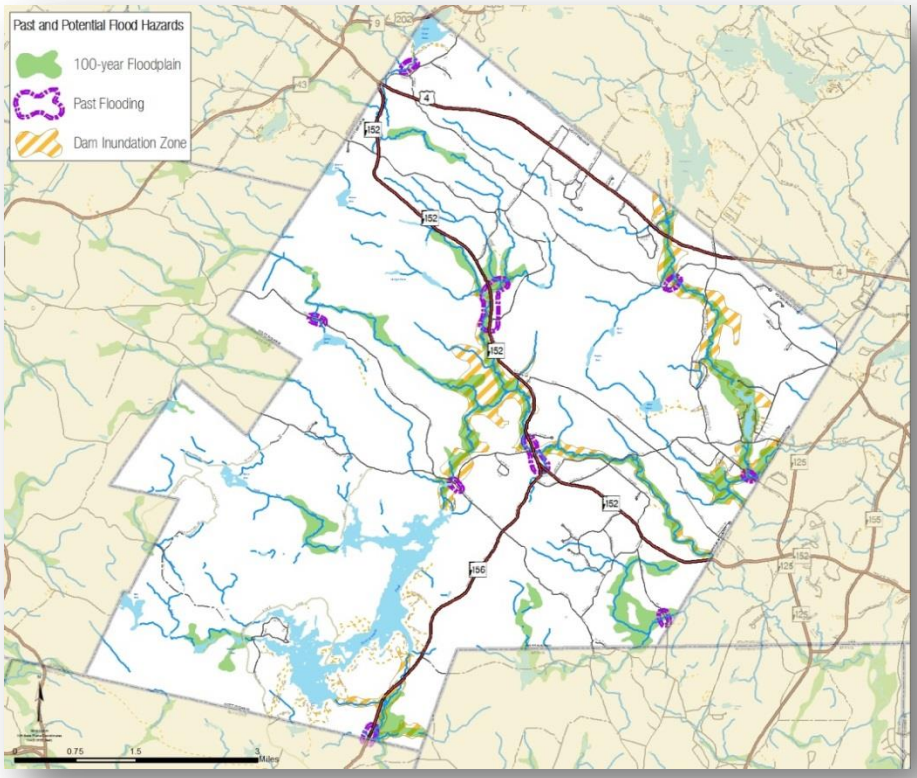
- ∴ River ice jams, which could occur, although the Army Corps of Engineers Ice Jam Database contains no record of ice jams in Nottingham; the Committee could not recollect any records either.
- ∴ Dam breach or failure.

Extent of the Hazard

Flooding can occur in any area of the Town but is more likely to occur within the 100-year floodplain, downstream of dams, along river and stream banks, near wetlands and road crossings, and other low-lying areas. Nottingham has approximately 18.96% (5,417 ac) of its land in 100-yr. floodplain (see Map 6).

Based on extent of the floodplain, Nottingham has significant flooding potential along Route 152 at North River/ Flutter Street and just north of Priest Road, also Deerfield Road at Back Creek and at the bridge; along McCrillis Road also Kelsey Road and Route 156 at Dolloff Dam Road. Areas where roads cross streams are also more susceptible to flooding.

Although flooding of the full extent of this floodplain by definition would require a 100-year storm, smaller storms with a higher annual probability of occurrence could still flood significant portions of that floodplain. Structures that could be impacted by a 100-year storm could also be affected by smaller, more frequent flooding; however, Nottingham has few structures within the floodplain. It is likely that the 100-year floodplain will expand in area when flood maps are updated due to better mapping technology and current precipitation data.



Map 6: Past and Potential Hazards (Source: SRPC/FEMA, 2017)

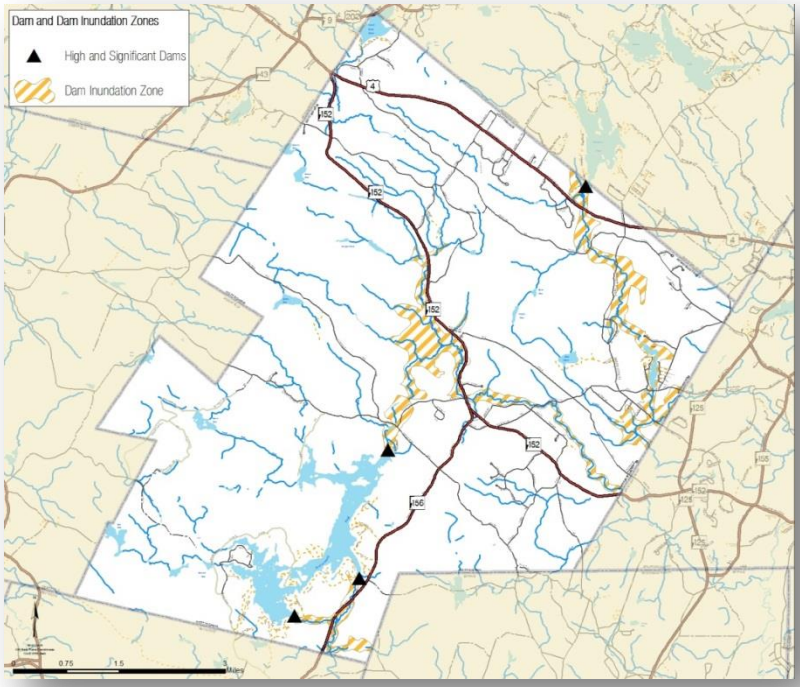
Past Events and Impacts

Although the storm could not be classified, a 1936 event was described at the time as causing "the greatest damage in New Hampshire's history" (Fahey 1936). Two other consequential flooding events took place in 2006 and 2007, both of which were considered 100-year events. During the 2007 event, the Town experienced significant impacts including: the failure of the Mill Pond Dam; major flooding on Route 152 led to the need for the National Guard to evacuate children from the Nottingham School (the school building was not damaged); residential areas adjacent to Gerrish Drive and the surrounding low-lying areas around Swan Drive experienced flooding (the rebuilt dam now regulates water height near the Swan Drive neighborhood and should alleviate future issues).

Dam Failure

Dam failure could potentially result in flooding in Nottingham. The Pawtuckaway Lake/Dollof Dam and the Mendums Pond Dam are High Hazard Dams. These dams have never breached, have been continually inspected, and are in excellent condition. However, the Mill Pond Dam failed during the 2007 flooding event. This dam is privately owned and was reengineered to alleviate future flooding risks when it was rebuilt (see Map 6).

There are three delineated dam inundation zones: 1) south of the Mendums Pond Dam, which crosses Route 4 as it follows the Little River before surrounding areas around Nottingham Lake; 2) north of the Pawtuckaway Lake/Drowns Dam (significant hazard), which travels along Mile Brook to the Bean River, and eventually merges with areas surrounding the North River and Route 152; and 3) east of the Pawtuckaway Lake/Dollof Dam, which travels along the Pawtuckaway River adjacent to Route 156. Inundation waters would affect Route 4, 152, and 156 in Nottingham and would largely destroy any structures in its path.



Map 7: Dam Inundation Zones (Source: NHDES, 2015)

A more comprehensive list of dams, their associated classifications, and inspection schedules in Nottingham are located in Table 14.

Table 14: Dams in Nottingham by Classification

Dam Classification	Classification Definition	Number of Dams in Nottingham	Inspection Interval (Years)
High	Dam that has a high hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in probable loss of human life.	2	2
Significant	Dam that has a significant hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no probable loss of lives but major economic loss to structures or property.	2	4
Low	Dam that has a low hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no possible loss of life and low economic loss to structures/property.	4	6
Non-Menace	Dam that is not a menace because it is in a location and of a size that failure of misoperation of the dam would not result in probable loss of life or loss to property.	7	6

Potential Future Impacts on the Community

Overall, flooding potential in Nottingham is high. Flood conditions will continue to affect the Town of Nottingham. Both seasonal flooding and flooding due to extreme weather events have the potential to occur during all seasons.

Estimated Potential Losses

Based on the high hazard ranking and assessed value of residential, commercial, and utilities structures, there is approximately $33,695,860 in estimated potential losses from flooding.

Hurricane and Tropical Storms

Overview	
Hazard Type	Hurricane and Tropical Storms
Location/Extent	Town-wide
Severity	1.7
Probability	3
Overall Threat	5 (High)

Description of the Hazard

A hurricane is the term used for tropical cyclones that occur in the Northern Hemisphere east of the International Dateline to the Greenwich Meridian. Tropical cyclones originate over tropical or subtropical waters and are characterized by organized deep convection and a closed surface wind circulation about a well-defined center. These events are called typhoons if they occur west of the International Dateline. Hurricane season in the Atlantic runs from June 1 to November 30.

According to the State Hazard Mitigation Plan (2013) tropical cyclones with maximum sustained winds of less than 39 mph are called tropical depressions. Once the tropical cyclone reaches winds of at least 39 mph, they are typically called a tropical storm and assigned a name. If the winds reach 74 mph or greater, they are upgraded and called a hurricane.

Extent of the Hazard

Hurricanes may impact all areas of the Town. The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating system based on a hurricane's sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous, and require preventative measures.

Scale Number (Category)	Sustained Winds (MPH)	Damage	Storm Surge
1	74-95	**Minimal:** Unanchored mobile homes, vegetation and signs.	4-5 feet
2	96-110	**Moderate:** All mobile homes, roofs, small crafts, flooding.	6-8 feet
3	111-130	**Extensive:** Small buildings, low-lying roads cut off.	9-12 feet
4	131-155	**Extreme:** Roofs destroyed, trees down, roads cut off, mobile homes destroyed. Beach homes flooded.	13-18 feet
5	More than 155	**Catastrophic:** Most buildings destroyed. Vegetation destroyed. Major roads cut off. Homes flooded.	Greater than 18 feet

Past Impacts and Events

These severe tropical storms may occur anytime from early spring to late fall, and in general are less common than other storms, e.g. nor'easters. As wind events, historically hurricanes have caused damage in Nottingham, most notably in 1938 and 1954 (Hurricane Carol). Quite a few other hurricanes have impacted the Town, including Hurricane Donna, Gloria, and Bob, with high winds but relatively little damage.

The NOAA National Climatic Data Center's Storm Events database (NCDC 2016) does not list any Hurricanes as directly affecting Rockingham County from January 1, 2008 to September 30, 2016; however, Rockingham County did experience impacts from Hurricane Sandy. Hurricane Sandy was the last hurricane to hit the region during the period of October 26 to November 8, 2012. Nottingham experienced minimal impacts associated with rain and wind.
The database does report one tropical storm event, which is detailed as follows:

> Tropical Storm Irene (August 28, 2011) - brought a prolonged period of strong and gusty winds and heavy rain to the state. The high winds snapped or uprooted numerous trees throughout the state causing more than 160,000 customers to lose electrical and/or communication services. The heavy rains caused rivers and streams throughout the state to flood causing damage to bridges, roads, and property. The strongest winds across the state began Sunday morning in southern areas and spread northward during the day. Winds continued to be gusty overnight as the storm moved away from the area. Observed maximum wind gusts included 63 mph at Portsmouth, 52 mph at Concord, and 51 mph at Manchester. On the top of Mt. Washington, winds gusted to 104 mph as the storm approached and 120 mph as it moved away. The combination of wet soil and the prolonged period of strong and gusty winds brought down numerous trees throughout the state. One person was killed and three people were injured across the state due to falling trees or branches. Rainfall amounts across the state ranged from 1.5 to 3 inches across southeastern New Hampshire. Locally, there were minor impacts including, some brush removal. There were also some trees down resulting in sporadic power outages throughout town.

Potential Future Impacts on Community

Based on historical data and statistical predictors, the Atlantic Basin averages approximately 12 total named storms per year. Six of those storms will become hurricanes with three becoming a category three or higher. With variability in sea-level pressure and sea-surface temperatures in the Atlantic Ocean, it is difficult to predict with certainty the number of storms in any given year. It is even more difficult to determine which of those storms will make landfall. Because Nottingham is considerably inland from the New Hampshire coast, wind speeds may be diminished from their coastal strength, and significant impact on the Town would be dependent on the exact track of these concentrated storms.

Nottingham remains vulnerable to hurricane hazards, including: high winds, heavy rainfall, and inland flooding; therefore the recurrence potential of hurricane and tropical storm hazards is moderate. It is likely that the region will be impacted by a significant storm of tropical origin within the foreseeable future.

Estimated Loss Potential

Based on the high hazard ranking and assessed value of residential, commercial, and utilities structures, there is approximately $33,695,860 in estimated potential losses from impacts associated from hurricanes and tropical storms.

Tornado & Downburst

Overview	
Hazard Type	Tornado & Downburst
Location/Extent	Town-wide – dependent upon tornado track
Severity	1.7
Probability	2
Overall Threat	3.3 (Moderate)

Description of the Hazard

A tornado is a violent windstorm characterized by a twisting, funnel shaped cloud with winds in excess of 200 mph, often accompanied by violent lightening, peripheral high winds, severe hail, and severe rain. Tornadoes develop when cool air overrides a layer of warm air, causing the warm air to rise rapidly. The atmospheric conditions required for the formation of a tornado include great thermal instability, high humidity, and the convergence of warm, moist air at low levels with cooler, drier air aloft. Most tornadoes remain suspended in the atmosphere, but if they touch down they become a force of destruction.

Tornadoes produce the most violent winds on earth, at speeds of 280 mph or more. In addition, tornadoes can travel at a forward speed of up to 70 mph. Damage paths can be in excess of one mile wide and 50 miles long. Violent winds and debris slamming into buildings cause the most structural damage. A tornado is usually accompanied by thunder, lightning, heavy rain, and a loud "freight train" noise. In comparison to a hurricane, a tornado covers a much smaller area but can be more violent and destructive.

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: microburst, which covers an area less than 2.5 miles in diameter and macroburst, which covers an area at least 2.5 miles in diameter.

Extent of the Hazard

The Fujita Scale is the standard scale for rating the severity of a tornado as measured by the damage it causes. The scale measures wind speeds of 65 to greater than 200 miles per hour. The damage path of a tornado can be in excess of one mile wide and 50 miles long, whereas a downburst is typically less than 2.5 miles. Downbursts can have wind speeds of 150 miles per hour.

Enhanced Fujita Scale	
EF–0	65–85 mph winds
EF–1	86–110 mph
EF–2	111–135 mph
EF–3	136–165 mph
EF–4	166–200 mph
EF–5	>200 mph

Past Impacts and Events

Tornadoes are rare in New Hampshire. The NCDC Storm Events database (NCDC 2016) lists only ten tornadoes that have impacted Rockingham County since 1950. Two were EF-0 events (65-85 mph); two were EF1 events (73-112 mph); five were EF2 events (111-135 mph); and one was an EF3 event (136-165 mph). Over the course of the past six decades, there has been one fatality, 11 injuries, and approximately $1.2 in property damages associated with tornados.

Table 15: Tornado Data for Rockingham County (1951 – 2008)

Date	Magnitude	Death	Injuries	Property Damages
08/21/1951	EF2	0	0	2,500
06/09/1953	EF3	0	5	25,000
07/31/1954	EF1	0	0	25,000
06/19/1957	EF2	0	1	25,000
07/02/1961	EF2	0	1	250,000
07/26/1966	EF1	0	0	2,500
10/03/1970	EF0	0	0	25,000
06/09/1978	EF0	0	0	250
05/21/2006	EF2	0	2	3,000
07/24/2008	EF2	1	2	840,000
	TOTAL	1	11	1,198,250

Note: Of the 10 recorded tornadoes that have touched down in Rockingham County, there is no record of any tornadoes directly impacting the community.

Between 1991 and 2010, the average annual number of tornadoes in New Hampshire was one.[6] Though the frequency of tornado events in New Hampshire is not great, the state has experienced large tornados throughout its history. An early example is the tornado that stuck the state in September 1821. This tornado was reported to have tracked from the Connecticut River, near Cornish, and terminating near Boscawen. When the skies cleared, 6 people were dead, hundreds injured and thousands homeless.

In 1998 an F2 tornado in Antrim, N.H. blew down a 45-foot by 12-foot section of the Great Brook Middle School. Witnesses reported seeing a funnel cloud, and the weather service, after an inspection, confirmed it was a tornado. According to the June 2, 1998 edition of the Eagle Tribune, John Jensenius from the National Weather Service in Gray, Maine estimated that the twister cut a path half a mile long, up to 100 yards wide, and was on the ground for several minutes.

