

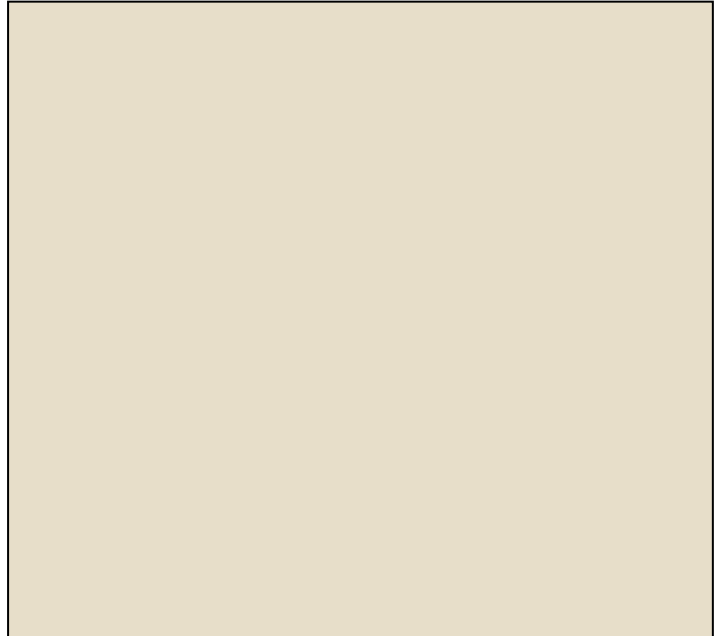
**For Pembroke Selectmen Adoption**

**02-02-22**

**Hazard  
Mitigation Plan  
Update 2022**



**Town of  
Pembroke  
New Hampshire**



**Adopted by the Pembroke**

**Board of Selectmen**

**February 2, 2022**

**Approved by NH HSEM/FEMA**

**Month xx, 2022**





Stephanie Alexander &lt;salexander@cnhrpc.org&gt;

## Pembroke, NH – Local Hazard Mitigation Plan – Approvable Pending Adoption

**DOS: Hazard Mitigation Planning** <hazmitplanning@dos.nh.gov>

Mon, Jan 10, 2022 at 8:30 AM

To: "bondpembrokeselectmen@gmail.com" <bondpembrokeselectmen@gmail.com>, "pgagnon@pembroke-nh.com" <pgagnon@pembroke-nh.com>, "djodoin@pembroke-nh.com" <djodoin@pembroke-nh.com>, "salexander@cnhrpc.org" <salexander@cnhrpc.org>

Good Morning!

The Department of Safety, Division of Homeland Security & Emergency Management (HSEM) has completed its review of the Pembroke, 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](mailto: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 reply to this email or call 603-223-3650.

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

Sincerely,



Hazard Mitigation (JM)

New Hampshire Department of Safety, Division of Homeland Security & Emergency Management

Brian Eaton, State Hazard Mitigation Officer / [Brian.E.Eaton@dos.nh.gov](mailto:Brian.E.Eaton@dos.nh.gov) / (603) 227-8724

John Marcel, State Hazard Mitigation Planner / [John.E.Marcel@dos.nh.gov](mailto:John.E.Marcel@dos.nh.gov) / (603) 223-3650



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# Town of Pembroke, NH

## Hazard Mitigation Plan Update 2022

Selectmen Adopted **February 2, 2022**

NH HSEM/FEMA Approved **Month xx, 2022**



### Town of Pembroke

311 Pembroke Street  
Pembroke, NH 03275  
Phone: (603) 485-4747  
Fire Department Phone: (603) 485-3621  
Police Department Phone: (603) 485-9173  
<https://www.pembroke-nh.com>

### Central NH Regional Planning Commission (CNHRPC)

28 Commercial Street, Suite 3  
Concord, NH 03301  
Phone: (603) 226-6020  
[www.cnhrpc.org](http://www.cnhrpc.org)



### NH Department of Safety (NHDOS)

#### NH Homeland Security and Emergency Management (NHHSEM)

33 Hazen Drive  
Concord, NH 03305 (*Mailing Address*)



### Incident Planning and Operations Center (IPOC)

110 Smokey Bear Blvd  
Concord, NH 03301 (*Physical Address*)  
Phone: (800) 852-3792 or (603) 271-2231  
[www.nh.gov/safety/divisions/hsem](http://www.nh.gov/safety/divisions/hsem)  
<https://apps.nh.gov/blogs/hsem>










### US Department of Homeland Security

#### Federal Emergency Management Agency (FEMA)

99 High Street, Sixth Floor  
Boston, Massachusetts 02110  
Phone: (617) 223-9540  
[www.fema.gov](http://www.fema.gov)

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## **1 PLANNING PROCESS**

The Town's Hazard Mitigation Committee reformed to rewrite the Plan into a more concise format and to incorporate the newest material required by FEMA in addition to updating the Town's newest information since **2017**. This Planning Process Chapter contains information previously available in the Introduction Chapter of the **Plan Update 2017**. Expanded public participation steps were taken and a new plan development procedure was used as documented in the Methodology section.

### **Certificate of Adoption, 2022**

Town of Pembroke, NH  
Board of Selectmen  
311 Pembroke Street  
Pembroke, NH 03275

#### **A Resolution Adopting the Pembroke Hazard Mitigation Plan Update 2022**

WHEREAS, the Town of Pembroke has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of the hazards profiled in the **Hazard Mitigation Plan Update 2022** including but not limited to flooding, high wind events, severe winter weather, and fire, resulting in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Town of Pembroke has developed and received conditional approval from the NH Homeland Security and Emergency Management (NHHSEM) for its **Hazard Mitigation Plan Update 2022** under the requirements of 44 CFR 201.6; and

WHEREAS, public and Committee meetings were held between **April 2021** through **November 2021** regarding the development and review of the **Hazard Mitigation Plan Update 2022**; and

WHEREAS, the **Plan** specifically addresses hazard mitigation strategies, and Plan maintenance procedures for the Town of Pembroke; and

WHEREAS, the **Plan** recommends several hazard mitigation actions (projects) that will provide mitigation for specific natural hazards that impact the Town of Pembroke with the effect of protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Pembroke eligible for funding to alleviate the effects of future hazards; now therefore be it



## 1 PLANNING PROCESS

## Plan Process Acknowledgments

The Board of Selectmen-appointed Hazard Mitigation Committee was comprised of these individuals on behalf of their respective Departments, Boards or Committees who met between **April 2021** through **November 2021** to develop the **Pembroke Hazard Mitigation Plan Update 2022**:

- **Joshua Coughlin**, Pembroke School District Facilities Director
- **Carolyn Cronin**, Pembroke Town Planner
- **Matthew Gagne**, Pembroke Water Works Superintendent
- **Paul Gagnon**, Pembroke Fire Department Chief
- **Chris Gamache**, Tri-Town Ambulance Director
- **Dwayne Gilman**, Pembroke Police Department Chief
- **David Jodoin**, Pembroke Town Administrator
- **Paulette Malo**, Pembroke Sewer Commission Operations Director
- **VJ Ranfos**, Pembroke Department of Public Works Director
- **Karen Yeaton**, Pembroke Board of Selectmen Member

The following Central NH Regional Planning Commission (CNHRPC) staff contributed to the development of the Hazard Mitigation Plan Update:

- **Stephanie Alexander**, CNHRPC Senior Planner
- **Matthew Baronas**, CNHRPC Assistant Planner (GIS mapping)

Several other Town-affiliated individuals or other agency representatives attended one or more Committee meetings and/or contributed information to the content of the Plan. Members of the public\* **(0)** participated as fully as appointed members in the Hazard Mitigation Committee meetings.

- **Craig Clough**, Tri-Town Ambulance Deputy Director
- **Gary Gaskell**, Pembroke Police Department Lieutenant
- **Dan Mattingly**, Pembroke Sewer Commissioner
- **Kayla Henderson**, NH Homeland Security and Emergency Management Representative

### Who is a Member of the Public?

For the purposes of this Plan,  
“**a member of the public**” or “**the public**” or “**public participant**” means:

Anyone who is not a Town of Pembroke, School District, County, State, or federal government employee; anyone who is not paid for services by property tax dollars; anyone who is not a volunteer of the Town; and anyone who does not represent non-profit agencies and other Committees of which the Town is a member.

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## Authority

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In 2000, the President enacted the Disaster Mitigation Act 2000 (DMA) which requires states and municipalities to have local adopted and FEMA approved natural hazard mitigation plans in place to be eligible for disaster and mitigation funding programs such as the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Assistance (HMA) programs, including Hazard Mitigation Grant Program, Flood Mitigation Assistance Program, and Pre-Disaster Mitigation Program. New Hampshire is awarded funds based upon the completeness of its State Plan and the number of local plans.

As a result of the DMA, funding was provided to state offices of emergency management, including the New Hampshire Homeland Security and Emergency Management, to produce local (municipal) hazard mitigation plans. To remain in compliance with the DMA, the Town of Pembroke is required to submit for FEMA approval a revised **Hazard Mitigation Plan Update** every five years.

The New Hampshire Homeland Security and Emergency Management (NH HSEM) produced its latest approved [State of New Hampshire Multi-Hazard Mitigation Plan 2018](#) in **October 2018**. The development of the State's Plan allows for New Hampshire to receive funding programs to provide to communities in the event of disasters or for mitigation.

Prior versions of the Town's Hazard Mitigation Plan are noted in the [Final Plan Dates](#) section. A **2019** Hazard Mitigation Grant Program (HMGP) grant provided 75%/25% funding for the Town to update its prior Plan through the Central NH Regional Planning Commission. The 25% match required by the Town was provided by in-kind staff and volunteer time and labor.

This **Pembroke Hazard Mitigation Plan Update 2022** has been developed in accordance with the Disaster Mitigation Act of **2000** and the [FEMA Local Mitigation Plan Review Guide, October 1, 2012](#) and effective one year later. The most recent Plan development standards provided by FEMA Region I have also been incorporated. The planning effort of the Town is a regular process and this Plan is considered a "living document."

The new Pembroke Hazard Mitigation Committee was established by the Board of Selectmen to begin meeting **April 2021** and guided the development of the Plan. The Committee consisted of the Town's Police and Fire Departments, Town Administration, Public Works Department, Planning Department, Tri-Town Ambulance, Sewer Commission, Pembroke Water Works, and Pembroke School District. Because of the COVID-19 pandemic, no public participants were active with Committee activities although advertised appropriately.

The attendees of the meeting process are noted in the [Acknowledgements](#). The Central NH Regional Planning Commission, of which Pembroke is a member, contributed to the development of this Plan by facilitating the meeting and technical processes, working with the Committee and its members to obtain information, preparing the document, and handling the submissions to NH HSEM and FEMA.

## Methodology

The **Pembroke Hazard Mitigation Plan Update 2022** was developed over a seven-month period with a group of Town staff members and volunteers, open to public participants, and the CNHRPC comprising the Hazard Mitigation Committee. The **2021** methodology for Plan development is summarized in this section. The **Hazard Mitigation Plan** is designed differently from the **2017 Plan** with the intent to better conform to the current approvable Central NH Region format and incorporating the new **2018 State Multi-Hazard Mitigation Plan** items, with the purpose of easier updating and implementation while meeting FEMA’s requirements. The Plan roughly follows the **FEMA Local Mitigation Planning Handbook, 2013** by using its terminology and some of its tasks, ensuring **Pembroke’s Plan Update 2022** begins to follow a standardized approach to Plan construction and content endorsed by FEMA. Many of the vital sections of the **2022 Plan Update** will be contained in the chapter **10 APPENDICES** for easier display, usage, sharing, and update.

## MEETINGS AND DUTIES

The meetings and tasks of the Hazard Mitigation Committee were dictated by Agendas and how much the Committee was able to complete for each Agenda is displayed in **Table 1**. Work Sessions were designed to accomplish what could not be completed at meetings due to time constraints and additional information to process. All meetings were publicly accessible by Zoom.

**Table 1**  
**Meeting Schedule and Agenda Activities**

Meeting	Date	Agenda Activities – See APPENDIX C
<b>Meeting 1</b> <i>Remotely held via Zoom Webinar</i>	04-07-21	Discuss Process and Schedule; Review Declared Disasters and Public Assistance Funding to Pembroke; Develop New Hazard Identification and Risk Assessment (HIRA), Begin to Identify Potential and Past Hazard Locations 2017-2021; Prepare for Maps 1-2 Revisions; Schedule Meetings
<b>Work Session 1</b> <i>Remotely held via Zoom Webinar</i>	04-21-21	Finish Identifying Recent Past Hazard Events 2017-2021; Update Critical and Community Facilities Vulnerability Assessment and Develop Problem Statements; Revise Maps 1-2
<b>Work Session 1.2</b> <i>Remotely held via Zoom Webinar</i>	05-05-21	Finish Identifying Recent Past Hazard Events 2017-2021; Update Critical and Community Facilities Vulnerability Assessment and Develop Problem Statements; Revise Maps 1-2
<b>Work Session 1.3</b> <i>Remotely held via Zoom Webinar</i>	05-19-21	Update Critical and Community Facilities Vulnerability Assessment and Finish Problem Statements; Review and Update Goals and Objectives; Status of Maps 1-2
<b>Meeting 2</b> <i>Remotely held via Zoom Webinar</i>	06-09-21	Finalize Problem Statements and Identify Those to Utilize as NEW 2021 Mitigation Actions; Begin Department Roundtable-Review & Update of Capability Assessment