In July 2008, an F2 tornado and high winds created a path of destruction through five New Hampshire counties that destroyed homes, displaced families, downed trees and forest lands and closed major state roadways. The impact to residents was extensive, with over 100 homes rendered uninhabitable. Phone and electric service was cut off to over 12,500 customers. One fatality is attributed to a building collapse, and local hospitals reported numerous physical

[6] NOAA. U.S. Tornado Climatology (https://www.ncdc.noaa.gov/climate-information/extreme-events/us-tornado-climatology)

injuries associated with this severe storm.[7] Since the July 2008 tornado, the NCDC Storm Events database reports that nine tornados have hit New Hampshire; however, none have hit Rockingham County. The most recent event occurred in July 2016 in Pittsburg.

Downburst activity is very prevalent throughout the State. However, the majority downburst activity is mostly unrecognized unless a large amount of damage has occurred. Several of the more significant and recent events are highlighted below:

- ∴ Central, NH – July 6, 1999 – Damages: Two roofs blown off structures, downed trees, widespread power outages, and damaged utility poles and wires; two fatalities.
- ∴ Stratham, NH – August 18, 1991 – Damages: $2,498,974 worth of damages; five fatalities.
- ∴ Moultonborough, NH – July 26, 1994 – Damages: Downed trees, utility poles and wires. Approximately 1,800 homes without power and 50-60 homes damages.
- ∴ Bow, NH – September, 6, 2011 – Damages: City Auto in Bow had 15 campers damaged and estimated $200,000 in damage.

While tornados are not common, they would cause significant impacts in the Town. The probability of reoccurrence of a downburst may be higher. A tornado or downburst can impact the entire jurisdiction and may cause greater damage in the community center.

Potential Future Impacts on Community

There have been 10 reported tornadoes over the course of 66 years; the average annual probability of recurrence, therefore, is 15% (10/66 x 100). The probability may be slightly higher if local reports of tornadoes were considered; however, this 15% probability is for all of Rockingham County – not just Nottingham. The actual probability for Nottingham should be much lower, considering the great dependence of impact upon the actual track of any tornado. The Hazard Mitigation Committee identified one tornado that touched down relatively close (Hampton Falls) to the Town, which would suggest the average annual probably of recurrence to be less than 2%. The tornado recurrence probability for Nottingham, therefore, is relatively low.

Estimated Loss Potential

Based on the moderate hazard ranking and assessed value of residential, commercial, and utilities structures, there is approximately $16,847,930 in estimated potential losses from impacts associated from tornadoes and downbursts.

[7] New Hampshire Department of Safety. State of NH Natural Hazard Mitigation Plan 2013. Homeland Security and Emergency Management.

Severe Winter Weather

Overview	
Hazard Type	Severe Winter Weather
Location/Extent	Town-wide
Severity	1
Probability	3
Overall Threat	3 (Moderate)

Description of the Hazard

Winter snow and ice events are common in New Hampshire. The National Climatic Data Center (NCDC 2016) Storm Events database reports 47 severe winter weather events, which include: 2 blizzards, 38 heavy snow events, 1 ice storm, and 6 winter storms (nor'easters) that have impacted Rockingham County from January, 1 2008 to September 30, 2016. Heavy snow typically brings significant snow removal costs along with delays in transportation schedules. Wet snow can result in major infrastructure damage from heavy snow loads and has been the cause of human harm during long periods of shoveling, including back injuries and in some cases heart attacks to older individuals. The most severe damage, though, often comes from ice storms and winter nor'easters.

The State's Multi-Hazard Mitigation Plan Update 2013 identifies four types of winter storms:

- *Heavy snowstorms*: A storm that deposits four or more inches of snow (or 10 cm) in a twelve-hour period
- *Blizzards*: A violent snowstorm with winds blowing at a minimum speed of 35 miles (56 kilometers) per hour and visibility of less than one-quarter mile (400 meters) for three hours
- *Nor'easter*: A large weather system traveling from south to north, passing along the coast. As the storm's intensity increases, the resulting counterclockwise winds which impact the coast and inland areas in a Northeasterly direction. Winds from a Nor'easter can meet or exceed hurricane force winds.
- *Ice Storms*: An event that occurs when a mass of warm, moist air collides with a mass of cold, arctic air. The less dense warm air will rise and the moisture may precipitate out in the form of rain. When this rain falls through the colder, denser air and comes in contact with cold surfaces, ice will form and may continue to form until the ice is as thick as several inches.

Extent of the Hazard

Snow and ice storms are a Town-wide hazard.

Sperry-Piltz Ice Accumulation Index

The Sperry–Piltz Ice Accumulation Index, or SPIA Index, is a forward-looking, ice accumulation and ice damage prediction index that uses an algorithm of researched parameters that, when combined with National Weather Service forecast data, predicts the projected footprint, total ice accumulation, and resulting potential damage from approaching ice storms. It is a tool to be used for risk management and/or winter weather preparedness.

The Sperry-Piltz Ice Accumulation Index, or "SPIA Index" – Copyright, February, 2009

ICE DAMAGE INDEX	* AVERAGE NWS ICE AMOUNT (in inches) *Revised-October, 2011	WIND (mph)	DAMAGE AND IMPACT DESCRIPTIONS
0	< 0.25	< 15	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	0.10 – 0.25	15 - 25	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
	0.25 – 0.50	< 15	
2	0.10 – 0.25	25 - 35	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
	0.25 – 0.50	15 - 25	
	0.50 – 0.75	< 15	
3	0.10 – 0.25	> = 35	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
	0.25 – 0.50	25 - 35	
	0.50 – 0.75	15 - 25	
	0.75 – 1.00	< 15	
4	0.25 – 0.50	> = 35	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
	0.50 – 0.75	25 - 35	
	0.75 – 1.00	15 - 25	
	1.00 – 1.50	< 15	
5	0.50 – 0.75	> = 35	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.
	0.75 – 1.00	> = 25	
	1.00 – 1.50	> = 15	
	> 1.50	Any	

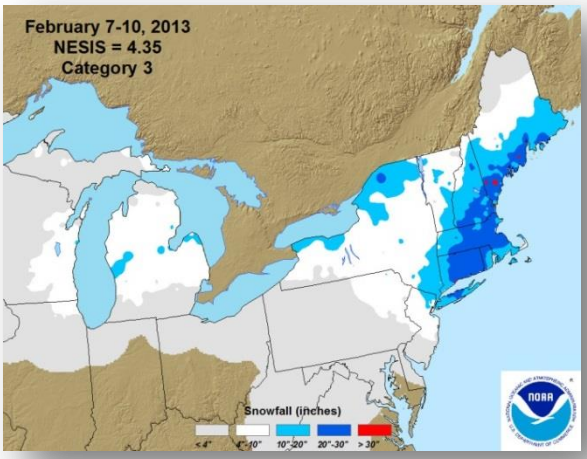
(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

Past Events and Impacts

Three events of those listed in the NCDC database are of particular note for their severity:

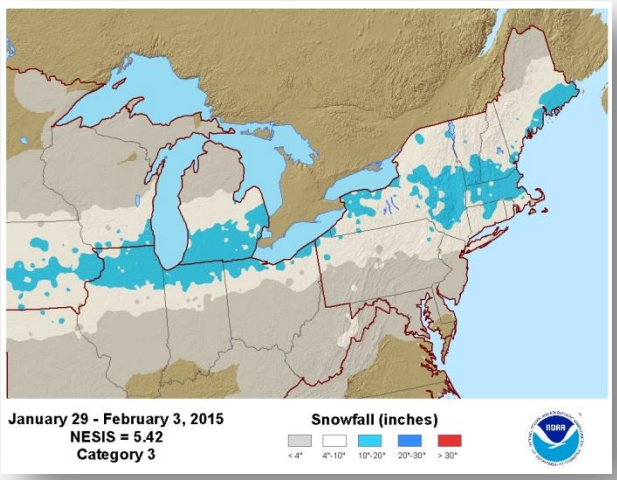
The Ice Storm of 2008 (December 11th – 12th) was a major winter storm that brought a mixture of snow, sleet, and freezing rain. The greatest impact in the state was in southern and central New Hampshire where a significant ice storm occurred. Following the ice storm, recovery and restoration efforts were negatively impacted by additional winter weather events that passed through the state. The freezing rain and sleet ranged from 1 to 3 inches, ice accretion to trees and wires in these areas generally ranged from about a half inch to about an inch. The weight of the ice caused branches to snap, and trees to either snap or uproot, and brought down power lines and poles across the region. About 400 thousand utility customers lost power during the event, with some customers without power for two weeks. Property damage across northern, central and southeastern NH was estimated at over $5 million. Locally, Nottingham experienced widespread power outages for upwards of a week.

The Blizzard of 2013 – NEMO (February 8th-9th) was an area of low pressure developed rapidly off the Carolina coast late on the 7th and early on the 8th. The storm moved very slowly northeast during the 8th and 9th as it continued to intensify. By the morning of the 10th, the storm was located just to the east of Nova Scotia. The storm brought heavy snow, high winds, and blizzard conditions to the southeastern part of the state. Snowfall amounts were generally 18 inches or more in the southeast where blizzard conditions caused considerable blowing and drifting snow. In western and northern sections, snowfall amounts were in the 4 to 18 inch range. Southeastern New Hampshire had blizzard conditions for about 3 to 10 hours.



The NCDC Regional Snowfall Index for the stations near Nottingham reported between 18 and 24 inches of snow (Rochester and Nottingham) and 12 to 18 inches (between Epson and Northwood) from February 8-February 10, 2013. According to the NH Union Leader, wind gusts of over 30-miles-per hour were expected to occur with the storm; however, the NH Electric Co-op reported only minor power outages.[8] Locally, this storm resulted in a significant and expensive snow removal effort. There were some branches down, which led to sporadic power outages throughout town.

The Blizzard of 2015 – JUNO (January 26th – 28th) was area of low pressure developed off the Delmarva peninsula on Monday, January 26th, and intensified rapidly as it moved slowly northward through the 27th. Snow spread northward across the region Monday night and became heavy on Tuesday, the 27th. Winds became strong during the day Tuesday leading to blizzard conditions at times along and inland from the coast. The snow persisted into Tuesday night in many areas with blowing and drifting snow. Snowfall amounts ranged from 10 to more than 30 inches across much of the southeastern part of the state.



Juno was ranked on the NESIS as a 'major' event based on the area affected, the amount of snow, and the number of people living in the path of the storm. The Regional Snowfall Index for the station near Nottingham reported between 18 and 24 inches from January 25-January 28th, 2015[9]. Locally, this storm resulted in a significant and expensive snow removal effort. There were some branches down, which led to sporadic power outages throughout town.

Other, less recent events were also damaging. The nor'easter of December 7, 1996 was especially damaging to power systems and is described in the NCDC database as "the most extensive and costliest weather related power outage in the state's history," at least until 1996 when that database entry was made. The 1998 ice storm probably surpassed this storm in power systems impact. This storm is thought to have been of the same magnitude as the one that occurred in the region in 1929, indicating a return period of approximately 70 years (CRREL 1998).

Extended Power Failures

When discussing extended power failure in this plan, it is referring to power failure that can last for a period of days or weeks. Many things can cause power failure: downed power lines (due to storm, wind, accident, etc.); failure of public utilities to operate or failure of the national grid. Extended power failure can present not only lighting difficulties but also heating, water supply and emergency services. In Nottingham, there have been extended power outages on occasion; the worst in recent years was the ice storm of 2008 where power was out for over a week in

[8] New Hampshire Union Leader. February 9, 2013.
http://www.unionleader.com/apps/pbcs.dll/article?AID=/20130209/NEWS1101/130209041/0/OPINION02
[9] http://gis.ncdc.noaa.gov/map/viewer/#app=cdo&cfg=rsi&theme=rsi

some places. There is a back-up generator at the Town Office, which acts as the primary emergency housing facility. The majority of residential homeowners in Nottingham have purchased personal back-up generators in recent years.

Potential Future Impacts on Community

Nottingham will continue regularly to receive impacts from severe, regional winter weather events. Due to its heavily forested nature, the Town is most highly exposed in terms of damage to forest resources and the secondary impacts of those damages.

Estimated Loss Potential

Based on the moderate hazard ranking and assessed value of residential, commercial, and utilities structures, there is approximately $16,847,930 in estimated potential losses from impacts associated from severe winter weather.

Severe Thunderstorms & Lightning

Overview	
Hazard Type	Severe Thunderstorm and Lightning
Location/Extent	Town-wide (sporadic)
Severity	1
Probability	3
Overall Threat	3 (Moderate)

Description of the Hazard

As defined by NOAA, a thunderstorm is a rain shower during which thunder is heard. Because thunder comes from lightning, all thunderstorms have lightning. A thunderstorm is the result of convection, which is the upward atmospheric motion that transports whatever is in the air (such as moisture) with it. A thunderstorm is classified as *severe* if it has hail one inch or greater, winds gusting in excess of 50 knots (57.5 mph), or a tornado. Thunderstorm-related hazards that could impact Nottingham include: high winds and downburst, lightning, hail, and, torrential rainfall. Thunderstorms and severe thunderstorms are a Town-wide hazard. They are most likely to occur in spring and summer.

Lightning can cause significant, sometimes severe, damage. Lightning strikes can cause direct damage to structures and serious injury or death to people and animals. Extensive damage also commonly results from secondary effects of lightning, such as electrical power surges, wildfire, and shockwave. According to lightning fatality data collected by the National Oceanic and Atmospheric Administration (NOAA), lightning kills an average of 49 people each year in the United States. There were 349 fatalities in the United States from 2005 to 2015.

Extent of the Hazard

Lightning heats air to a temperature of 50,000 degrees Fahrenheit and causes the air to expand and contract rapidly, which causes thunder. A lightning strike occurs very quickly but can occur multiple times during a storm.

Table 16: Lightning Activity Scale

Lightning Activity Level (LAL)	Conditions
LAL1	No thunderstorms activity
LAL2	Isolated thunderstorms
LAL3	Widely scattered thunderstorms
LAL4	Scattered thunderstorms
LAL5	Numerous thunderstorms
LAL6	Widely scattered, scattered, or numerous DRY thunderstorms

Past Events and Impacts

Thunderstorms are common in New Hampshire but can be considered generally less severe than in other areas of the country, such as the Great Plains states. Severe thunderstorms do occur in New Hampshire, though. The NCDC database lists 73 reported events (48 different days) of severe thunderstorm winds in Rockingham County from January 1, 2008 to June 30, 2016. None of these events were specifically identified as taking place in Nottingham.

There were no reported lightning strike related deaths in New Hampshire. The NCDC database lists six reported lightning events in Rockingham Country from January 1, 2008 to June 30, 2016; none occurred in the Town of Nottingham. While reports of significant lightning events have not occurred frequently in the past in Rockingham County, lighting and thunder can occur throughout the jurisdiction. In particular, the Planning Committee has identified that there are usually a handful of strikes within Pawtuckaway Park on any given year. A concern around the campground remains due to a higher density of people and infrastructure.

Finally, hail is a fairly common part of thunderstorms in New Hampshire, but damaging hail is apparently not. The damage that can result from hail is mostly to cars and windows. The NCDC Storm Events database lists 71 reported hailstorms in Rockingham County from January 1, 2008 to June 30, 2016. One of these events took place in Nottingham – on June 24, 2013. This event produced 1-inch hail but resulted in no direct or indirect injuries or death and no significant damage to property or crops. .

Potential Future Impacts on Community

The annual recurrence probability of thunderstorms in general is effectively 100%. Nottingham will continue to experience thunderstorms and should expect to sustain significant damage periodically.

Estimated Loss Potential

Based on the moderate hazard ranking and assessed value of residential, commercial, and utilities structures, there is approximately $16,847,930 in estimated potential losses from impacts associated from severe thunderstorms and lightning.

Wildfire

Overview	
Hazard Type	Wildfire
Location/Extent	Town-wide (Unfragmented, wooded areas)
Severity	1
Probability	3
Overall Threat	3 (Moderate)

Description of the Hazard

Wildfire is defined as an uncontrolled and rapidly spreading fire. A forest fire is an uncontrolled fire in a woody area. Forest fires occur during drought and when woody debris on the forest floor is readily available to fuel the fire. Grass fires are uncontrolled fires in grassland areas. Nottingham is a rural town with a predominantly forested landscape. Exposure to natural factors such as lightning that can cause wildfires is consequently high and can occur throughout the jurisdiction, particularly around Pawtuckaway State Park, which is an area far less accessible for firefighting than other areas.

Extent of the Hazard

The National Wildfire Coordinating Group (NWCG) categorizes the size of a wildfire in six classes depending on acres burned, ranging from less than ¼ acre to greater than 5,000 acres (see box to the right). The US Forest Service's surface fire behavior fire characteristics chart illustrates primary fire behavior values including the spread rate and the intensity of the fire, which can be used to compare predicted and observed fire behavior and to describe potential fire behavior.[10]

The National Wildfire Coordinating Group (NWCG) defines the size of a wildfire as:
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;

Past Impacts and Events

Wildfires in New Hampshire historically have tended to run in 50-yr cycles, which can be observed starting from the 1800s. This 50-year cycle is partially based upon human activities and, therefore, may not prove to be accurate into the future.[11] The peak in wildfires in the late 1940's and early 1950's is thought to be related to the increased fuel load from trees downed in the 1938 hurricane. Here, 60 years later, New Hampshire officials are again concerned about the high fuel load created by the 1998 and 2008 ice storms that hit New Hampshire.

[10] How to Generate and Interpret Fire Characteristics Charts for Surface and Crown Fire Behavior. (https://www.fs.fed.us/rm/pubs/rmrs_gtr253.pdf)
[11] New Hampshire Department of Safety. State of NH Natural Hazard Mitigation Plan 2013. Homeland Security and Emergency Management.

The NCDC Storm Events database lists 0 reported wildfires in Rockingham County from January 1, 2008 to September 30, 2016. However, the Planning Committee acknowledged a handful of small fire that took place in the summer of 2016 – partly due to drought conditions. During this time, there was a fire in which one house that was destroyed near Lucas Pond; two other small fires near Fort Hill Road and Revolutionary Lane; and a moderate wildfire in Pawtuckaway State Park. (More information needed on the wildfire in the Park). Challenges experienced by emergency responders and local firefighters with the State Park fire, included: inability to access to water (to draft from) and uneven, hilly topography.

Potential Future Impacts on Community

The probability of occurrence of wildfires in the future is effectively impossible for the Hazard Mitigation Committee to predict due to the dependence of wildfire on the occurrence of the causal hazards and the variability of numerous factors that affect the severity of a wildland fire.

In general, if a wildfire occurred in one of the large, unfragmented woodland areas, the cost of the timber loss would probably be in the range of several million dollars. The possibility of extensive wildfire is perhaps higher for the area of Town around Pawtuckaway State Park (has a manned Fire Tower), because that area is far less accessible for firefighting than other areas; however, it is also more sparsely settled, so damages might not be much different than in other areas.

Estimated Loss Potential

Based on the moderate hazard ranking and assessed value of residential, commercial, and utilities structures, there is approximately $16,847,930 in estimated potential losses from impacts associated from wildfires.

Earthquakes & Landslide

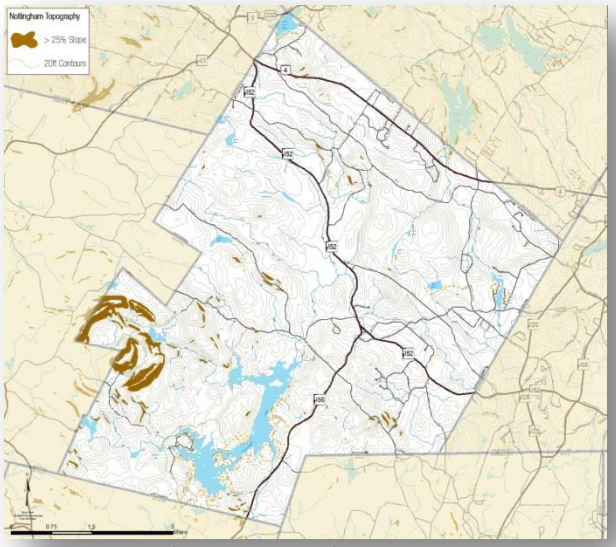
Overview	
Hazard Type	Earthquake & Landslide
Location/Extent	Town-wide and areas with steep slopes (>25%)
Severity	1
Probability	1
Overall Threat	1 (Low)

Description of the Hazard

The USGS defines an earthquake as a term used to describe both sudden slip on a fault, and the resulting ground shaking and radiated seismic energy caused by the slip, or by volcanic or magmatic activity, or other sudden stress changes in the earth. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and often cause landslides, flash floods, fires, avalanches, and tsunamis. Larger earthquakes usually begin with slight

tremors but rapidly take the form of one or more violent shocks, and are followed by vibrations of gradually diminishing force called aftershocks.[12] Earthquakes in the Northeast are not associated with specific know faults.

Due to the geology of the region, the area impacted by an earthquake in the Northeast can be up to 40 times greater than the same magnitude event occurring on the West coast. Earthquakes can occur at any time without warning. An earthquake can impact all areas of the jurisdiction. People at greatest risk from earthquakes are those who live in unreinforced masonry buildings build on filled land or unstable soil.[13]



Map 8: Steep Slopes in Nottingham (Source: SRPC, 2017)

Landslides could occur in Nottingham in areas with steep slopes, where soils and loose bedrock formations would tend to slough off and move en masse downhill under gravity. Earthquakes could readily cause landslides, as could ground saturation from extended heavy precipitation events. Given seismic or precipitation events that could initiate landslide, landslide hazard is likely quite high in steep slope areas. There are approximately 670 acres of steep slopes greater than 25% in Nottingham. Areas of steep slopes are especially prevalent in the south western corner of the Town within Pawtuckaway State Park, though they are present elsewhere in the Town (see Map 8 above).

Extent of the Hazard

The magnitude and intensity of an earthquake is measured by the Richter scale and the Modified Mercalli Intensity (MMI) scale, respectively. The Richter magnitude scale was developed in 1935 by Charles F. Richter of the California Institute of Technology as a mathematical device to compare the size of earthquakes. The magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismographs. Adjustments are included for the variation in the distance between the various seismographs and the epicenter of the earthquakes. [14]

MODIFIED MERCALLI SCALE		RICHTER SCALE	
I.	Felt by almost no one.	2.5	Generally not felt, but recorded on seismometers.
II.	Felt by very few people.		
III.	Tremor noticed by many, but they often do not realize it is an earthquake.	3.5	Felt by many people.
IV.	Felt indoors by many. Feels like a truck has struck the building.		
V.	Felt by nearly everyone; many people awakened. Swaying trees and poles may be observed.		
VI.	Felt by all; many people run outdoors. Furniture moved, slight damage occurs.	4.5	Some local damage may occur.
VII.	Everyone runs outdoors. Poorly built structures considerably damaged; slight damage elsewhere.		
VIII.	Specially designed structures damaged slightly, others collapse.	6.0	A destructive earthquake.
IX.	All buildings considerably damaged, many shift off foundations, Noticeable cracks in ground.		
X.	Many structures destroyed. Ground is badly cracked.	7.0	A major earthquake.
XI.	Almost all structures fall. Very wide cracks in ground.	8.0 and up	Great earthquakes.
XII.	Total destruction. Waves seen on ground surfaces, objects are tumbled and tossed.		

[12] The Northeast States Emergency Consortium Earthquake Hazards. http://nesec.org/earthquakes-hazards/. Viewed on 8/10/15
[13] http://nesec.org/earthquakes-hazards/
[14] USGS. Earthquake Hazard Program. http://earthquake.usgs.gov/learn/glossary/?term=Richter%20scale. Viewed on 8/10/15

The Modified Mercalli Intensity (MMI) scale was developed in 1931 by the American seismologists Harry Wood and Frank Neumann. This scale, composed of 12 increasing levels of intensity that range from imperceptible shaking to catastrophic destruction, is designated by Roman numerals. It does not have a mathematical basis; instead it is an arbitrary ranking based on observed effects actually experienced at a given place and therefore has a more meaningful measure of severity.[15]

Past Impacts and Events

Due to the state's location in an area of moderate seismic activity earthquakes are a common event in New Hampshire, but significantly damaging earthquakes are not. The Northeast States Emergency Consortium (NESEC, 2016) website presents a history of earthquake in the Northeast and documents that New Hampshire is an area of high earthquake probability. Three hundred and sixty earthquakes occurred in New Hampshire from 1638 to 2007. Approximately 40-50 earthquakes are detected in the Northeast annually.[16] However, New Hampshire has only experienced nine earthquakes of significant magnitude (Richter Magnitude 4.0 or greater) in that time period. Nottingham has experienced no major earthquakes in recent years. There have been no recorded or knowledge of any landslides directly impacting the community.

Earthquakes are on average an annual occurrence but significant quakes have an annual probability of occurrence (based on the 1638 to 2007 period) of about 2.4%.

Table 17: Notable Historic Earthquakes in NH 1638-2007 (Magnitude 4.0 or Greater)

Location	Date	*Intensity MMI Scale*	Magnitude *Richter Scale*
Central New Hampshire	June 11, 1638	-	6.5
Portsmouth	November 10, 1810	V	4.0
Near Hampton	July 23, 1823	IV	4.1
Ossipee	October 9, 1925	VI	4.0
Ossipee	December 20, 1940	VII	5.5
Ossipee	December 24, 1940	VII	5.5
West of Laconia	January 19, 1982	-	4.7
Northeast of Berlin	October 20, 1988	-	4.0
Southeast of Berlin	April 6, 1989	-	4.1

Potential Future Impacts on Community

Earthquakes could readily cause landslides, as could ground saturation from extended heavy precipitation events. Given seismic or precipitation events that could initiate landslide, landslide hazard is likely quite high in steep slope areas.

[15] USGS. Earthquake Hazard Program. http://pubs.usgs.gov/gip/earthq4/severitygip.html. Viewed on 8/10/15
[16] http://nesec.org/earthquakes-hazards/

The Hazard Mitigation Committee did not have the expertise available to analyze the actual probability of landslide in Nottingham. The USGS (1997) classifies landslide incidence regionally as very low (less than 1.5% of land area involved). The local probability in Nottingham however, will depend on specific soil/rock types and upon the probability of initiating events.

Estimated Loss Potential

Based on the low hazard ranking and assessed value of residential, commercial, and utilities structures, there is approximately $3,369,586 in estimated potential losses from impacts associated from earthquakes and landslides.

Extreme Temperatures

Overview	
Hazard Type	Extreme Temperatures
Location/Extent	Town-wide
Severity	1
Probability	2
Overall Threat	2 (Moderate)

Description of the Hazard(s)

Extreme temperatures can be describes as heat waves and cold waves (or winter storm and extreme winter conditions.

A *heat wave* is a prolonged period of excessively hot and sometimes also humid weather relative to normal climate patterns of a certain region. Heat kills by pushing the human body beyond its limits. In extreme heat and high humidity, evaporation is slowed and the body must work extra hard to maintain a normal temperature. Most heat disorders occur because the victim has been overexposed to heat or has over-exercised for his or her age and physical condition. Older adults, young children, and those who are sick or overweight are more likely to succumb to extreme heat. Conditions that can induce heat-related illnesses include stagnant atmospheric conditions and poor air quality. Consequently, people living in urban areas may be at greater risk from the effects of a prolonged heat wave than those living in rural areas. Also, asphalt and concrete store heat longer and gradually release heat at night, which can produce higher nighttime temperatures known as the "urban heat island effect."[17]

A *cold wave* can be both a prolonged period of excessively cold weather and the sudden invasion of very cold air over a large area. Along with frost it can cause damage to agriculture, infrastructure, and property. Cold waves, heavy snowfall and extreme cold can immobilize an entire region. Even areas that normally experience mild winters can be

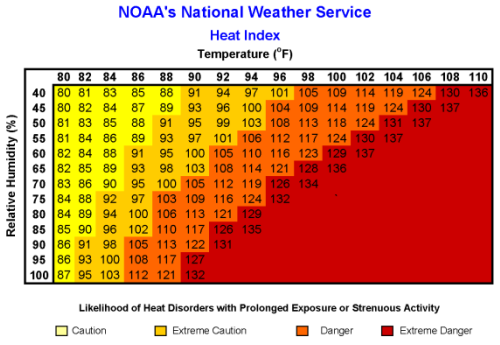
[17] International Federation of Red Cross and Red Crescent Societies. Climatological hazards: extreme temperatures. http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard/extreme-temperatures/

hit with a major snowstorm or extreme cold. Winter storms can result in flooding, storm surge, closed highways, blocked roads, downed power lines and hypothermia.

Extent of the Hazard

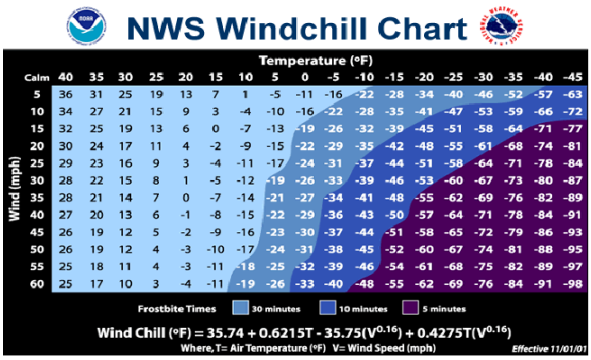
Extreme Heat

Extreme heat events can be described as periods with high temperatures of 90°F or above. The graph to the right displays the likelihood of heat disorders with prolonged exposure or strenuous activity.



Extreme Cold

What constitutes extreme cold varies by region. Characteristics of an extreme cold event in northern states include temperatures at or below zero for an extended period of time. According to the National Weather Service (NWS), extreme cold is a daily concern during the winter months for northern states. The NWS Wildchill Temperature index calculates the dangers from winter winds and freezing temperatures (Source: NWS)



Past Impacts and Events

According to a 2014 study of climate change by Climate Solutions New England, Climate Change in Southern New Hampshire, from 1970 to 1999, southern New Hampshire experienced an average of seven days per year above 90°F each year. This is projected to increase to 22 days per year under a low emissions scenario to nearly 50 days per year under a high emissions scenario. Between 1980 and 2009, an average of one day per year reached 95°F in southern New Hampshire. By the end of the century, the number of days per year over 95°F is expected to increase as much as six to 22 days per year. Additionally, the average daytime maximum temperature on the hottest day is expected to increase to as much as 98°F to 102°F (depending on the emissions scenario), compared to the historical average of 93°F.[18] Between 1960 and 2012, there was an average of 8.3 days per year (or 0.8 days/decade) greater than 90°F recorded in Durham (the closest of four stations to Nottingham included in the study). During this time the hottest day of the year averaged 95.0°F.[19]

Locally, there have been no records of extreme heat-related losses; however, the police and fire departments have received and responded to call during heat waves from residents experiencing heat exhaustion. During these times of prolonged heat waves, the Recreation Department keeps kids indoors and limits outdoor recreational activities. The Town Hall acts as a cooling station for residents seeking shelter from the heat. The Town also receives notifications and guidance from the state.

[18] Wake, C. et al. "Climate Change in Southern New Hampshire; Past, Present, and Future." Climate Solutions of New England. 2014
[19] Wake, C. et al. "Climate Change in Southern New Hampshire; Past, Present, and Future." Climate Solutions of New England. 2014

Between 1960 and 2012, the average temperature of the coldest day of the year was -14.5°F in Durham (the closest of four stations to Nottingham included in the study).[20] Between 1980 and 2009, there were an average of 164 days per year under 32°F and 16 days per year under 0°F in southern New Hampshire. By the end of the century, southern New Hampshire is expected to see 20 fewer days below 32°F and only about 2 to 5 days per year under 0°F.

Locally, there have been no records of extreme cold-related losses; however, the Town Hall does serve as a warming station for residents seeking shelter during extreme cold events. This has occurred a few times over the past five years or so.

Potential Future Impacts on Community

Annual average temperatures may increase on average by 3-5°F by 2050 and 4-8°F by 2100.[21]

Estimated Loss Potential

Based on the moderate hazard ranking and assessed value of residential, commercial, and utilities structures, there is approximately $16,847,930 in estimated potential losses from impacts associated from extreme temperatures.