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 1 PLANNING PROCESS

Meeting	Date	Agenda Activities – See APPENDIX C
<b>Work Session 2</b> <i>Remotely held via Zoom Webinar</i>	06-30-21	Complete Problem Statements and Identify Those to Utilize as NEW 2021 Mitigation Actions; Continue Department Roundtable- Review & Update of Capability Assessment
<b>Work Session 2.2</b> <i>Remotely held via Zoom Webinar</i>	07-15-21	Complete Department Roundtable- Review & Update of Capability Assessment
<b>Work Session 2.3</b> <i>Remotely held via Zoom Webinar</i>	08-04-21	Complete Department Roundtable- Review & Update of Capability Assessment
<b>Meeting 3</b> <i>Remotely held via Zoom Webinar</i>	08-25-21	Determine Status of the 2015 Mitigation Actions; Begin to Develop Mitigation Action Plan 2022; Schedule New Meetings
<b>Work Session 3</b> <i>Remotely held via Zoom Webinar</i>	09-08-21	Develop Mitigation Action Plan 2022; Begin to Prioritize Mitigation Action Ranking Scores for Action Achievability
<b>Work Session 3.2</b> <i>Remotely held via Zoom Webinar</i>	09-12-21	Complete Mitigation Action Plan 2022
<b>Work Session 3.3</b> <i>Remotely held via Zoom Webinar</i>	09-29-21	Prioritize Mitigation Action Ranking Scores for Action Achievability; Overview of Meeting 4/Work Session 4 and Public Information Meeting
<b>Work Session 3.4</b> <i>Remotely held via Zoom Webinar</i>	10-04-21	Complete Prioritizing Mitigation Action Ranking Scores for Action Achievability;
<b>Meeting 4</b> <i>Remotely held via Zoom Webinar</i>	10-27-21	Review Draft Hazard Mitigation Plan Update 2022; Overview of Work Session 4 Tasks; Schedule Public Information Meeting
<b>Work Session 4</b> <i>Remotely held via Zoom Webinar</i>	11-04-21	Review Draft Hazard Mitigation Plan Update 2022; Review Draft Community Survey for Haz Mit and Severe Weather Events; Interim Hazard Mitigation Plan Implementation 2022-2026; Prepare for Public Information Meeting; Review Plan Approval Process; Prepare for Board of Selectmen Adoption Meeting
<b>Public Information Meeting</b> <i>Remotely held via Zoom / Held in-person</i>	11-17-21	HMC members present sections of the Plan to the public in a brief question and answer format meeting. Describe hazards and mitigation Actions. Maps will be available.

*Source: Pembroke Hazard Mitigation Committee Agendas, 2022*

For all meetings, since the meetings were held remotely via Zoom, CNHRPC staff took a roll call during each meeting and completed a meeting match timesheet for participants documenting their time at the meetings. The Committee members worked to complete the Agendas, including developing the **Hazard Risk Assessment, Critical and Community Facilities Vulnerability Assessment, Capability Assessment, and Mitigation Action Plan**, completing the **Enhanced STAPLEE Action Prioritization**, etc. along with input from members of the public and guests. The agendas and attendance sheets are included in **APPENDIX C** of the Plan.

The specific meeting tasks are described in detail on the Agendas in **APPENDIX C** and in **Table 1**. CNHRPC staff facilitated the Committee Meetings and Work Sessions. Information needed on the Agenda Tasks indicated above was collected from any attendees present, including any members of the public, by CNHRPC, during discussions among attendees. The new and updated information was described in each Chapter under the **2022 Plan Update** section. Maps were reviewed and updated by the Committee and guests and revised using a Geographic Information System (GIS) by CNHRPC.

In between meetings, Town staff and volunteers and CNHRPC staff researched and collected information for the Chapters. CNHRPC updated and rewrote Chapters, tables, and sections as appropriate. The Chapters were also updated by revising the document to the current FEMA standards and the **2018 State Multi-Hazard Mitigation Plan**.

### **Public Outreach Strategy**

Many individuals were personally invited to attend and participate in the Pembroke Hazard Mitigation Plan Committee meetings. They included Town Boards and Committees, Town Departments, Pembroke School District, NH Homeland Security and Emergency Management (NHHSEM) Representatives, and others, along with general email invitations through the Town's public notification email list. In addition, an online and highly publicized Severe Weather and Hazard Mitigation Survey yielded 81 responses.

The Hazard Mitigation Committee itself was comprised of Town Department staff and volunteers, including Town Administration, Fire Department, Public Works Department, Police Department, Planning Department, Sewer Commission, Pembroke Water Works, and Pembroke School District. Other staff members or volunteers may have occasionally participated on behalf of their Departments.

The public process for this Plan included posting the meeting information on the Town's online calendar and website at <https://www.pembroke-nh.com/>. Meetings were held remotely via the secure Zoom Webinar platform. For the first meeting, the Town advertised by sending a mass email to the Town's notification list and posting flyers and meeting announcements at the Town Hall. Because of the COVID-19 pandemic, between October 2020-April 2021 the Town Offices were closed to the public and from April 2021 to present have been open on a limited basis. Other than the outdoor Town bulletin board, no physical postings of the Agenda occurred as another result of the pandemic during this time. Copies of publicity for the Plan are included in **APPENDIX C**.

The Central NH Regional Planning Commission staff facilitated the Hazard Mitigation Committee meetings, guided the planning process, compiled new and old data, updated information, and prepared the 2022 Plan documents, Appendices, and Maps.

As a final attempt to obtain additional public input, a specially noticed Public Information Meeting was held on November 17, 2021 at a Board of Selectmen's meeting at which many members of the public participated. This meeting was publicly noticed on the Town website and calendar, and on the Board of Selectmen's Agenda. All documents were available for review on the Town's website in advance of the meeting.



## **OPPORTUNITY FOR PUBLIC PARTICIPATION**

### **Public Input from the Hazard Mitigation Committee Meetings**

The public notification is described in the Public Outreach Strategy sidebar. Zero (0) members of the public attended the HMC meetings as indicated in the **Acknowledgements** and by the Attendance Sheets in **APPENDIX C Meeting Information**, in addition to Public Information Meeting attendees. Members of the public would have assisted with completing the Agendas, including developing the **Hazard Identification Risk Assessment**, **Critical and Community Facilities Vulnerability Assessment**, **Capability Assessment**, and **Mitigation Action Plan**, completing the **Enhanced STAPLEE Action Prioritization**, etc. along with the Committee members. The general public had the opportunity to attend and participate in the 16 posted meetings or to contact the Town Administrator/Emergency Management Director for more information prior to the Board of Selectmen adoption of the Plan.

### **Public Input from the Public Information Meeting**

The **Public Information Meeting (PIM)** was held on November 17, 2021. The Hazard Mitigation Committee members presented portions of the Plan and had the Maps available for display. The agenda and draft minutes are included in **APPENDIX C**. Held during a scheduled Board of Selectmen meeting, the PIM offered additional opportunity for the public to listen to presentations, ask questions and had the opportunity to review the final draft Plan document, Appendices and Maps.

### **Pembroke Community Survey for Hazard Mitigation and Severe Weather Events**

As a last attempt to obtain broad public input on hazard mitigation and severe weather events, an online community survey posted on Survey Monkey was developed in May 2021 and remained open through the November 17, 2021 PIM. Every person on the Town's public email distribution list received notification of the survey, the Town website prominently published its link, as did Department social media. A total of 81 responses was received from the community at large. Following the HIRA hazard list, the survey asked respondents seven questions:

- **Q1** On which road do you live, work, and/or travel through Pembroke? (This will help us understand where you have experienced severe weather or other hazard events.)

Respondents traveled through all sections of Town, including Buck Street, Pembroke Street/US 3, Academy Road, Broadway, Cross Country Road, North Pembroke Road, Glass Street, and others.

- **Q2** How concerned are you about the following natural hazards, severe weather events, or human/technological hazards impacting Pembroke? (on a 1-5 Importance scale)

Respondents were most concerned about High Wind, Aging Infrastructure, Public Health, Drought, Long Term Utility Outage, and Cyberattack events.



- **Q3** Natural hazards can have a significant impact on a community but planning for or mitigating these events can help lessen the impacts. Planning may require Town funds as well as federal funds in addition to Town staff support and volunteer support. Please indicate how important you believe these mitigation planning priorities are for Pembroke: (on a 1-5 Importance scale).

Mitigation planning priorities were Enhancing Functions of Natural Features, Protecting/Reducing Damage to Utilities, Improving the Transportation Network, Protecting Town Facilities, and Limiting Development in Hazard Areas.

- **Q4** Can you describe any hazard events or severe weather events you experienced in Pembroke? If yes, please provide brief comments on up to 2 events by describing what happened (What), the location (Where), the approximate month and year of the occurrence (When), and how bad the event was from 1 [not bad] to 5 [extremely bad] (Impact scale).

Respondents most frequently recalled the ice storms of 1998 and 2008 with the related power/utility outages during these times, and more contemporary windstorms with power/utility outages. Flooding was also highly noted, in general and specifically the Mother's Day Flood of 2006, April 2007 floods, and 2008 floods. Most were given a 4 or 5 on the Impact scale.

- **Q5** In your household, has anyone done any of the following preparedness or mitigation activities? Check all that apply.

Regarding mitigation and preparedness, respondents most frequently chose Talked about What To Do In Case of Weather Emergency and Prepared Family Emergency Plans. Almost half of respondents had chosen Made a 72-hour Emergency Kit.

- **Q6** What are the best ways for you to receive information about disasters and severe weather events in Pembroke? Please pick up to 3:

Respondents preferred Town Email Distribution List, Local Television (WMUR), Town Website, and Internet News Media, as the best ways to receive severe weather and disaster information.

- **Q7** Please feel free to provide any other information related to severe weather and hazard mitigation in the space below.

Few respondents added comments, but those who did mentioned the need for additional public information on disasters being made available, concerns about

traveling on US 3, road closures and detours, and wondered about emergency sheltering. Many respondent write-in ideas are noted as Mitigation Action items or are standard Department policy. The summary of survey responses are provided in **APPENDIX F**.

### **Public Input from the Board of Selectmen Adoption Meeting**

The Board of Selectmen meeting to adopt the **Hazard Mitigation Plan** was held on **February 2, 2022**. Although the Plan's APA had been received, the Board permitted public comment prior to adoption although Plan changes could not be made at this time. Discussion was held prior to the unanimous adoption of the Plan by the Board.

### **COMPLETION OF THE PLAN STEPS AND DATES**

On November 17, 2021, the Committee held a **Public Information Meeting**. The same extensive public notification described in the Public Outreach Strategy sidebar occurred to obtain review and comment from the public for the Plan. On November 29, 2021, this Plan, Appendices and Maps were submitted to the NH Homeland Security and Emergency Management (NHHSEM) for compliance review and revision to apply for Approved Pending Adoption (APA) status, also known as conditional approval.

On January 10, 2022, Pembroke received an **Approved Pending Adoption (APA)** notification from NHHSEM. The APA states the Plan will be approved by FEMA after proof of adoption by the local governing body, a Certificate of Adoption from the Board of Selectmen, is submitted.

On **February 2, 2022**, the Board of Selectmen **adopted the Hazard Mitigation Plan Update** for the Town at a duly noticed public meeting. Copies had been made available at the Town Office and on the Town website for public review. The public notice and flyers are included in **APPENDIX C**. The signed Certificate of Adoption was sent to NHHSEM/FEMA.

On **Month xx, 2022**, Pembroke received a **Notification of Formal Approval** from NHHSEM, with the Plan approval granted effective that day. A **Letter of Formal Approval** from FEMA confirming the notification will be forthcoming. The next Hazard Mitigation Plan update is due five (5) years from this date of approval, on **Month xx, 2027**.

**Final Plan Dates**

The following is a summary of the required dates which guide the adoption and update of the **Pembroke Hazard Mitigation Plan**. Included is the history of the Plan approvals and lapsing dates as shown in **Table 2**.

**Table 2**  
**Pembroke's Hazard Mitigation Plan Adoption History**

Year of FEMA-Approved Hazard Mitigation Plan	Adoption by Pembroke Board of Selectmen	NHHSEM/ FEMA's Formal Approval	Plan Lapse
Original 2004	02/23/04	05/04/04	05/04/09
Update 2010	06/07/10	06/07/10	06/07/15
Update 2017	01/17/17	01/30/17	01/30/22
Update 2022	02/02/22	0x/xx/22	0x/xx/27

*Source: Plan Adoption History*

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## 2 COMMUNITY PROFILE

It has been over five years since the last Plan was written, with some basic information available from the newest 2020 decennial US Census beginning in mid-2021. The best available new data has been used in this Chapter to portray the population, housing, and overall demographic picture of present-day Pembroke. The former **Relation to Natural Hazards** section has been updated within **4 HAZARD RISK ASSESSMENT** as **Built Environment Changes**. The tables clearly identify the facilities in Town and which natural, human, and technological hazard events could most likely occur in those areas, as described in **5 COMMUNITY VULNERABILITY ASSESSMENT AND LOSS ESTIMATION**.