Drought

Overview	
Hazard Type	Drought
Location/Extent	Town-wide
Severity	1.7
Probability	3
Overall Threat	5 (High)

Description of the Hazard

A drought is defined as a long period of abnormally low precipitation, especially one that adversely affects growing or living conditions. The impacts of droughts are indicated through measurements of soil moisture, groundwater levels, and stream flow. The effect of drought on these indicators is variable during any particular event. For example, frequent minor rainstorms can replenish the soil moisture without raising groundwater levels or increasing streamflow. Low streamflow also correlates with low ground-water levels because ground water discharge to streams and rivers maintains streamflow during extended dry periods. Low streamflow and low ground-water levels commonly cause diminished water supply.

Drought is a regional hazard and can impact the entire jurisdiction. Agricultural land and residents who use dug, shallower wells may be more vulnerable to the effects of drought.

[20] Wake, C. et al. "Climate Change in Southern New Hampshire; Past, Present, and Future." Climate Solutions of New England. 2014
[21] Wake, C. et al. "Climate Change in Southern New Hampshire; Past, Present, and Future." Climate Solutions of New England. 2014

Extent of the Hazard

The National Drought Monitor classifies the duration and severity of the drought using precipitation, stream flow, and soil moisture data coupled with information provided on a weekly basis from local officials. There are five magnitudes of drought outlined in the New Hampshire State Drought Management Plan: Exceptional, Extreme, Severe, Moderate, and Abnormally Dry. At the time of the preparation of this Plan, Nottingham was in an extreme state of drought.

Past Impacts and Events

While the impacts of drought are typically not as damaging and disruptive as floods or storm events, the impacts of long term drought or near drought conditions can impact crops and the water supply.

Periods of drought have occurred historically in New Hampshire. Six droughts of significant extent and duration were evident in the 20th century as noted below in Table 18. The most severe drought recorded in New Hampshire occurred from 1960 to 1969. This drought encompassed most of the northeastern United States (1956-1966). The drought of 1929-1936 was the second worst and coincided with severe drought conditions in large areas of the central and eastern United States. The drought of 2001-2002 was the third worst on record.[22]

Table 18: Severe Drought Conditions in New Hampshire

Dates	Area Affected	Magnitude	Remarks
1929 – 1936	Statewide	-	Regional; recurrence interval 10 to > 25 years
1939 – 1944	Statewide	Severe Moderate	Severe in southeast NH and moderate elsewhere in the State. Recurrence interval 10 to > 25 years.
1947 – 1950	Statewide	Moderate	Recurrence interval 10 to >25 years
1960 – 1969	Statewide	Extreme	Longest recorded continuous spell of less than normal precipitation. Encompassed most of the northeast US. Recurrence interval >25 years.
2001 – 2002	Statewide	Severe	Recurrence interval 10 to >25 years
2015	Central & Southern NH	Moderate	Recurrence interval cannot yet be determined

In more recent years, drought has again become a problem in New Hampshire. In 1999, a drought warning was issued by the Governor's Office. In March 2002, all counties in New Hampshire with the exception of Coos County were declared in Drought Emergency. This was the first time that low-water conditions had progressed beyond the Level Two, Drought Warning Stage. With extreme variation in environmental conditions due to global warming possibly on the rise, drought probability may grow in the future. Currently, drought possibility seems moderate. The large amount of water resources and relatively sparse population in New Hampshire have tended to minimize the impacts of drought events in the region, but this regional protection may be endangered in the future with increases in drought frequency or severity.

[22] NHDES. Drought Management Program. Publications. *NH Drought Historical Events*. Viewed on 8/10/15. http://des.nh.gov/organization/divisions/water/dam/drought/documents/historical.pdf

Normal precipitation for the state averages 40 inches per year. During the summer of 2015, most of central and southern New Hampshire experienced its most recent drought, the first since 2001 – 2002 (was the 3rd worst on record, exceeded only by the national droughts of 1956-1966 and 1941-1942). While many communities experienced record snowfall totals this past winter (2014-2015), the lack of rainfall and higher-than-average temperatures resulted in river and groundwater levels to be lower than average. This resulted in the implementation of local water conservation plans throughout the region.

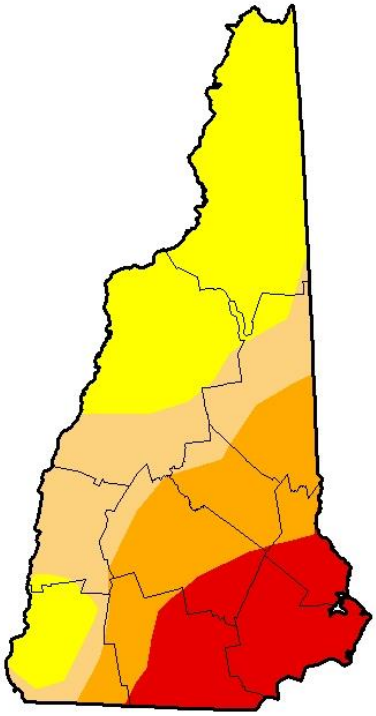
Locally, Nottingham experienced a few private wells run dry (some of which could have been dug too shallow). During these times of drought, the Town Hall and Fire Department posts bulletins, uses the local TV stations, and accesses the internet (website, Facebook, etc.) to provide existing condition data and general assistance information. The fire department provides a fire prevention and general awareness program to the school.

Drought conditions continued in intensified into 2016 in New Hampshire and in Southeast New Hampshire in particular. As of October 2016, nearly 20% of the state was categorized as being in extreme drought. One hundred and sixty community water systems have reported implementing a water restriction or ban, and 13 towns have reported implementing voluntary or mandatory outdoor use bans in the state.

See: http://des.nh.gov/organization/divisions/water/dwgb/water_conservation/documents/waterban.pdf.

U.S. Drought Monitor

New Hampshire



October 11, 2016

(Released Thursday, Oct. 13, 2016)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0	D1	D2	D3	D4
Current	0.00	37.56	21.95	21.22	19.27	0.00
Last Week 10/4/2016	15.44	22.12	21.95	21.22	19.27	0.00
3 Months Ago 7/12/2016	16.44	41.96	24.41	17.18	0.00	0.00
Start of Calendar Year 12/29/2015	50.84	34.27	14.88	0.00	0.00	0.00
Start of Water Year 9/27/2016	15.33	22.23	21.95	21.22	19.27	0.00
One Year Ago 10/13/2015	76.38	8.74	14.88	0.00	0.00	0.00

Intensity:

D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Brian Fuchs
National Drought Mitigation Center

http://droughtmonitor.unl.edu/

Potential Future Impacts on Community

The National Drought Mitigation Center website (NDMC 2004) emphasizes that reliable drought prediction for regions above 30°N latitude is effectively impossible.

With extreme variation in environmental conditions due to climate change possibly on the rise, drought probability may grow in the future. Currently, drought possibility seems moderate. The large amount of water resources and relatively sparse population in New Hampshire have tended to minimize the impacts of drought events in the region, but this regional protection may be endangered in the future with increases in drought frequency or severity.

Historically, droughts in New Hampshire have had limited effect because of the plentiful water resources and sparse population. Since 1960, the population has more than doubled, which has increased demand for the State's water resources. Further droughts may have considerable effect on the State's densely populated areas along the seacoast and in the south-central area.

Estimated Potential Losses

Based on the high hazard ranking and assessed value of residential, commercial, and utilities structures, there is approximately $33,695,860 in estimated potential losses from drought.

Public Health Threats

Overview	
Hazard Type	Public Health Threats
Location/Extent	Town-wide
Severity	0.7
Probability	2
Overall Threat	1.3 (Low)

Description of the Hazard

Epidemic

As defined by the CDC, and epidemic is "the occurrence of more cases of disease than expected in a given area or among a specific group of people over a particular period of time."[23] In addition to being categorized by the type of transmission (point-source or propagated), epidemics may occur as outbreaks or pandemics. As defined in the State Hazard Mitigation Plan, an outbreak is a sudden increase of disease that is a type of epidemic focused to a specific area or group of individuals. A pandemic is an epidemic that spreads worldwide, or throughout a large geographic area.

[23] Slate; http://www.slate.com/id/2092969/

Epidemics may be caused by infectious diseases, which can be transmitted through food, water, the environment or person-to-person or animal-to-person (zoonoses), and noninfectious diseases, such as a chemical exposure that causes increased rates of illness. Infectious disease that may cause an epidemic can be broadly categorized into the following groups[24]:

- Foodborne (Salmonellosis, Ecoli)
- Water and Foodborne (Cholera, Giardiasis)
- Vaccine Preventable (Measles, Mumps)
- Sexually Transmitted (HIV, Syphilis)
- Person-to-Person (TB, Aseptic meningitis)
- Arthropodborne (Lyme, West Nile Virus)
- Zoonotic (Rabies, Psittacosis)
- Opportunistic fungal and fungal infections (Candidiasis).

An epidemic may also result from a bioterrorist event in which an infectious agent is released into a susceptible population, often through an enhanced mode of transmission, such as aerosolization (inhalation of small infectious disease particles).[25] For the purposes of this Plan, widespread drug and substance abuse may also be considered epidemics.

Lyme Disease

Lyme disease, which is spread to humans by the bite of an infected tick, is a growing threat in New Hampshire. New Hampshire has one of the highest rates of Lyme disease in the U.S.

Radon

Radon is a radioactive gas which is naturally occurring as a result of the typical decay of uranium commonly found in soil and rock (especially granite). Radon has carcinogenic properties and is a common problem in many states; New Hampshire has some isolated areas that are among the highest levels of radon in the United States according to the US Environmental Protection Agency (EPA). Whether or not a particular type of granite emanates radon is dependent on the geochemistry of that particular granite, some types are a problem and some are not. In other parts of the country, radon is associated with certain black shales, sandstones, and even limestones. The EPA has estimated that radon in indoor air is responsible for about 13,600 lung cancer deaths in this country each year (EPA document, EPA 811-R-94-001, 1994).[26]

Arsenic

Arsenic is a semi-metal element that is odorless and tasteless. Arsenic is a hazard because it can enter drinking water supplies, either from natural deposits in the earth or from agricultural and industrial practices.[27]

[24] New Hampshire Department of Safety. State of NH Natural Hazard Mitigation Plan 2013. Homeland Security and Emergency Management.
[25] Ibid
[26] Ibid
[27] EPA. Arsenic in Drinking Water. (http://water.epa.gov/lawsregs/rulesregs/sdwa/arsenic/index.cfm)

Wells drilled into New Hampshire's bedrock fractures have about a 1 in 5 probability of containing naturally occurring arsenic above 10 parts per billion. In addition, wells within short distances (~50 feet) can present very different water quality because of our highly fractured bedrock. Arsenic in water has no color or odor, even when present at elevated levels. Therefore, the only way to determine the arsenic level in your well water is by testing.

Extent of the Hazard

Public health threats are events or disasters that can affect an entire community.

Past Impacts and Events

Epidemic

The Committee recognizes that the largest threat is at the school. Because students are traveling for school, there is a threat of enabling infection and viruses to be transmitted from outside the Town's borders. The closest point of dispensing (POD) site is at the Raymond High School. Another major consideration is the Pawtuckaway State Park, which sees large influxes of people during the summer months. While there have not been any cases of widespread disease, the Planning Committee recognized that there have been numerous beach closures due to high e.coli levels.

Currently, New Hampshire is among those states in the Northeast combating a serious opioid epidemic, which has resulted in 558 drug overdose deaths since January 2014.[28] Leading causes have been from heroin and/or fentanyl. New Hampshire has some of the highest percentages of illicit drug use among young adults in not just the Northeast, but the entire country. The Town Library offers a drug education and awareness program; however, the Police Department acknowledges that the Town needs to do more to reach students before they enter high school in order to educate them about the ongoing heroin epidemic impacting NH and inform those seeking help for their addiction about treatment and recovery resources.

Lyme Disease

The number of New Hampshire residents diagnosed with Lyme disease has increased over the past 10 years, with significant increases occurring since 2005.[29] In 2009, the rate of cases of Lyme disease reported in New Hampshire residents was 108 cases per 100,000 persons, which is significantly higher than the Healthy People 2010 science-based 10-year national objective for improving the health of all Americans objective of 9.7 cases per 100,000 persons.[30] From 2009 to 2013, reported cases of Lyme disease in New Hampshire increased by approximately 20% from 1416 cases per year to 1691 cases per year.[31] From 2008-2009, there were 212 reported cases of Lyme disease in Rockingham County, which is the highest case count of any county in the state.[32]

Radon

[28] New Hampshire Medical Examiner's Office. http://www.nhshp.org/resources/Documents/Opioid%20Crisis%20FACTSheet_FINAL.pdf
[29] 2011 New Hampshire State Health Profile; Improving Health, Preventing Disease, Reducing Costs for All. NH Division of Public Health Services Department of Health and Human Services. http://www.dhhs.nh.gov/dphs/documents/2011statehealthprofile.pdf
[30] HealthyPeople.gov. About Healthy People. Accessed April 2014. Available at: http://healthypeople.gov/2020/about/default.aspx
[31] NHDHHS. State of New Hampshire Tickborne Disease Prevention Plan. March 31, 2015. http://www.dhhs.state.nh.us/dphs/cdcs/lyme/documents/tbdpreventionplan.pdf)
[32] 2011 New Hampshire State Health Profile; Improving Health, Preventing Disease, Reducing Costs for All. NH Division of Public Health Services Department of Health and Human Services. http://www.dhhs.nh.gov/dphs/documents/2011statehealthprofile.pdf

Exposure is a significant hazard in New Hampshire. According to a NH Bureau of Environmental & Occupational Health (BEOH) study looking at >15,000 indoor radon test results in single-family dwellings, households in northern, eastern, and southeastern regions of New Hampshire especially tend to have nominally high concentrations of radon in air or water (BEOH 2004); however, values in excess of the US Environmental Protection Agency's 4.0 picocurie per liter (pCi/L) action guideline have been found in nearly every community in New Hampshire. Values exceeding 100 pCi/L have been recorded in at least eight of New Hampshire's ten counties. The highest indoor radon reading in New Hampshire known to NHDES is greater than 1200 pCi/L; higher values probably exist. In the BEOH study, 44.0% of tests in Rockingham Co. exceeded the 4.0 pCi/L action level and 13.0% even exceeded 12.0pCi/L.

In Nottingham, between 40 and 49.9% of homes tested by homeowners from 1987 to 2008 tested at or above the radon action level of 4.0 pCi/L. The probability of significant radon exposure is fairly high.[33]

Arsenic

From 1975 until 2001, the federal maximum contaminant limit (MCL) for arsenic in water supplied by public water systems was 50 parts per billion, because the health effects of exposure to lower concentrations was not recognized. Based on an exhaustive review of the new information about arsenic's health effects, in January 2001 EPA established a goal of zero arsenic in drinking water. At the same time, EPA adopted an enforceable MCL of 10 parts per billion (ppb) based on balancing treatment costs and public health benefits. Studies have shown that chronic or repeated ingestion of water with arsenic over a person's lifetime is associated with increased risk of cancer (of the skin, bladder, lung, kidney, nasal passages, liver or prostate) and non-cancerous effects (diabetes, cardiovascular, immunological and neurological disorders). The same studies found that dermal absorption (skin exposure) of arsenic is not a significant exposure path; therefore, washing and bathing do not pose a known risk to human health.[34]

Potential Future Impacts on Community

With the occurrence of worldwide pandemics such as SARS, H1N1 and Avian Flu, Nottingham could be susceptible to an epidemic and subsequent quarantine. While all individuals are potentially vulnerable to the hazard of an epidemic, epidemics often occur among a specific age group or a group of individuals with similar risk factors and exposure.[35] Nottingham does not have a High School and students are required to travel elsewhere or are homeschooled. Because students are traveling for school, there is a threat of enabling infection and viruses to be transmitted from outside the Town's borders. With the influx of tourists from neighboring towns or even states, there is also another threat of enabling infection and viruses to be transmitted Nottingham's unique geography and State Park provides its citizens and tourists alike the opportunity for summer and winter recreation activities, which often brings outdoor enthusiasts into the Town. It is also important to note that the majority of Nottingham's residents commute outside the Town in order to get to and from work, thus increasing the threat of enabling infection and viruses to be transmitted from other parts of the State. The opioid epidemic will continue to be a major challenge for law enforcement and public health officials to work on solving.

[33]NHDES http://des.nh.gov/organization/divisions/air/pehb/ehs/radon/documents/radon_by_town.pdf
[34] New Hampshire Environmental Services. Drinking Water and Groundwater Bureau. Arsenic in Drinking Water Fact Sheet.
[35] New Hampshire Department of Safety. State of NH Natural Hazard Mitigation Plan 2013. Homeland Security and Emergency Management.