A simplified description of how the Town's population and housing have grown within the last four decades follows. Relationships of the locations of people and buildings to natural hazard events are generally explored. Examination of this information will allow the Town to better understand the land use and demographic trends within its borders and how emergency and preventative services can best serve the growing and changing population and landscape.

### Geographic Context

The Town of Pembroke is located in Central New Hampshire within Merrimack County. It is bordered by the communities of Chichester to the north, Epsom to the northeast, Allenstown to the east and southeast, Bow to the south, and Concord to the northwest. The State's capital City of Concord abuts the Town along their shared Soucook River boundary. US Route 3 is a significant travel corridor for commuters and those driving south through Hooksett into Manchester or north through Pembroke into Concord and to Interstate 93.

Pembroke is unique in several ways. The Town is bordered on three sides by rivers, the Soucook River to the west sharing the border with Concord, the Suncook River to the east sharing the border with Allenstown, and the Merrimack River to the south sharing the border with Bow. Pembroke has a strong commercial base on NH 106 and US 3, with a more rural NH 28 following the Suncook River north-south. The Town has several Class VI non-maintained range roads north of US 3 that host the rural cultural heritage and forested lands of the community. Suncook Village is a small downtown with many opportunities for redevelopment that have been occurring slowly over the last few decades.

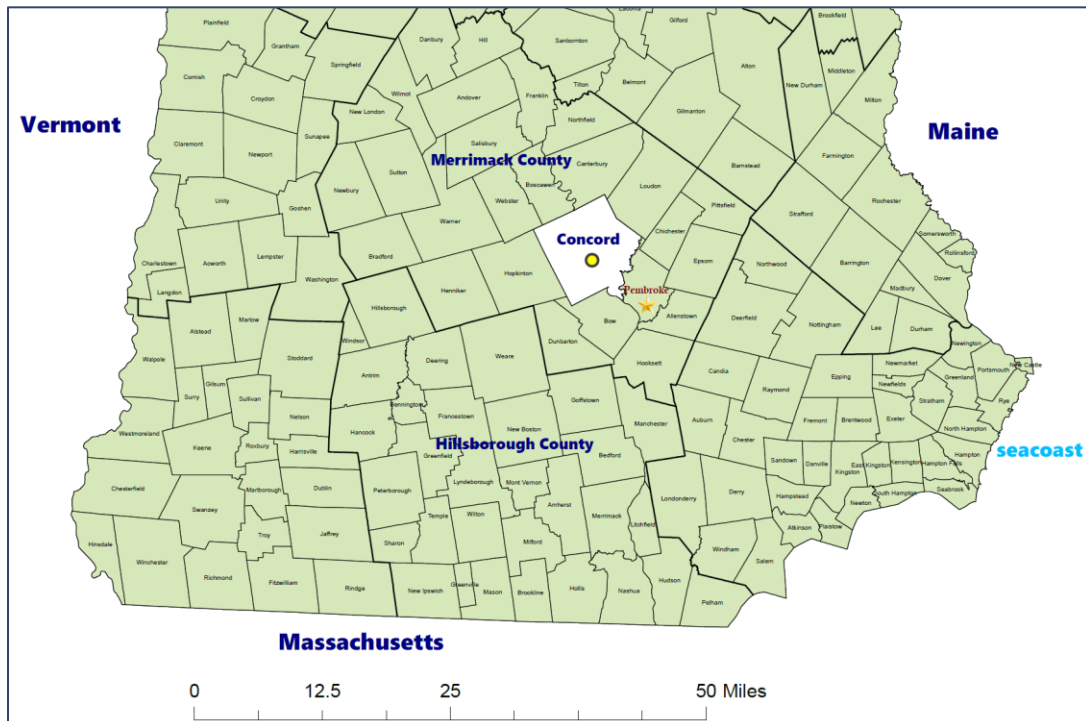
Yet, Pembroke is growing tremendously as a bedroom community to Concord and Hooksett with traffic concerns and new housing developments. With easy access to I-93 in Concord, Pembroke may continue to experience substantial growth until rising development pressures require zoning changes or non-maintained road upgrades.

## PEMBROKE'S LOCATION IN NH

Merrimack County in which Pembroke resides is often referred to as a valley as its borders are higher in elevation than its middle communities. Concord is the only City in the County. Merrimack County is surrounded on all sides by other NH Counties, including Hillsborough, Sullivan, Belknap, Rockingham, Strafford, and Grafton. Most, but not all, communities in Merrimack County comprise the majority of the Central NH Planning Region joined by two communities from Hillsborough County. Hillsborough County borders Massachusetts and includes the cities of Manchester and Nashua

Concord is located about **50** miles from the Massachusetts state border, the Vermont state border, the Maine state border, and the seacoast. New Hampshire's many Interstates, US Routes, NH Routes, and local roadways generally enable travel and commute from Central NH to most of these points in about one hour. Geographically, Pembroke abuts eastern Concord, about **5** miles to downtown Concord from the Town Hall and about **55** miles east of the Vermont state border, the mid-way point between Concord and Keene on NH 9/US 202. The Town of Pembroke's context within Merrimack County and the State of New Hampshire is shown in **Figure 1**.

**Figure 1**  
**Pembroke in the State**



Source: Central NH Regional Planning Commission

## PEMBROKE'S LOCATION IN CENTRAL NH

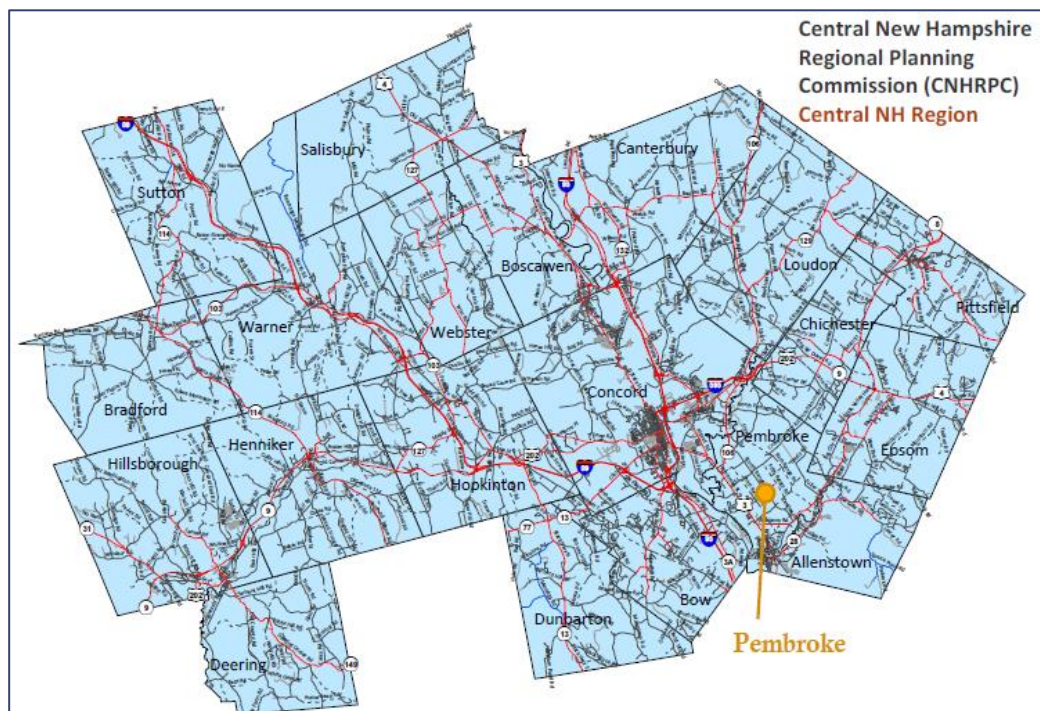
The Town is a voluntary member of the Central New Hampshire Regional Planning Commission. The **19** Towns and **1** City comprising the Central NH Region contain several major rivers and New Hampshire and Interstate highways. The Pembroke's historically rural identity, commuting difficulty, available services, and unmaintained range roads and border by three rivers, could ensure regular future development within the community that borders Concord.

The **Blackwater River** (Salisbury, Webster, Hopkinton) and the **Warner River** (Bradford, Sutton, Warner, Webster, Hopkinton) flow south into the **Contoocook River**. The **Contoocook River** flows in a north-easterly direction through Hillsborough, Henniker, Hopkinton, Concord and Boscaawen until its confluence with the **Merrimack River** in Boscaawen/Penacook (Concord). The **Contoocook River** and the **Merrimack River** effectively bisect the region into three sections. The **Soucook River** flows south through Loudon along the Concord/Pembroke border and enters the **Merrimack River**. The **Suncook River** originates in Belknap County, flowing south through Pittsfield, Chichester, Epsom, Pembroke, and Allenstown until it too converges with the **Merrimack River** in Bow/Hooksett.

In the Central NH Region, Interstates 89, 93 and 393 stretch in north, northwest, east, and south directions, meeting in Concord and Bow. Major traffic routes of US 3 flow north-south and US 4/202 traverses in an east-west direction. Pembroke can be accessed via NH 106 at the US 3 intersection, traveling north to Concord, through US 3 running west-east between Concord to Allenstown, and via NH 28 running from between Allenstown to Epsom in a north-south direction. Dozens of NH state highways crisscross the entire region. A map of the Central NH Region in which Pembroke is situated, with the region's major routes, is displayed in **Figure 2**.

**Figure 2**  
**Pembroke in the**  
**Central NH**  
**Region**

*Source: Central NH  
Regional Planning  
Commission*





## Population and Housing Growth

The **2020 Pembroke Master Plan** was adopted by the Planning Board in **February 2021**. The goal for future updates is annual review and revision of one or two Chapters. Chapters from the **2020 Master Plan** to update include Vision, Implementation, Housing, Economic Development, Community Facilities, Land Use, Transportation and Natural Resources. New future chapters to consider could include Energy and Historic and Cultural Resources. The **Hazard Mitigation Plan 2022** could be adopted as an Appendix or a Chapter to the **2020 Master Plan** by the vote of the Planning Board. The Master Plan influences the Zoning Ordinance and the Subdivision and Site Plan Review Regulations along with the Capital Improvements Program. These documents are used by local land use boards and staff to guide growth and development of Pembroke.

### POPULATION AND HOUSING TRENDS

The following tables contain the newest consistent data on housing and population growth which depict development trends over time. Minimal **2020** Census figures were available. Shown in **Table 3**, Pembroke's population and housing boomed during the **1980-1990** decade (**+35%** people, **+39%** homes). Beginning with the **1990-2000** decade (**+5%** people and **+8%** homes), population and housing trends slowed dramatically. The **2000-2010** decade which included a series of significant natural disasters and an economic recession experienced slower growth (**+3%** people and **+5%** homes). The new **2020** Census population and ACS 2015-2019 housing unit figures calculated **+1%** people and **+2%** housing units in indicating the slowest growth period in **50** years.

**Table 3**

#### Overall Population and Housing Growth Trends in Pembroke, 1970-2020

Growth	Population	Net Change		Housing Units	Net Change	
		#	%		#	%
<b>1970 Census</b>	4,261	N/A	0	1,386	N/A	0
<b>1980 Census</b>	4,861	600	14.1%	1,828	442	31.9%
<b>1990 Census</b>	6,561	1,700	35.0%	2,536	708	38.7%
<b>2000 Census</b>	6,897	336	5.1%	2,734	198	7.8%
<b>2010 Census</b>	7,115	218	3.2%	2,872	138	5.0%
<b>2020 Census</b>	7,207	92	1.3%	2,925	53	1.8%
<b>Total Change from 1970 – 2020 Census</b>	---	<b>2,946</b>	<b>69.1%</b>	---	<b>1,539</b>	<b>111.0%</b>

*Sources: 1970-1990 US Census CPH-2-31 Table 9 Population and Housing Unit Counts;*

*US Census 2000 & 2010 Data \*includes all housing units, including vacant and seasonal and 2019 Group Quarters.*

*US Census 2020 Population, ACS 2015-2019*

### Population and Housing Data

In total, the Town has grown by **+2,946** people and **+1,539** housing units by confirmed Census counts and estimates from **1970-2020**. In **Table 3**, Pembroke's confirmed **2020** Census population of **7,207** shows an overall increase of about **+69%** in population over the previous five decades, up from **4,261** people in **1970**. The estimated **2019** Census housing units (**+53**) displays an overall increase of about **+111%** (**1,539** units) since **1970** to total **2,925** units by **2020**. The Town began with a high population of **4,261** in **1970**, and after growth booms between **1970-1990**, the population and housing increases tapered off significantly. Between **2000-2020**, the Town's population increased by **+310** people while during the same time housing units increased by **+191** units.

Overall growth trends seem to be slowing over the current partial **2010-2020** decade, with a population growth of **+1.3%** (**+92** people) and **+1.8%** housing units growth (**+53** units) to date. Over the nearly five decade timeframe of **1970-2020**, this is by far the smallest amount of growth seen in Pembroke. The overall growth rate by percentage in Pembroke since **1970** is smaller than other than the geographically small-sized population communities in the Central NH region.