Lyme disease will continue to impact public health, and with changes in climate, in particular warmer winters, higher rates of Lyme disease will be an ongoing concern.

Radon, arsenic, and other potential groundwater containments will continue to need to be addressed. There have been reports by the EPA that lung cancer deaths nationwide can be attributed to radon exposure, but nothing inclusive has been determined at this point. With assistance from epidemiological health experts, for future plan updates the Committee may be able to use the life-table or concentration risk analysis methodologies in the EPA study (EPA 2003) together with demographic and behavioral health data to arrive at a reasonable estimate of risk

Estimated Potential Losses

Based on the low hazard ranking and assessed value of residential, commercial, and utilities structures, there is approximately $3,369,586 in estimated potential losses from impacts associated from public health threats.

Hazardous Materials

Overview	
Hazard Type	Hazardous Materials
Location/Extent	Town-wide (Route 4)
Severity	1
Probability	2
Overall Threat	2 (Low)

Description of the Hazard

Hazardous materials in various forms can cause death, serious injury, long-lasting health effects, and damage to buildings, homes, and other property. Many products containing hazardous chemicals are used and stored in homes routinely. These products are also shipped daily on the nation's highways, railroads, waterways, and pipelines. Chemical manufacturers are one source of hazardous materials, but there are many others, including service stations, hospitals, and hazardous materials waste sites.

Extent of the Hazard

Incidents involving hazardous materials could potentially occur at any residence or business or along any road; however, it is more likely that a spill would occur along Route 4. This stretch experiences a significant amount of truck traffic from 11PM – 4AM – carrying petroleum, propane, gas, food, and medical supplies.

Past Impacts and Events

While there haven't been any major hazardous spills, there have been two accidents involving hazardous materials; one involving a milk truck that tipped over on Route 156 and Church Street and dumped milk into an unnamed brook and the other a tanker carrying petroleum.

Potential Future Impacts on Community

Route 4 is the major east/west corridor that often has trucks carrying bio-diesel fuel and other harmful chemicals through Town. The Team agreed that a number of private wells, public drinking water supplies, and other important water resources along the North River, Mendums Brook, Little River, a prime wetland near Barrington, and an area beside Freeman/Hall Road were all vulnerable to hazardous spills in the future.

Estimated Potential Losses

Based on the low hazard ranking and assessed value of residential, commercial, and utilities structures, there is approximately $3,369,586 in estimated potential losses from hazardous materials impacts.

Hazards Not Included in this Plan

The State of New Hampshire identifies avalanches as a hazard in the State Multi-Hazard Mitigation Plan Update of 2013. Avalanches are not included in this Plan for the Town of Nottingham. Avalanches were not identified by the present or past Planning Committee as a local hazard due to the fact that there are no significant mountains or topographical features, other than Pawtuckaway State Park, where avalanches would be likely to or have occurred in the past. The Town will re-evaluate the need to include additional hazards to this Plan during subsequent updates of the Plan.

Chapter 7: Action Plan

Past Mitigation Strategies

During that update the Planning Committee developed a list of strategies to implement over the course of the Plan's life-cycle. Table 19 summarizes those strategies, and provides information as to if the strategy was accomplished or not.

Table 19: Accomplishments since Last Plan Adoption

Proposed Mitigation Action	Status Update 2017
Construct a new future Highway Department Headquarters at the Town Pit. Designing a bridge over Little River.	Completed action. The bridge over Little River was designed and constructed in 2014. The Town did not build a new Highway Department at the Town Pit. It was decided to rebuild the old building at the same location.
Purchase a 1-ton 4x4 Utility Truck for the Fire & Rescue.	Completed action. This equipment was purchased in 2016.
Construction on Berry Road; Culvert & Twin Bridges replacements.	Deferred action. However, this project remains in the Town's Capital Improvements Plan and is expected to be completed within the next 5 – 7 years.
There will be a continued need to establish new dry hydrant and cistern locations throughout the Town.	Ongoing action. The Town continues to establish new dry hydrants and cisterns as needed. A new dry hydrant will be installed on Swan Drive ($11,000) and is in the Town's Capital Improvement Plan for 2017.
Public education on the Household Hazardous Waste (HHW) Program at NHDES. Awareness on changing the way residents purchase, use, and dispose of hazardous products.	Ongoing action. The Town partners with Raymond to encourage residents to participate in "Household Hazardous Waste Day". This is an annual event held in either September or October on Industrial Drive in Raymond.
Establish local and state partnerships to protect the Pawtuckaway State Park into a permanent conservation easement.	Removed action. This action has been deemed "not feasible" and should be removed from future plans.
Maintain transportation infrastructure by identifying and assessing potential areas (roads and culverts) of concern that are recognized in this plan.	Ongoing action. The Town's Road agent continues to utilize these plans in order to help identify vulnerable transportation infrastructure and prioritize projects for the Town's 10-year transportation plan.
Continue to provide outreach assistance to elderly and special needs populations by organizing staff and coordinating within Town departments (Recreation & Fire and Rescue).	Deferred Action. The Town will encourage the development of a partnership between the Recreation Department and Fire to implement and coordinate a senior check-in program.
Add safety related pages on website (Emergency Management and Police Department) that deal with natural and manmade disasters.	Deferred Action. Due to capacity issues this has yet to be accomplished. The Police Chief will take the lead on implementing this action over the course of this plan's cycle.

Proposed Mitigation Action	Status Update 2017
Make all documents relating to the Hazard Mitigation Update available at the Town Library, Town Hall, and other public locations.	Completed. All documents are located at the Town Hall, Police and Fire, and the Library. The Town is encouraged to make these materials available online and on the website.

Status Update:

Completed Action – This program continues to be an implemented mitigation action item since the last updated plan was developed

Deferred Action – At the time of developing this plan, more time is required for completion

Removed Action – This existing program is no longer a priority to the Town

Ongoing Action – This program will occur throughout the life of the plan

Existing Mitigation Strategies

During that update the Planning Committee developed a list of existing programs and strategies that were ongoing planning mechanisms to help reduce impacts from future hazards. Table 20 summarizes those programs, and provides information on the effectiveness, any changes in priority, and a list of recommendations to improve them during the next life-cycle of this plan.

Table 20: Existing Programs and Policies

Existing Program	Description	Effectiveness	2017 Update
Building Codes	Establishes regulations for the design and installation of building systems	Good	The Town is using the 2009 International Building Code and is waiting for the state to adopt the new codes. At the time of this plan update, the state building code review board is trying to get legislation passed to adopt the 2015 codes.
Emergency Operations Plan (EOP)	Defined notification procedures and actions that should be taken in different emergency situations.	Excellent	The EOP was updated and adopted on 7/14/2016. Services were provided by LMK Emergency Planning Associates and were funded through a grant.
Drainage Infrastructure Improvements	Infrastructure is maintained and upgraded on an as needed basis	Good	The Town updated their subdivision regulations in 2015; the Town's site plan regulations were amended in 2016. Both sets of regulations have thresholds for stormwater management plans, requirements for development within flood hazards areas, and design standards for drainage, erosion, and sediment control.
Hazardous Materials Response Team	Technical assistance and guidance with regards to hazardous material incidents	Good	The Town still works with the Seacoast HazMat Team. There have been no events that have required assistance. Emergency responders have received and attended mandatory, scheduled trainings.
Floodplain Management Ordinance	Local ordinance to regulate development in the floodplain.	Average	The floodplain ordinance has not been updated since 1994 and it is recommended that the Town strengthen this regulation after the new FEMA floodplain maps are delineated and completed.

Existing Program	Description	Effectiveness	2017 Update
Tree Maintenance	Utility companies and NHDOT have tree maintenance programs to clear trees and limbs from power lines and roadways.	Good	The Town completes work over the course of a few days, each year using a hired private tree cutting service. Significant upgrades have been completed by Eversource and New Hampshire Electric Cooperative.
Evacuation and Notification	Evacuation and notification procedures are defined in Nottingham's EOP.	Good	The Town uses the Nixle system; however, there have not been any emergency evacuations over the past five years. The system has been used to encourage community participation in ongoing police investigations. Other forms of notification include a call-system used by the School and a local channel on Comcast that lists notices, office hours, and meetings.
Communication Improvements	Strategies to improve local communication	Good	Radio equipment upgrades have increased communication between Police and Fire. The Town added a second TV channel for the School. Two private cell towers were built on Route 4 to improve cell service. A repeater was constructed on Deerfield Road to improve communication for the Fire Department and to address blind spots around Pawtuckaway State Park.
Emergency Back-Up Power & Emergency Shelters	Offers temporary shelter during extended periods without power	Good	It is recognized that Nottingham residents have not typically used the Town Hall, which acts as a shelter and warming station, when opened during emergencies. This area tends to have flooding issues during major storm events. A back-up shelter has been on the Town's warrant article a number of years ago, but did not pass. Regionally, a POD arrangement has been set up with the Raymond High School.
Contractor & Operator List	Comprehensive list of local and private partners that could offer assistance during an emergency	Good	The Town's Road Agent developed a list of highway personnel, part-time help, highway equipment, emergency contacts, etc. The full list will be included as an appendix to this plan update.
Community Rating System	Education for the public on the benefits of the community rating system	Average	There has been no outreach to the public on the community rating system as there are not enough flood insurance policies in town to make it worthwhile.
Identifying Road Safety Improvements	Work with NHDOT to identify road safety improvements to state roads.	Average	The Town has reached out to NHDOT to discuss two dangerous intersections, including 1) the intersection of 152 and 156, which has site and speeding issues, and a constricted turning area and 2) the intersection of 152 and Route 4 in Northwood which has similar challenges.

Existing Program	Description	Effectiveness	2017 Update
Identifying Vulnerable Municipal Infrastructure	Review of critical facilities in order to determine ability to withstand natural disasters	Good	While there has been no formal review, the Town has knowledge of their ability to withstand disasters from past experience. Flooding has been the primary issue and most of the damage has been to the Town's transportation infrastructure, which has resulted in multiple bridge replacements. Flood waters did not impact any critical facilities, but the areas around them are often inundated and cause challenges with isolation. The weight from a significant snow load during a winter storm collapsed the old sand and gravel garage roof; a new one was built in 2011-2012.
Identifying Future Dry Hydrants and Cisterns	Determine location of future potential fire aid to avoid damage to existing infrastructure	Excellent	The Town has identified two future locations on 1) Lamprey Drive on the east side of Pawtuckaway Lake and on 2) Swan Drive on the west side of Nottingham Lake. In 2015, there was a replacement/upgrade to a dry hydrant on Deerfield Road. As part of the Town's updates to their site and subdivision regulations, it is now required that a cistern or dry hydrant be installed for any new development. Two new developments include Rocky Hill and Strawberry Lane.

Effectiveness:

- ∴ Excellent – The existing program works as intended and is exceeding its goals
- ∴ Good – The existing program works as intended and meets its goals
- ∴ Average – The existing program does not work as intended and/or does not meet its goals
- ∴ Poor – The existing program is negatively impacting the community

2017 Update:

- ∴ Recommendations for improvement

The Planning Committee's Understanding of Multi-Hazard Mitigation Strategies

The Planning Committee determined that any strategy designed to reduce personal injury or damage to property that could be done prior to an actual disaster would be listed as a potential mitigation strategy.

This decision was made even though not all projects listed in Tables 20 (New Mitigation Actions and 21 (Implementation Plan) are fundable under FEMA HMA grant programs. The Planning Committee determined that this Plan was in large part a management document designed to assist the Select Board and other town officials in all aspects of managing and tracking potential emergency planning strategies. For instance, the Planning Committee was aware that some of these strategies are more properly identified as readiness issues. The Planning Committee did not want to "lose" any of the ideas discussed during these planning sessions and thought this method was the best way to achieve that objective.

The Planning Committee identified eleven new strategies to implement during the life of this Plan. These strategies are intended to supplement existing programs and the ongoing and not yet completed mitigation strategies identified in previous plan updates. When identifying new strategies, the Planning Committee balanced a number of factors including capacity to implement strategies, priority projects, existing strategies, policies, and programs, the hazard ranking, and whether a strategy will reduce risk associated with multiple hazards.

Future Mitigation Strategies

The Committee identified several new mitigation strategies to reduce vulnerability to hazards. The Committee focused on identifying the best appropriate strategies for the community and the hazards it is most vulnerable based on the vulnerability assessment. Some of the mitigation strategies are strategies for multiple hazards. The goal of each proposed mitigation strategy is reduction or prevention of damage from a multi-hazard event.

New mitigation strategies are listed in Table 20, which also includes a feasibility assessment and prioritization of each hazard.

Feasibility & Prioritization

A technique known as a STAPLEE evaluation, which was developed by FEMA, was used to evaluate new mitigation strategies based on a set of criteria (see below). The STAPLEE method is commonly used by public administration officials and planners.

S	Social:	Is the proposed strategy socially acceptable to the community? Is there an equity issue involved that would result in one segment of the community being treated unfairly?
T	Technical:	Will the proposed strategy work? Will it create more problems than it solves?
A	Administrative:	Can the community implement the strategy? Is there someone to coordinate and lead the effort?
P	Political:	Is the strategy politically acceptable? Is there public support both to implement and to maintain the project?
L	Legal:	Is the community authorized to implement the proposed strategy? Is there a clear legal basis or precedent for this activity?
E	Economic:	What are the costs and benefits of this strategy? Does the cost seem reasonable for the size of the problem and the likely benefits?
E	Environmental:	How will the strategy impact the environment? Will it need environmental regulatory approvals?

The Committee evaluated each mitigation strategy using the STAPLEE and ranked each of the criteria as poor, average, or good. These rankings were assigned the following scores: *Poor=1; Average=2; Good=3.*

The following questions were used to guide further prioritization and action:

- Does the action reduce damage?
- Does the action contribute to community objectives?
- Does the action meet existing regulations?
- Does the action protect historic structures?
- Can the action be implemented quickly?

The prioritization exercise helped the committee evaluate the new hazard mitigation strategies that they had brainstormed throughout the multi-hazard mitigation planning process. While all actions would help improve the Town's multi-hazard and responsiveness capability, funding availability will be a driving factor in determining what and when new mitigation strategies are implemented.