Over the **1970-2020** period, the number of people living in each housing unit has declined steadily from its high of **3.3** people per housing unit in **1970** to its steady low of **2.5** people per housing unit between **2000-2020**. Overall, these numbers are similar in comparison to other small-sized population Central NH Region towns and likely indicate an aging population living together or Group Quarters cohabitation.

### Population Density

Another good measurement of community population and housing change is population density, or how many people live in a square mile of land area. Although Pembroke encompasses a total land area of **22.6** square miles (**14,487** acres), an additional **0.17** square miles (**110.3** acres) is water area (**22.8** total square miles). Over the **50-year** period between **1970-2020**, the data for population density is displayed in **Table 4**.

**Table 4**  
**Population Density in Pembroke, 1970-2020**

Municipality Size		Persons per Square Mile					
Land Acreage	Land Area in Square Miles	1970	1980	1990	2000	2010	2020
14,487	22.63	188	215	290	305	314	318

Sources: **Table 3**, NH Office of Planning and Development GIS acreage calculations, 2013

From **Table 4**, the overall population density between **1970** and **2019** increased **+69%**, from **188** people per square mile in **1970** to an estimated high of **318** people per square mile in **2020**. Pembroke is a geographically small-sized community in the Central NH Region at **22.8** square miles (including water acreage). Pembroke has a comparatively large number of people per square mile as compared to both other small-sized Central NH Region communities and communities statewide.

## NEW CONSTRUCTION

**Table 5** displays Pembroke’s estimated new home and new building construction permits issued by the Building Inspector between **2016-2021**. During this **6**-year period, a total of **109** new construction permits for homes and housing units have been issued, but not necessarily built.

**Table 5**  
**New Construction Permits Issued by Building Type, 2016-2021**

Building Type	2016	2017	2018	2019	2020	2021*	6-Year Totals
Single Family Homes**	3	5	5	6	10	7	36
Multi-family Homes	1	0	0	16	55	0	72
Manufactured Homes	1	0	0	0	0	0	1
Non-Residential Buildings	5	1	0	2	4	2	14
<b>Totals</b>	<b>10</b>	<b>6</b>	<b>5</b>	<b>24</b>	<b>69</b>	<b>9</b>	<b>123</b>

Source: Pembroke Assessing Database, 09-21

\*may include Accessory Dwelling Unit (ADU)

\*\* to date 09-21

From **Table 5**, **36** permits were issued for new single family homes, with **72** permits for new multi-family homes, over the last **6** years. While **1** new construction permit for manufactured homes was issued during the period, it was the replacement of an existing home, with a net of **0** permits. This period was also active for the construction of new non-residential buildings, totaling **14** new commercial/ industrial/ exempt permits. The most active year was **2020** when a total of **10** new single family home permits were issued while **55** multi-family home permits were issued.

It is important to note that the number of permits *issued* does not necessarily equate to buildings *constructed*. When using these figures, compared to most similar-sized Central NH region communities, Pembroke had more construction between **2015-2021**.

## Land Use and Zoning

According to NH Office of Planning and Development's **2013** geographic information system (GIS) calculations, Pembroke has a total land area of **14,487** acres, or **22.63** square land miles. An additional **110.3** acres (about **0.17** square miles) is water area, to total **14,597** Town acreage within its political boundaries. The GIS land acreage figure is larger than the most recent **MS-1 2021** assessing reporting calculation of **13,724** total Land Use acres for the Town, a **763.5** acres difference. Certain acreages are often posted in more than one land use category for taxation purposes, and certain other land acreage is not displayed on MS-1 reports to the NH Department of Revenue Administration. Reviewing the assessing information closely should clarify the answer as to why this discrepancy exists. Small differences between the actual taxable land calculations from the assessing records and the acreage from the basic GIS calculations are often found and are not unusual.

For New Hampshire and specifically the Central NH Region, Pembroke is considered a geographically small-sized community in terms of land area and contains higher than usual population and housing figures. Pembroke's proportion of residential land is higher than most towns in the Central NH Region, likely because of its multi-family developments. The northern-central section of the Town of Pembroke is highly rural, forested, has little commercial development while the southern-western section hosts commercial, industrial, residential, and tax-exempt development. With current commuter traffic and development activity, there seems to be more of an incentive to begin the process for enabling developments in the northern section in the future.

### LAND USE TYPES AND ACREAGE

**Table 6** provides a snapshot of the Town's **2021** land use acreage from the Town's MS-1 reporting. Land use categories were combined for ease of summary. Forested land use and open space is the most extensive land use type, comprising **53%** of the Town's land area. Residential land use at **24%** is the next highest, followed by Farm Land (**7%**). Exempt land use (**9%**) is high, with Commercial (**4%**) and Industrial (**3%**) land uses densely situated in Pembroke.

**Table 6**  
**Land Use Acreage, 2021**

Land Use Category 2021	Acres	% of Town
Residential	2,686.0	19.6%
Residential Vacant	501	3.6%
Residential Mobile Home	13	0.1%
Residential Apartments	68	0.5%
Commercial Improved	415	3.0%
Commercial Vacant	101	0.7%
Industrial Improved	393	2.9%
Utilities	29	0.2%
Exempt	1,202	8.8%
Farm Land	652	4.8%
Farm Land Recreation	277	2.0%
Forest Land	4,104	29.9%
Forest Land with Stewardship	165	1.2%
Forest Land Recreation	2,184	15.9%
Forest Land Rec & Stewardship	419	3.1%
Unproductive	96	0.7%
Unproductive Recreation	33	0.2%
Wet	86	0.6%
Industrial Vacant	57	0.4%
Open Space	59	0.4%
Residential Condo	19	0.1%
Discretionary Easement	164	1.2%
<b>Total</b>	<b>13,724</b>	<b>100.00%</b>

*Source: Pembroke MS-1 2021, Assessing Database*

The total of Pembroke parcels is **3,014** in **2021**, up by **80** parcels from **2017**.

## PEMBROKE ZONING

The perspective of the Town's Zoning Districts offers another way to view how the land is utilized within Pembroke in **Table 7**. Several tables of dimensional and density regulations pertaining to water and septic, lot frontages, setbacks, buffers and lot sizes, etc. are available within the Zoning Ordinance. The ordinance includes a table of uses for each district, indicating what types of facilities are permitted. Several commercial and residential districts fall within Pembroke, over which aquifer, floodplain, shoreland and wetland protection overlay districts apply further regulation.