Table 20: Future Mitigation Actions & STAPLEE

New Mitigation Project	S	T	A	P	L	E	E	Total
Educate the public about securing debris, propane tanks, yard items, or stored objects that may otherwise be swept away, damaged, or posed a hazard if picked up and washed away by floodwaters	3	3	3	3	3	3	3	21
Educate the public on the importance of keeping storm drains clear of debris during storms and to not rely solely on the highway department.	3	3	3	3	3	3	3	21
Improve the hydraulic capacity of the culvert that handles water from Mendums Pond (Little River) by replacing the existing infrastructure on Kennard Road with an oversized design to handle increased flows.	3	2	3	3	3	2	2	18
		Materials; changing hydraulics; low area				Cost of engineering	State permitting process	
Improve the hydraulic capacity of the culvert on Kennard Road that handles water from Cyrus Pond to Langley Pond to Cedar Water Pond by replacing the existing infrastructure with an oversized design to handle increased flows.	3	2	3	3	3	2	2	18
		Materials; changing hydraulics; low area				Cost of engineering	State permitting process	
Consider revising criteria for new development and redevelopment of residential structures located within the special flood hazard areas to require an additional two (2) feet of freeboard to the base flood elevation as recommended by the New Hampshire Coastal Risk and Hazards Commission's Final Report and Recommendation (November, 2016). *This strategy will not be completed until new FEMA maps are completed.	3	2	3	2	2	2	3	17
		Engaging the public to support the need for improved regulations		The need for public support to pass	Challenges with landowners and abutters	Cost to resident to have a LOMA or survey		

New Mitigation Project	S	T	A	P	L	E	E	Total
Improve emergency communication coordination with school (there are challenges with using the school when classes are not in session), as well as improve the overall use of the Nixle system. Consider developing a communication plan that would organize all potential notification outlets, such as the local TV channel, Town website, and social media.	3	3	2	3	3	3	3	20
			Coordination with the school					
Coordinate with the NH Department of Resources and Economic Development (DRED) and the Division of Parks and Recreation to conduct a GIS-based mapping exercise to identify potential access points and fire needs. Currently, it is challenging for fire trucks to draft from the north side of Pawtuckaway Lake during a wildfire event.	3	2	1	3	2	2	3	16
		Seasonal water levels; access difficulty	Coordination with state agencies		State owned land	Lack of funding and GIS capacity		
Expand upon existing Lyme disease outreach with library and school. This campaign may include more information on the start of tick season, general awareness, common signs, and long-term effects. Consider expanding outreach to other tick and vector-borne diseases including triple E, anaplasmosis, and babesiosis.	3	3	2	3	3	3	3	20
			Coordination with the school					
Develop a Law Enforcement Against Drugs (LEAD) task force and define clear objectives to reach 8th grade students. Currently, the 5th and 7th grade students participate in a Drug Abuse Resistance Education (DARE) program; however, the Police Department recognizes a program for students before high school is needed. Before implementation, there needs to be a better understanding of the issues; more trained officers; and the development of a clear and consistent message.	3	2	2	3	3	2	3	18
		Short staff; knowing the message; no capacity for training	Coordination with the school			Lack of staff capacity; a need for more involvement		

New Mitigation Project	S	T	A	P	L	E	E	Total
Organize a group of trained volunteers to assist during emergency events. Train agreed members of the civilian population in order to provide additional assistance to emergency responders, including: elderly assistance protocols, traffic control, etc. All trained volunteers would be cross trained in communication protocol.	3	2	2	3	2	3	3	18
		Finding volunteers may be difficult	Training volunteers		Legal and liability issues with volunteers			
Identify potential areas and/or locations for emergency responders to operate during an emergency that are outside existing floodplain areas through a mapping exercise.	3	3	3	3	3	3	3	21
*Construction on Berry Road; Culvert & Twin Bridges replacements.	3	3	3	3	3	2	2	19
						Budget Constraints	Potential Environmental Impacts	
*Continue to provide outreach assistance to elderly and special needs populations by organizing staff and coordinating within Town departments (Recreation & Fire and Rescue).	3	3	3	3	3	2	3	20
						Budget Constraints		
*Add safety related pages on website (Emergency Management and Police Department) that deal with natural and manmade disasters.	3	3	3	3	3	3	3	21
*There will be a continued need to establish new dry hydrant and cistern locations throughout the Town.	3	3	3	3	3	3	3	21

New Mitigation Project	S	T	A	P	L	E	E	Total
*Public education on the Household Hazardous Waste (HHW) Program at NHDES. Awareness on changing the way residents purchase, use, and dispose of hazardous products.	3	3	3	3	3	3	3	21
*Maintain transportation infrastructure by identifying and assessing potential areas (roads and culverts) of concern that are recognized in this plan.	3	3	3	3	3	2	2	19
						Budget Constraints	Environmental impacts resulting from construction	

*Ongoing and deferred actions from the 2012 Plan. Previous STAPLEE scores were reaffirmed.

Implementation Schedule for Prioritized Strategies

After reviewing the finalized STAPLEE numerical ratings, the Team prepared to develop the Implementation Plan (Table 21). To do this, the Team developed an implementation plan that outlined the following:

- ∴ Type of hazard
- ∴ Affected location
- ∴ Type of Activity
- ∴ Responsibility
- ∴ Funding
- ∴ Cost Effectiveness; and
- ∴ Timeframe

The following questions were asked in order to develop an implementation schedule for the identified priority mitigation strategies.

WHO? Who will lead the implementation efforts? Who will put together funding requests and applications?

WHEN? When will these actions be implemented, and in what order?

HOW? How will the community fund these projects? How will the community implement these projects? What resources will be needed to implement these projects?

In addition to the prioritized mitigation projects, Table 21, Implementation Plan, includes the responsible party (WHO), how the project will be supported (HOW), and what the timeframe is for implementation of the project (WHEN).

Table 21: Implementation Plan

New Mitigation Project	Type of Hazard	Affected Location	Type of Activity	Responsibility	Funding	Cost Effectiveness	Timeframe
							Ongoing/Continuous
						Low = < $5,000	*6 months - 1 year*
						Medium = $5,000 - $10,000	*1 - 2 years*
						High = > $10,000	*2 - 5 years*
Educate the public about securing debris, propane tanks, yard items, or stored objects that may otherwise be swept away, damaged, or posed a hazard if picked up and washed away by floodwaters	Flooding	Town-wide	Education and Awareness	Town Administration	Town Funding and/or Grants	Low = < $5,000	1-2 years
Educate the public on the importance of keeping storm drains clear of debris during storms and to not rely solely on the highway department.	Flooding	Town-wide	Education and Awareness	Town Administration	Town Funding and/or Grants	Low = < $5,000	1-2 years
Improve the hydraulic capacity of the culvert that handles water from Mendums Pond (Little River) by replacing the existing infrastructure with an oversized design to handle increased flows.	Flooding	Kelsey Road	Structure and Infrastructure Project	Highway Department	Capital Improvement Plan	High = > $10,000	5 years
Improve the hydraulic capacity of the culvert that handles water from Cyrus Pond to Langley Pond to Cedar Water Pond by replacing the existing infrastructure with an oversized design to handle increased flows.	Flooding	McCrillis Road	Structure and Infrastructure Project	Highway Department	Capital Improvement Plan	High = > $10,000	5 years

Consider revising criteria for new development and redevelopment of residential structures located within the special flood hazard areas to require an additional two (2) feet of freeboard to the base flood elevation as recommended by the New Hampshire Coastal Risk and Hazards Commission's Final Report and Recommendation (November, 2016).	Flooding	Flood Hazard Areas	Local Planning and Regulations	Code Enforcement & Planning Board	Town Funding and/or Grants	Medium = $5,000 - $10,000	2-5 years
Improve emergency communication coordination with school (there are challenges with using the school when classes are not in session), as well as improve the overall use of the Nixle system. Consider developing a communication plan that would organize all potential notification outlets, such as the local TV channel, town website, and social media.	Multi-Hazard	Town-wide	Local Planning	Police Department	Town Funding and/or Grants	Low = < $5,000	6 months - 1 year
Coordinate with the NH Department of Resources and Economic Development (DRED) and the Division of Parks and Recreation to conduct a GIS-based mapping exercise to identify potential access points and fire needs. Currently, it is challenging for fire trucks to draft from the north side of Pawtuckaway Lake during a wildfire event.	Wildfire	Pawtuckaway State Park	Local Planning	Fire Department	State	High = > $10,000	5 years
Expand upon existing Lyme disease outreach with library and school. This campaign may include more information on the start of tick season, general awareness, common signs, and long-term effects. Consider expanding outreach to other tick and vector-borne diseases including triple E, anaplasmosis, and babesiosis.	Public Health	Town-wide	Education and Awareness	Library	Town Funding and/or Grants	Low = < $5,000	1-2 years

Develop a Law Enforcement Against Drugs (LEAD) task force and define clear objectives to reach 8th grade students. Currently, the 5th and 7th grade students participate in a Drug Abuse Resistance Education (DARE) program; however, the Police Department recognizes a program for students before high school is needed. Before implementation, there needs to be a better understanding of the issues; more trained officers; and the development of a clear and consistent message.	Public Health	Town-wide	Education and Awareness	Police Department	Town Funding and/or Grants	Low = < $5,000	1-2 years
Organize a group of trained volunteers to assist during emergency events. Train agreed members of the civilian population in order to provide additional assistance to emergency responders, including: elderly assistance protocols, traffic control, etc.	Multi-hazard	Town-wide	Local Planning	Police & Fire Department	Town funding	Low = < $5,000	3-5 years
*Construction on Berry Road; Culvert & Twin Bridges replacements.	Flooding	Berry Road	Construction Project	Highway Department	Town Funding and/or Grants	High = > $10,000	1-2 years
*Continue to provide outreach assistance to elderly and special needs populations by organizing staff and coordinating within Town departments (Recreation & Fire and Rescue).	Multi-hazard	Town-wide (elderly and special needs populations)	Education and Awareness	Recreation Department & Fire and Rescue	Town funding	Low = < $5,000	1-2 years
*Add safety related pages on website (Emergency Management and Police Department) that deal with natural and manmade disasters.	Multi-hazard	Town-wide	Education and Awareness	EMD	Town funding	Low = < $5,000	6 months - 1 year
**There will be a continued need to establish new dry hydrant and cistern locations throughout the Town.	Multi-hazard	Town-wide	Town Planning	Fire Department & Highway Department	Town funding	Low = < $5,000	Ongoing/continuous

**Public education on the Household Hazardous Waste (HHW) Program at NHDES. Awareness on changing the way residents purchase, use, and dispose of hazardous products.	Hazardous Materials	Town-wide	Public Education & Outreach	Town Administrator	Town funding & NHDES Assistance	Low = < $5,000	Ongoing/continuous
**Maintain transportation infrastructure by identifying and assessing potential areas (roads and culverts) of concern that are recognized in this plan.	Flooding	Town-wide	Prevention	EMD & Selectmen	Town funding And/or Grants	Low = < $5,000	Ongoing/continuous
*Deferred actions from the 2012 Plan. Previous implementation notes were reaffirmed. **Ongoing and continuous actions will be completed on an ongoing basis throughout the life of the plan.							

Chapter 8: Monitoring, Evaluation, and Updating the Plan

Introduction

A good mitigation plan must allow for updates where and when necessary, particularly since communities may suffer budget cuts or experience personnel turnover during both the planning and implementation states. A good plan will incorporate periodic monitoring and evaluation mechanisms to allow for review of successes and failures or even just simple updates.

Multi-Hazard Plan Monitoring, Evaluation, and Updates

To track programs and update the mitigation strategies identified through this process, the Town will review the multi-hazard mitigation plan annually or after a hazard event. Additionally, the Plan will undergo a formal review and update at least every five years and obtain FEMA approval for this update or any other major changes done in the Plan at any time. The Emergency Management Director is responsible for initiating the review and will consult with members of the multi-hazard mitigation planning team identified in this plan. The public will be encouraged to participate in any updates and will be given the opportunity to be engaged and provide feedback through such means as periodic presentations on the plan at town functions, annual questionnaires or surveys, and posting on social media/interactive websites. Public announcements will be made through advertisements in local papers, postings on the Town website, and posters disseminated throughout the Town. A formal public meeting will be held before reviews and updates are official.

Changes will be made to the Plan to accommodate projects that have failed or are not considered feasible after a review for their consistency with STAPLEE, the timeframe, the community's priorities or funding resources. Priorities that were not ranked high, but identified as potential mitigation strategies, will be reviewed as well during the monitoring and update of the plan to determine feasibility of future implementation. In keeping with the process of adopting this multi-hazard mitigation plan, a public meeting to receive public comment on plan maintenance and updating will be held during the annual review period and before the final product is adopted by the Board of Selectmen. Chapter 9 contains a representation of a draft resolution for Nottingham to use once a conditional approval is received from HSEM.

Integration with Other Plans

Both the 2004 and 2012 plans were used during periodic updates to the Nottingham Master Plan. Input on impacts to roads and other critical infrastructure from hazards was included in relevant master plan sections. Both plans were also used during capital improvements planning updates and prioritization of municipal culverts and stream crossings for repair and replacement schedules.

This multi-hazard plan will only enhance mitigation if balanced with all other town plans. Nottingham will take the necessary steps to incorporate the mitigation strategies and other information contained in this plan with other town activities, plans and mechanisms, such as comprehensive land use planning, capital improvements planning, site plan regulations, and building codes to guide and control development in the Town of Nottingham, when appropriate.

The local government will refer to this Plan and the strategies identified when updating the Town's Master Plan, Capital Improvements Program, Zoning Ordinances and Regulations, and Emergency Action Plan. The Board of Selectmen and the Hazard Mitigation Committee will work with Town officials to incorporate elements of this Plan into other planning mechanisms, when appropriate. The Emergency Management Director along with other members of the Hazard Mitigation Committee will work with the Planning Board to suggest including the updated Hazard Mitigation Plan as a chapter in the Town's Master Plan. In addition, the Town will review and make note of instances when this has been done and include it as part of their annual review of the Plan.

Chapter 9: Plan Adoption

Conditional Approval Letter from HSEM (received on 3/17/17)

Good morning!

The Department of Safety, Division of Homeland Security & Emergency Management (HSEM) has completed its review of the Nottingham, NH Hazard Mitigation Plan and found it approvable pending adoption. Congratulations on a job well done!

With this approval, the jurisdiction meets the local mitigation planning requirements under 44 CFR 201 pending HSEM's receipt of electronic copies of the adoption documentation and the final plan.

Acceptable electronic formats include Word or PDF files and must be submitted to us via email at HazardMitigationPlanning@dos.nh.gov. Upon HSEM's receipt of these documents, notification of formal approval will be issued, along with the final Checklist and Assessment.

The approved plan will be submitted to FEMA on the same day the community receives the formal approval notification from HSEM. FEMA will then issue a Letter of Formal Approval to HSEM for dissemination that will confirm the jurisdiction's eligibility to apply for mitigation grants administered by FEMA and identify related issues affecting eligibility, if any. If the plan is not adopted within one calendar year of HSEM's Approval Pending Adoption, the jurisdiction must update the entire plan and resubmit it for HSEM review. If you have questions or wish to discuss this determination further, please contact me at Whitney.Welch@dos.nh.gov or 603-223-3667.

Thank you for submitting the Nottingham, NH Hazard Mitigation Plan and again, congratulations on your successful community planning efforts.

Sincerely,

Whitney

Hazard Mitigation Planning
NH Homeland Security and Emergency Management
33 Hazen Drive
Concord, NH 03301
NEW: 603-223-3667
603-223-3609 (fax)

Signed Certificate of Adoption

CERTIFICATE OF ADOPTION

Town of Nottingham, New Hampshire
Board of Selectmen
A Resolution Adopting the Nottingham, NH Multi-Hazard Mitigation Plan Update 2017

Plan Dated: 2/22/2017

Conditionally Approved: 3/17/2017

WHEREAS, the Town of Nottingham authorizes responsible departments and/or agencies to execute their responsibilities demonstrated in the plan, and received funding from the NH Office of Homeland Security and Emergency Management under a Flood Mitigation Assistance Project Grant and assistance from Strafford Regional Planning Commission in the preparation of the Nottingham, NH Multi-Hazard Mitigation Plan Update 2017; and

WHEREAS, several public planning meetings were held between November 30th, 2016 and February 8th, 2017 regarding the development and review of the Nottingham, NH Multi-Hazard Mitigation Plan Update 2017; and

WHEREAS, the Nottingham, NH Multi-Hazard Mitigation Plan Update 2017 contains several potential future projects to mitigate hazard damage in the Town of Nottingham; and

WHEREAS, a duly-noticed public meeting was held by the Nottingham Board of Selectmen on April 10, 2017 to formally approve and adopt the Nottingham, NH Multi-Hazard Mitigation Plan Update 2017.

NOW, THEREFORE BE IT RESOLVED that the Nottingham Board of Selectmen adopts the Nottingham, NH Multi-Hazard Mitigation Plan Update 2017.

ADOPTED AND SIGNED this 10th day of April, 2017

Donna Thing

Nottingham Board of Selectmen, Chair

CHRISTIAN STERNDALE, Notary Public
My Commission Expires June 18, 2019

Town Seal or Notary

Date 10 APRIL 2017

Final Approval Letter from HSEM

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

APR 26 2017

Heather Dunkerley
Acting State Hazard Mitigation Officer
Homeland Security & Emergency Management
33 Hazen Drive
Concord, NH 03303

Dear Ms. Dunkerley:

We would like to congratulate the Town of Nottingham and the State of New Hampshire for their dedication and commitment to mitigation planning. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I Mitigation Planning Team has completed its review of the Multi-Hazard Mitigation Plan Update 2017, Town of Nottingham, NH and determined it meets the requirements of 44 C.F.R. Pt. 201.

With this plan approval, the Town of Nottingham is eligible to apply to New Hampshire Homeland Security and Emergency Management for mitigation grants administered by FEMA. Requests for mitigation funding will be evaluated individually according to the specific eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in your community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

Approved mitigation plans are eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Complete information regarding the CRS can be found at http://www.fema.gov/national-flood-insurance-program-community-rating-system, or through your local floodplain administrator.

The Multi-Hazard Mitigation Plan Update 2017, Town of Nottingham, NH must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of April 20, 2017** in order to maintain eligibility for mitigation grant funding. We encourage the Town to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

Once again, thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please do not hesitate to contact Melissa Surette at (617) 956-7559.

Sincerely,

Paul F. Ford
Acting Regional Administrator

PFF: ms

cc: Fallon Reed, Chief of Planning, New Hampshire
Whitney Welch, Hazard Mitigation Planner, New Hampshire
Jennifer Gilbert, New Hampshire State NFIP Coordinator

Enclosure

Appendices

Appendix A: Bibliography

Appendix B: Planning Process Documentation

Appendix C: Summary of Possible All-Hazard Mitigation Strategies

Appendix D: Technical and Financial Assistance for All-Hazard Mitigation
- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)

Appendix E: Maps
- Emergency Response Facilities
- Non-Emergency Response Facilities
- Facilities and Populations to Protect
- Potential Resources
- Water Resources

Appendix A: Bibliography

Documents

- Local Mitigation Plan Review Guide, FEMA, October 1, 2011
- Multi-Hazard Mitigation Plans
    - Town of Albany, 2010
    - Town of Rollinsford, 2016
- State of New Hampshire Multi-Hazard Mitigation Plan (2013) - State Hazard Mitigation Goals
- Disaster Mitigation Act (DMA) of 2000, Section 101, b1 & b2 and Section 322a http://www.fema.gov/library/viewRecord.do?id=1935
- Economic & Labor Market Information Bureau, NH Employment Security, 2015; Census 2010 and Revenue Information
- NCDC [National Climatic Data Center, National Oceanic and Atmospheric Administration]. 2017. Storm Events

Photos

- Charlie A. Brown, Former Town Administrator, Town of Nottingham

Appendix B: Planning Process Documentation

Agendas

Town of Nottingham, New Hampshire

Hazard Mitigation Committee Meeting #1

November 30, 2016
2:00PM – 4:00PM

Nottingham Town Office
139 Stage Road
Nottingham, NH 03290

Agenda

1. Introductions
2. Review update process
    a. Responsibilities of committee
    b. In-kind match documentation
    c. Steps towards adoption
3. Review existing and past mitigation strategies
4. Review past disasters and emergency declarations
5. Adjourn

Town of Nottingham, New Hampshire

Hazard Mitigation Committee Meeting #2

December 21, 2016
2:00PM – 4:00PM

Nottingham Town Office
139 Stage Road
Nottingham, NH 03290

Agenda

1. Introductions
2. Unfinished business
    a. Review gaps in existing and past mitigation strategies from November meeting
3. Review critical facilities list
4. Existing hazards analysis
    a. Discussion of existing hazards
    b. Fill out hazard vulnerability assessment tool
    c. Develop actions for each hazard
    d. Determine responsibilities for implementation
5. Adjourn

Town of Nottingham, New Hampshire

Hazard Mitigation Committee Meeting #3

January 11, 2017
2:00PM – 4:00PM

Nottingham Town Office
139 Stage Road
Nottingham, NH 03290

Agenda

1. Introductions
2. Unfinished Business
3. Review of STAPLEE Method to prioritize mitigation actions
    a. Fill out and complete STAPLEE exercise
4. Final review of critical facilities inventory
    a. Identify which critical facilities are vulnerable to future hazards
5. Final review of maps
6. Next steps
7. Adjourn

Town of Nottingham, New Hampshire

Hazard Mitigation Committee Meeting #4

February 8, 2017
2:00PM – 4:00PM

Nottingham Town Office
139 Stage Road
Nottingham, NH 03290

Agenda

1. Introductions
2. Review descriptions of hazards
3. Review past mitigation strategies
4. Next steps
5. Adjourn

Town of Nottingham, New Hampshire

Hazard Mitigation Committee Meeting #1

November 30, 2016
2:00PM – 4:00PM

Nottingham Town Office
139 Stage Road
Nottingham, NH 03290

Sign In Sheet

Name	Position/Affiliation	Email Address	In-kind prior to meeting	Hourly Rate
GUNNAR FOSS	CHIEF OF POLICE	chieffoss@comast.net	.50	
~~John~~ John Fernald	Road Agent	(	.21	
CHRIS STEENDALE	TOWN ADMINISTRATOR	CSTEENDALE@NOTTINGHAM.NH.GOV	.50	
Teresa L. Bascom	Planning Board	teresalbascom@gmail.com	.50	✓

Town of Nottingham, New Hampshire

Hazard Mitigation Committee Meeting #2

December 21, 2016
2:00PM – 4:00PM

Nottingham Town Office
139 Stage Road
Nottingham, NH 03290

Sign In Sheet

Name	Position/Affiliation	Email Address	In-kind prior to meeting
John F. Fernald Sr	Road Agent		/
CHRIS STERNDALE	TOWN ADMIN		/
Gunnar Foss	POLICE		/
Paul Colby	Code Admin	pcolby@nottingham-nh.gov	/
Teresa Bousceam	Plan. Board	teresalbasseam@gmail.com	
Torey O'Brien	Fire/Rescue		
Chris D'Eon	Fire Rescue	cdeon0801@fiu.edu	

Town of Nottingham, New Hampshire

Hazard Mitigation Committee Meeting #3

January 11, 2017
2:00PM – 4:00PM

Nottingham Town Office
139 Stage Road
Nottingham, NH 03290

Sign In Sheet

Name	Position/Affiliation	Email Address	In-kind prior to meeting
CHRIS STEENDALE	TA		1.0
Paul Colby	Code Admin		1.0
Gunnar Foss	Police		1.0
Zach Gagnon	FF/EMT - Fire		
Torey O'Brien	FF/EMT - Fire		
Charlene Andersen	Select Board		1.5

Town of Nottingham, New Hampshire

Hazard Mitigation Committee Meeting #4

February 8, 2017
2:00PM – 4:00PM

Nottingham Town Office
139 Stage Road
Nottingham, NH 03290

Sign In Sheet

Name	Position/Affiliation	Email Address	In-kind prior to meeting
Paul Colby	Code Administration	pcolby@nottingham-nh.gov	2
Teresa L Bascom	Plan board	teresalbascom@gmail.com	
CHRIS STEINDALE	T.A.	csteindale@	1
Chris D'Eon	FF/AEMT	cdeon881@fin.edu	
Torey O'Brien	FF/EMT	Torey Obrien@gmail.com	

Appendix C: Summary of Possible All-Hazard Mitigation Strategies

I. RIVERINE MITIGATION

A. Prevention

Prevention measures are intended to keep the problem from occurring in the first place, and/or keep it from getting worse. Future development should not increase flood damage. Building, zoning, planning, and/or code enforcement personnel usually administer preventative measures.

1. Planning and Zoning[36] - Land use plans are put in place to guide future development, recommending where - and where not - development should occur and where it should not. Sensitive and vulnerable lands can be designated for uses that would not be incompatible with occasional flood events - such as parks or wildlife refugees. A Capital Improvements Program (CIP) can recommend the setting aside of funds for public acquisition of these designated lands. The zoning ordinance can regulate development in these sensitive areas by limiting or preventing some or all development - for example, by designating floodplain overlay, conservation, or agricultural districts.

2. Open Space Preservation - Preserving open space is the best way to prevent flooding and flood damage. Open space preservation should not, however, be limited to the floodplain, since other areas within the watershed may contribute to controlling the runoff that exacerbates flooding. Land Use and Capital Improvement Plans should identify areas to be preserved by acquisition and other means, such as purchasing easements. Aside from outright purchase, open space can also be protected through maintenance agreements with the landowners, or by requiring developers to dedicate land for flood flow, drainage and storage.

3. Floodplain Development Regulations - Floodplain development regulations typically do not prohibit development in the special flood hazard area, but they do impose construction standards on what is built there. The intent is to protect roads and structures from flood damage and to prevent the development from aggravating the flood potential. Floodplain development regulations are generally incorporated into subdivision regulations, building codes, and floodplain ordinances.
    a. Subdivision Regulations: These regulations govern how land will be divided into separate lots or sites. They should require that any flood hazard areas be shown on the plat, and that every lot has a buildable area that is above the base flood elevation.
    b. Building Codes: Standards can be incorporated into building codes that address flood proofing for all new and improved or repaired buildings.
    c. Floodplain Ordinances: Communities that participate in the National Flood Insurance Program are required to adopt the minimum floodplain management regulations, as developed by FEMA. The regulations set minimum standards for subdivision regulations and building codes. Communities may adopt more stringent standards than those set forth by FEMA.

[36] All zoning should be carefully reviewed on a consistent basis by municipal officials to make sure guidelines are up-to-date and towns are acting in accordance with best management practices.

4. Stormwater Management - Development outside of a floodplain can contribute significantly to flooding by covering impervious surfaces, which increases storm water runoff. Storm water management is usually addressed in subdivision regulations. Developers are typically required to build retention or detention basins to minimize any increase in runoff caused by new or expanded impervious surfaces, or new drainage systems. Generally, there is a prohibition against storm water leaving the site at a rate higher than it did before the development. One technique is to use wet basins as part of the landscaping plan of a development. It might even be possible to site these basins based on a watershed analysis. Since detention only controls the runoff rates and not volumes, other measures must be employed for storm water infiltration - for example, swales, infiltration trenches, vegetative filter strips, and permeable paving blocks.

5. Drainage System Maintenance - Ongoing maintenance of channel and detention basins is necessary if these facilities are to function effectively and efficiently over time. A maintenance program should include regulations that prevent dumping in or altering water courses or storage basins; regrading and filling should also be regulated. Any maintenance program should include a public education component, so that the public becomes aware of the reasons for the regulations. Many people do not realize the consequences of filling in a ditch or wetland, or regrading.

B. Property Protection

Property protection measures are used to modify buildings subject to flood damage, rather than to keep floodwaters away. These may be less expensive to implement, as they are often carried out on a cost-sharing basis. In addition, many of these measures do not affect a building's appearance or use, which makes them particularly suitable for historical sites and landmarks.

1. Relocation - Moving structures out of the floodplain is the surest and safest way to protect against damage. Relocation is expensive, however, so this approach will probably not be used except in extreme circumstances. Communities that have areas subject to severe storm surges, ice jams, etc. might want to consider establishing a relocation program, incorporating available assistance.

2. Acquisition - Acquisition by a governmental entity of land in a floodplain serves two main purposes: 1) it ensures that the problem of structures in the floodplain will be addressed; and 2) it has the potential to convert problem areas into community assets, with accompanying environmental benefits. Acquisition is more cost effective than relocation in those areas that are subject to storm surges, ice jams, or flash flooding. Acquisition, followed by demolition, is the most appropriate strategy for those buildings that are simply too expensive to move, as well as for dilapidated structures that are not worth saving or protecting. Acquisition and subsequent relocation can be expensive, however, there are government grants and loans that can be applied toward such efforts.

3. Building Elevation - Elevating a building above the base flood elevation is the best on-site protection strategy. The building could be raised to allow water to run underneath it, or fill could be brought in to elevate the site on which the building sits. This approach is cheaper than relocation, and tends to be less disruptive to a

neighborhood. Elevation is required by law for new and substantially improved residences in a floodplain, and is commonly practiced in flood hazard areas nationwide.

4. Floodproofing - If a building cannot be relocated or elevated, it may be floodproofed. This approach works well in areas of low flood threat. Floodproofing can be accomplished through barriers to flooding, or by treatment to the structure itself.
    a. Barriers: Levees, floodwalls and berms can keep floodwaters from reaching a building. These are useful, however, only in areas subject to shallow flooding.
    b. Dry Floodproofing: This method seals a building against the water by coating the walls with waterproofing compounds or plastic sheeting. Openings, such as doors, windows, etc. are closed either permanently with removable shields or with sandbags.
    c. Wet Floodproofing: This technique is usually considered a last resort measure, since water is intentionally allowed into the building in order to minimize pressure on the structure. Approaches range from moving valuable items to higher floors to rebuilding the floodable area. An advantage over other approaches is that simply by moving household goods out of the range of floodwaters, thousands of dollars can be saved in damages.

5. Sewer Backup Protection - Storm water overloads can cause backup into basements through sanitary sewer lines. Houses that have any kind of connection to a sanitary sewer system - whether it is downspouts, footing drain tile, and/or sump pumps, can be flooded during a heavy rain event. To prevent this, there should be no such connections to the system, and all rain and ground water should be directed onto the ground, away from the building. Other protections include:
    a. Floor drain plugs and floor drain standpipe, which keep water from flowing out of the lowest opening in the house.
    b. Overhead sewer - keeps water in the sewer line during a backup.
    c. Backup valve - allows sewage to flow out while preventing backups from flowing into the house.

6. Insurance - Above and beyond standard homeowner insurance, there is other coverage a homeowner can purchase to protect against flood hazard. Two of the most common are National Flood Insurance and basement backup insurance.
    a. *National Flood Insurance:* When a community participates in the National Flood Insurance Program, any local insurance agent is able to sell separate flood insurance policies under rules and rates set by FEMA. Rates do not change after claims are paid because they are set on a national basis.
    b. *Basement Backup Insurance:* National Flood Insurance offers an additional deductible for seepage and sewer backup, provided there is a general condition of flooding in the area that was the proximate cause of the basement getting wet. Most exclude damage from surface flooding that would be covered by the NFIP.

C. Natural Resource Protection

Preserving or restoring natural areas or the natural functions of floodplain and watershed areas provide the benefits of eliminating or minimizing losses from floods, as well as improving water quality and wildlife habitats. Parks, recreation, or conservation agencies usually implement such activities. Protection can also be provided through various zoning measures that are specifically designed to protect natural resources.

1. Wetlands Protection - Wetlands are capable of storing large amounts of floodwaters, slowing and reducing downstream flows, and filtering the water. Any development that is proposed in a wetland is regulated by either federal and/or state agencies. Depending on the location, the project might fall under the jurisdiction of the U.S. Army Corps of Engineers, which in turn, calls upon several other agencies to review the proposal. In New Hampshire, the N.H. Wetlands Board must approve any project that impacts a wetland. Many communities in New Hampshire also have local wetland ordinances.

   Generally, the goal is to protect wetlands by preventing development that would adversely affect them. Mitigation techniques are often employed, which might consist of creating a wetland on another site to replace what would be lost through the development. This is not an ideal practice since it takes many years for a new wetland to achieve the same level of quality as an existing one, if it can at all.

2. Erosion and Sedimentation Control - Controlling erosion and sediment runoff during construction and on farmland is important, since eroding soil will typically end up in downstream waterways. Because sediment tends to settle where the water flow is slower, it will gradually fill in channels and lakes, reducing their ability to carry or store floodwaters.

3. Best Management Practices - Best Management Practices (BMPs) are measures that reduce non-point source pollutants that enter waterways. Non-point source pollutants are carried by storm water to waterways, and include such things as lawn fertilizers, pesticides, farm chemicals, and oils from street surfaces and industrial sites. BMPs can be incorporated into many aspects of new developments and ongoing land use practices. In New Hampshire, the Department of Environmental Services has developed Best Management Practices for a range of activities, from farming to earth excavations.

D. Emergency Services

Emergency services protect people during and after a flood. Many communities in New Hampshire have emergency management programs in place, administered by an emergency management director (very often the local police or fire chief).

1. Flood Warning - On large rivers, the National Weather Service handles early recognition. Communities on smaller rivers must develop their own warning systems. Warnings may be disseminated in a variety of ways, such as sirens, radio, television, mobile public address systems, or door-to-door contact. It seems that multiple or redundant systems are the most effective, giving people more than one opportunity to be warned.

2. Flood Response - Flood response refers to actions that are designed to prevent or reduce damage or injury, once a flood threat is recognized. Such actions and the appropriate parties include:
    a. Activating the emergency operations center (emergency director)
    b. Sandbagging designated areas (Highway Department)
    c. Closing streets and bridges (police department)
    d. Shutting off power to threatened areas (public service)
    e. Releasing children from school (school district)
    f. Ordering an evacuation (Board of Selectmen/emergency director)
    g. Opening evacuation shelters (churches, schools, Red Cross, municipal facilities)

These actions should be part of a flood response plan, which should be developed in coordination with the persons and agencies that share the responsibilities. Drills and exercises should be conducted so that the key participants know what they are supposed to do.

3. Critical Facilities Protection - Protecting critical facilities is vital, since expending efforts on these facilities can draw workers and resources away from protecting other parts of town. Critical facilities fall into two categories:
    a. Buildings or locations vital to the flood response effort:
        i. Emergency operations centers
        ii. Police and fire stations
        iii. Highway garages
        iv. Selected roads and bridges
        v. Evacuation routes
    b. Buildings or locations that, if flooded, would create disasters:
        i. Hazardous materials facilities
        ii. Schools

All such facilities should have their own flood response plan that is coordinated with the community's plan. Schools will typically be required by the state to have emergency response plans in place.

4. Health and Safety Maintenance - The flood response plan should identify appropriate measures to prevent danger to health and safety. Such measures include:
    a. Patrolling evacuated areas to prevent looting
    b. Vaccinating residents for tetanus
    c. Clearing streets
    d. Cleaning up debris

The Plan should also identify which agencies will be responsible for carrying out the identified measures. A public information program can be helpful to educate residents on the benefits of taking health and safety precautions.

E. Structural Projects

Structural projects are used to prevent floodwaters from reaching properties. These are all man-made structures, and can be grouped into the six types discussed below. The shortcomings of structural approaches are:

- Can be very expensive
- Disturb the land, disrupt natural water flows, & destroy natural habitats.
- Are built to an anticipated flood event, and may be exceeded by a greater-than expected flood
- Can create a false sense of security.

1. Diversions - A diversion is simply a new channel that sends floodwater to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During flood flows, the stream spills over the diversion channel or tunnel, which carries the excess water to the receiving lake or river. Diversions are limited by topography; they won't work everywhere. Unless the receiving water body is relatively close to the flood prone stream and the land in between is low and vacant, the cost of creating a diversion can be prohibitive. Where topography and land use are not favorable, a more expensive tunnel is needed. In either case, care must be taken to ensure that the diversion does not create a flooding problem somewhere else.

2. Levees/Floodwalls - Probably the best known structural flood control measure is either a levee (a barrier of earth) or a floodwall made of steel or concrete erected between the watercourse and the land. If space is a consideration, floodwalls are typically used, since levees need more space. Levees and floodwalls should be set back out of the floodway, so that they will not divert floodwater onto other properties.

3. Reservoirs - Reservoirs control flooding by holding water behind dams or in storage basins. After a flood peaks, water is released or pumped out slowly at a rate the river downstream can handle. Reservoirs are suitable for protecting existing development, and they may be the only flood control measure that can protect development close to a watercourse. They are most efficient in deeper valleys or on smaller rivers where there is less water to store. Reservoirs might consist of man-made holes dug to hold the approximate amount of floodwaters, or even abandoned quarries. As with other structural projects, reservoirs:
    a. are expensive
    b. occupy a lot of land
    c. require periodic maintenance
    d. may fail to prevent damage from floods that exceed their design levels
    e. may eliminate the natural and beneficial functions of the floodplain.

4. Channel Modifications - Channel modifications include making a channel wider, deeper, smoother, or straighter. These techniques will result in more water being carried away, but, as with other techniques mentioned, it is important to ensure that the modifications do not create or increase a flooding problem downstream.

5. Dredging: Dredging is often cost-prohibitive because the dredged material must be disposed of in another location; the stream will usually fill back in with sediment. Dredging is usually undertaken only on larger rivers, and then only to maintain a navigation channel.

6. Drainage Modifications: These include man-made ditches and storm sewers that help drain areas where the surface drainage system is inadequate or where underground drainage ways may be safer or more attractive. These approaches are usually designed to carry the runoff from smaller, more frequent storms.

7. Storm Sewers - Mitigation techniques for storm sewers include installing new sewers, enlarging small pipes, street improvements, and preventing back flow. Because drainage ditches and storm sewers convey water faster to other locations, improvements are only recommended for small local problems where the receiving body of water can absorb the increased flows without increased flooding. In many developments, streets are used as part of the drainage system, to carry or hold water from larger, less frequent storms. The streets collect runoff and convey it to a receiving sewer, ditch, or stream. Allowing water to stand in the streets and then draining it slowly can be a more effective and less expensive measure than enlarging sewers and ditches.

F. Public Information

Public information activities are intended to advise property owners, potential property owners, and visitors about the particular hazards associated with a property, ways to protect people and property from these hazards, and the natural and beneficial functions of a floodplain.

1. Map Information - Flood maps developed by FEMA outline the boundaries of the flood hazard areas. These maps can be used by anyone interested in a particular property to determine if it is flood-prone. These maps are available from FEMA, the NH Homeland Security and Emergency Management (HSEM), the NH Office of Energy and Planning (OEP), or your regional planning commission.

2. Outreach Projects - Outreach projects are proactive; they give the public information even if they have not asked for it. Outreach projects are designed to encourage people to seek out more information and take steps to protect themselves and their properties. Examples of outreach activities include:
    a. Presentations at meetings of neighborhood groups
    b. Mass mailings or newsletters to all residents
    c. Notices directed to floodplain residents
    d. Displays in public buildings, malls, etc.
    e. Newspaper articles and special sections
    f. Radio and TV news releases and interview shows
    g. A local flood proofing video for cable TV programs and to loan to organizations
    h. A detailed property owner handbook tailored for local conditions. Research has shown that outreach programs work, although awareness is not enough. People need to know what they can do about the hazards, so projects should include information on protection measures. Research also shows that locally designed and run programs are much more effective than national advertising.

3. Real Estate Disclosure - Disclosure of information regarding flood-prone properties is important if potential buyers are to be in a position to mitigate damage. Federally regulated lending institutions are required to advise applicants that a property is in the floodplain. However, this requirement needs to be met only five days prior to closing, and by that time, the applicant is typically committed to the purchase. State laws and local real estate practice can help by making this information available to prospective buyers early in the process.

4. Library - Your local library can serve as a repository for pertinent information on flooding and flood protection. Some libraries also maintain their own public information campaigns, augmenting the activities of the various governmental agencies involved in flood mitigation.

5. Technical Assistance - Certain types of technical assistance are available from the NFIP Coordinator, FEMA, and the Natural Resources Conservation District. Community officials can also set up a service delivery program to provide one-on-one sessions with property owners. An example of technical assistance is the *flood audit*, in which a specialist visits a property. Following the visit, the owner is provided with a written report detailing the past and potential flood depths and recommending alternative protection measures.

6. Environmental Education - Education can be a great mitigating tool if people can learn what not to do before damage occurs. The sooner the education begins the better. Environmental education programs for children can be taught in the schools, park and recreation departments, conservation associations, or youth organizations. An activity can be as involved as course curriculum development or as simple as an explanatory sign near a river. Education programs do not have to be limited to children. Adults can benefit from knowledge of flooding and mitigation measures; decision makers, armed with this knowledge, can make a difference in their communities

.

II. EARTHQUAKES

A. Preventive

1. Planning/zoning to keep critical facilities away from fault lines
2. Planning, zoning and building codes to avoid areas below steep slopes or soils subject to liquefaction
3. Building codes to prohibit loose masonry overhangs, etc.

B. Property Protection

1. Acquire and clear hazard areas
2. Retrofitting to add braces, remove overhangs
3. Apply Mylar to windows and glass surfaces to protect from shattering glass
4. Tie down major appliances, provide flexible utility connections
5. Earthquake insurance riders

C. Emergency Services

1. Earthquake response plans to account for secondary problems, such as fires and hazardous material spills

D. Structural Projects

1. Slope stabilization

III. DAM FAILURE

A. Preventive

1. Dam failure inundation maps
2. Planning/zoning/open space preservation to keep area clear
3. Building codes with flood elevation based on dam failure
4. Dam safety inspections
5. Draining the reservoir when conditions appear unsafe

B. Property Protection

1. Acquisition of buildings in the path of a dam breach flood
2. Flood insurance

C. Emergency Services

1. Dam condition monitoring
2. Warning and evacuation plans based on dam failure

D. Structural Projects

1. Dam improvements, spillway enlargements
2. Remove unsafe dams

IV. WILDFIRES

A. Preventive

1. Zoning districts to reflect fire risk zones
2. Planning and zoning to restrict development in areas near fire protection and water resources
3. Requiring new subdivisions to space buildings, provide firebreaks, on-site water storage, wide roads, multiple accesses
4. Building code standards for roof materials and spark arrestors
5. Maintenance programs to clear dead and dry brush, trees
6. Regulation on open fires

B. Property Protection

1. Retrofitting of roofs and adding spark arrestors
2. Landscaping to keep bushes and trees away from structures
3. Insurance rates based on distance from fire protection

C. Natural Resource Protection

1. Prohibit development in high-risk areas

D. Emergency Services

1. Fire Fighting

V. WINTER STORMS

A. Prevention

1. Building code standards for light frame construction, especially for wind-resistant roofs

B. Property Protection

1. Storm shutters and windows
2. Hurricane straps on roofs and overhangs
3. Seal outside and inside of storm windows and check seals in spring and fall
4. Family and/or company severe weather action plan & drills:
    a. include a NOAA Weather Radio
    b. designate a shelter area or location
    c. keep a disaster supply kit, including stored food and water
    d. keep snow removal equipment in good repair; have extra shovels, sand, rock, salt and gas
    e. know how to turn off water, gas, and electricity at home or work

C. Natural Resource Protection

1. Maintenance program for trimming trees and shrubs

D. Emergency Services

1. Early warning systems/NOAA Weather Radio
2. Evacuation plans

Appendix D: Technical & Financial Assistance for All-Hazard Mitigation

FEMA's Hazard Mitigation Assistance (HMA) grant programs provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. Currently, FEMA administers the following HMA grant programs[37]:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)

FEMA's HMA grants are provided to eligible Applicants (States/Tribes/Territories) that, in turn, provide sub-grants to local governments and communities. The Applicant selects and prioritizes subapplications developed and submitted to them by subapplicants. These subapplications are submitted to FEMA for consideration of funding. Prospective subapplicants should consult the office designated as their Applicant for further information regarding specific program and application requirements. Contact information for the FEMA Regional Offices and State Hazard Mitigation Officers is available on the FEMA website, www.fema.gov.

HMA Grant Programs

The HMA grant programs provide funding opportunities for pre- and post-disaster mitigation. While the statutory origins of the programs differ, all share the common goal of reducing the risk of loss of life and property due to Natural Hazards. Brief descriptions of the HMA grant programs can be found below. For more information on the individual programs, or to see information related to a specific Fiscal Year, please click on one of the program links.

A. Hazard Mitigation Grant Program (HMGP)

HMGP assists in implementing long-term hazard mitigation measures following Presidential disaster declarations. Funding is available to implement projects in accordance with State, Tribal, and local priorities.

What is the Hazard Mitigation Grant Program?

The Hazard Mitigation Grant Program (HMGP) provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. Authorized under Section 404 of the Stafford Act and administered by FEMA, HMGP was created to reduce the loss of life and property due to natural disasters. The program enables mitigation measures to be implemented during the immediate recovery from a disaster.

Who is eligible to apply?

Hazard Mitigation Grant Program funding is only available to applicants that reside within a presidentially declared disaster area. Eligible applicants are:

- State and local governments
- Indian tribes or other tribal organizations

[37] Information in Appendix E is taken from the following website and links to specific programs unless otherwise noted; http://www.fema.gov/government/grant/hma/index.shtm

- Certain non-profit organizations

Individual homeowners and businesses may not apply directly to the program; however a community may apply on their behalf.

How are potential projects selected and identified?

The State's administrative plan governs how projects are selected for funding. However, proposed projects must meet certain minimum criteria. These criteria are designed to ensure that the most cost-effective and appropriate projects are selected for funding. Both the law and the regulations require that the projects are part of an overall mitigation strategy for the disaster area.

The State prioritizes and selects project applications developed and submitted by local jurisdictions. The State forwards applications consistent with State mitigation planning objectives to FEMA for eligibility review. Funding for this grant program is limited and States and local communities must make difficult decisions as to the most effective use of grant funds.

For more information on the **Hazard Mitigation Grant Program (HMGP),** go to:
http://www.fema.gov/government/grant/hmgp/index.shtm

B. Pre-Disaster Mitigation (PDM)

PDM provides funds on an annual basis for hazard mitigation planning and the implementation of mitigation projects prior to a disaster. The goal of the PDM program is to reduce overall risk to the population and structures, while at the same time, also reducing reliance on Federal funding from actual disaster declarations.

Program Overview

The Pre-Disaster Mitigation (PDM) program provides funds to states, territories, Indian tribal governments, communities, and universities 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 to be awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds.

C. Flood Mitigation Assistance (FMA)

FMA provides funds on an annual basis so that measures can be taken to reduce or eliminate risk of flood damage to buildings insured under the National Flood Insurance Program.

Program Overview

The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP).

FEMA provides FMA funds to assist States and communities implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program.

Types of FMA Grants

Three types of FMA grants are available to States and communities:

- Planning Grants to prepare Flood Mitigation Plans. Only NFIP-participating communities with approved Flood Mitigation Plans can apply for FMA Project grants
- Project Grants to implement measures to reduce flood losses, such as elevation, acquisition, or relocation of NFIP-insured structures. States are encouraged to prioritize FMA funds for applications that include repetitive loss properties; these include structures with 2 or more losses each with a claim of at least $1,000 within any ten-year period since 1978.
- Technical Assistance Grants for the State to help administer the FMA program and activities. Up to ten percent (10%) of Project grants may be awarded to States for Technical Assistance Grants

Appendix E: Maps

Emergency Response Facilities
Non-Emergency Response Facilities
Critical Infrastructure
Water Resources

Critical Infrastructure & Past and Potential Hazards

2017
Hazard Mitigation Plan
Nottingham, NH

Emergency Response Facilities Legend

Name of Facility

- POLICE STATION
- FIRE STATION
- PUBLIC WORKS GARAGE
- TOWN HALL
- HELIPAD

Past & Potential Hazards

- Past & Potential Flooding
- Past Wildfire(s)
- Dam Inundation Zone

FEMA Floodplain

- 100-year Floodplain

Prepared by: Strafford Regional Planning Commission
150 Waterfall St, Suite 12, Rochester, NH 03867
T: (603) 994-3500 F: (603) 994-3504 Em: srpc@strafford.org
Critical Infrastructure & Past and Potential Hazards
Date: January 2017
Path: M:\Region\OEM_haz_mit\2016_2017_Updates\Nottingham\Final_Maps\EPF_11x17

Maps prepared by Strafford Regional Planning Commission are for planning purposes only.

DATA SOURCES

Base features are from USGS 1:24,000 scale Digital Line Graphs, as archived in the GRANIT database. All base features distributed by Complex Systems Research Center, Durham, NH. Digital data in NH GRANIT represent the efforts of the contributing agencies to record information from the cited source materials. Complex Systems Research Center, under contract to the NH Office of State Planning, and in consultation with cooperating agencies, maintains a continuing program to identify and correct errors in these data. CSP, CSRC and the cooperating agencies make no claim as to the validity or reliability or to any implied uses of these data.

N
Grid North
NH State Plane Coordinates
NAD 1983 (feet)

0 0.75 1.5 3 Miles

Critical Infrastructure & Past and Potential Hazards

2017
Hazard Mitigation Plan
Nottingham, NH

Non-Emergency Response Facilities Legend

Facility Name

- CELL TOWER
- SWITCHING STATION
- SUBSTATION
- SCHOOL
- GRAVEL PIT

Past & Potential Hazards

- Past & Potential Flooding
- Past Wildfire(s)
- Dam Inundation Zone

FEMA Floodplain

- 100-year Floodplain

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Grid North
NH State Plane Coordinates
NAD 1983 (feet)

0 0.75 1.5 3 Miles

Critical Infrastructure & Past and Potential Hazards

2017
Hazard Mitigation Plan
Nottingham, NH

Critical Infrastructure Legend

Dam Hazard Class

- High
- Significant
- Low

Bridges

Past & Potential Hazards

- Past & Potential Flooding
- Past Wildfire(s)
- Dam Inundation Zone

FEMA Floodplain

- 100-year Floodplain

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Grid North
NH State Plane Coordinates
NAD 1983 (feet)

0 0.75 1.5 3 Miles

Critical Infrastructure & Past and Potential Hazards

2017
Hazard Mitigation Plan
Nottingham, NH

Water Resources Legend

Auxiliary Fire Aid(s)

- DRY HYDRANT
- CISTERN
- RIVER ACCESS

Past & Potential Hazards

- Past & Potential Flooding
- Past Wildfire(s)
- Dam Inundation Zone

FEMA Floodplain

- 100-year Floodplain

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NH State Plane Coordinates
NAD 1983 (feet)

0 0.75 1.5 3 Miles