**Table 7**  
**Pembroke Zoning Districts, 2021**

<b>Zoning District</b>	<b>Abbreviation</b>	<b>Acreage</b>
Business/Residential	B1	99
Commercial/Business	B2	28
Residential - Medium Density	R1	3,088
Residential - Rural/Agricultural	R3	9,575
Commercial/Light Industrial	C1	1,506
Limited Office	LO	398
Soucook River Development District	SR	213
<b>Total</b>		<b>14,906</b>
<b>Zoning Overlay District</b>	<b>Abbreviation</b>	<b>Acreage</b>
Architectural Design	AD	521
Aquifer Conservation	AC	3,464
Floodplain Development	FD	1,161
Shoreland Protection	SP	803
Suncook Business	SB	5
Wetlands Protection	WP	615
Municipal Separate Storm Sewer System MS-4 District	---	---
<b>Total</b>		<b>6,570</b>
<b>Other Zoning Ordinances</b>		
Open Space Development		
Planned Development		
Earth Excavation		
Manufactured Home Parks or Subdivisions, Campgrounds		
Landscaping and Screening		

*Source: Town of Pembroke Zoning Ordinance and GIS, 2021*

The overlay districts are superimposed upon the zoning districts so additional regulations shall apply. For any conflicting regulation, the more restrictive shall apply. The Zoning Ordinance has sections amended every year at the annual March Town Meeting and is used and applied by the Land Use Department, Building Inspector and Planning Board.

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### 3 GOALS AND OBJECTIVES

The overall purpose of this Plan is to reduce future losses to life and property from potential hazard events by identifying appropriate **Actions** to implement during the five-year span of this Plan.

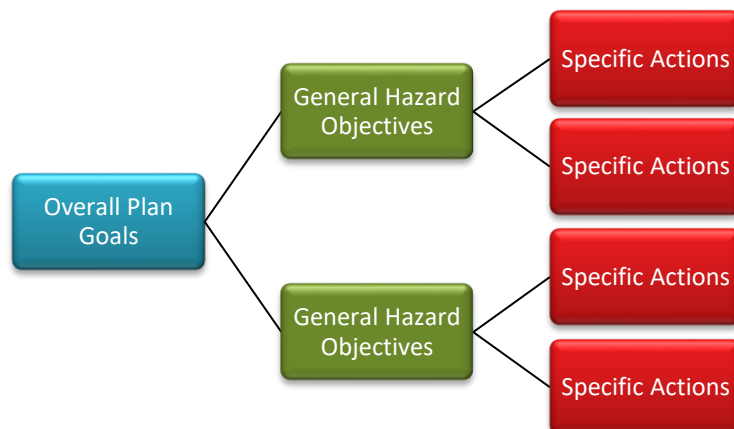
Inspired by early *State of New Hampshire Hazard Mitigation Plans*, the following Pembroke **Goals** were initially developed in the previous **Pembroke Hazard Mitigation Plans** and thus were reviewed and updated as applicable by the Hazard Mitigation Committee during a public meeting for the **2022 Plan**. While the hazard incidents have remained essentially the same as from the **2017 Plan** with a few disaster additions over the course of the last five years, it was important to reassess the continued relevancy of **Goals** and **Objectives** to influence the development of the best and most relevant hazard mitigation **Actions**. Lastly, with the most recent change in hazard types utilized in the *State of New Hampshire Multi- Hazard Mitigation Plan 2018*, it was necessary to revise some of the main hazard groups for the **General Hazard Mitigation Objectives** identification.

#### What Are Goals, Objectives and Actions

Goals, Objectives and Actions are used in the Hazard Mitigation Plan to define different levels of meaning. Their relationship is displayed in **Figure 3**.

The overall **Goals** provide a macro-level view of what emergency managers want to accomplish to keep the Town’s life, property and infrastructure safer from natural disasters. Statements of overall **Goals**, beginning with “To”, describe the desired vision of mitigation and safety for the community. **Goals** enable the development of thoughtful hazard **Objectives** designed to generally fulfill those **Goals**.

**Figure 3**  
Relationship of Goals, Objectives and Actions



## HAZARD CATEGORIES

From the [Hazard Identification and Risk Assessment](#), the individual natural, technological and human hazards under consideration have been grouped into similar event types for simplification, the Main Hazard categories in [Table 8. Objectives](#) begin to narrow down the focus of the overall **Goals** into hazard minimization statements and will use these categories.

Finally, **Actions** are the specific activities or projects which can be undertaken to accomplish an **Objective**. The **Action** is the target to reach to help mitigate hazards in the community. The completed **Action** fulfills the associated **Objectives**. Actions will be listed and reviewed later in **8 MITIGATION ACTION PLAN**.

**Table 8**  
**Main Hazard Categories for Objectives**

Main Hazard Category	Specific Hazards Included		
EARTH	DROUGHT	EARTHQUAKE	LANDSLIDE Soil, Rockslide or Excavation Areas
EXTREME TEMPERATURES	EXTREME TEMPERATURES Excessive Heat, Heat Wave, Cold or Wind Chill		
FIRE	WILDFIRE Brushfire, Outdoor Fires or Accidental		LIGHTNING
FLOOD	INLAND FLOODING Rains, Snow Melt, or Flash Floods	DAM FAILURE Water Overtop, Breach or Beaver	RIVER HAZARDS Ice Jams, Scouring, Erosion, Channel Movement or Debris
HEALTH	PUBLIC HEALTH Infectious Diseases, Air & Water Quality, Biological, Addiction, Arboviral or Tick-borne		
SOLAR	SOLAR STORMS AND SPACE WEATHER Solar Winds, Geomagnetic Storms (Aurora Borealis), Solar Radiation or Radio Blackout		
WIND	HIGH WIND EVENTS Wind, Thunderstorms, Hail, Downbursts, Tornadoes or Debris		TROPICAL AND POST-TROPICAL CYCLONES Hurricanes, Tropical Storms or Tree Debris
WINTER	SEVERE WINTER WEATHER Snow, Ice, Blizzard or Nor'Easter		AVALANCHE <i>appears in 2018 State HMP but is not relevant to Pembroke's geography and development.</i>
TECHNOLOGICAL	AGING INFRASTRUCTURE Bridges, Culverts, Roads, Pipes or Underground Lines		FIRE Vehicle, Structure, Arson or Conflagration
	LONG TERM UTILITY OUTAGE Power, Water, Sewer, Gas, Internet, Communications or Live Wire Danger		HAZARDOUS MATERIALS Haz Mat Spills, Brownfields or Trucking
HUMAN	TRANSPORTATION CRASH Vehicle, Airplane, Helicopter, Rail, Interstate, Pedestrian or Bicycle		MASS CASUALTY INCIDENT As a result of any hazard event

Main Hazard Category	Specific Hazards Included	
	<b>TERRORISM/ VIOLENCE</b> Active Shooter, Hostage, Public Harm, Civil Disturbance/Unrest, Politically Motivated Attacks, Incendiary Devices, Sabotage or Vandalism	<b>CYBER EVENT</b> Municipal Computer Systems Attack, Cloud Data Breach, Identity Theft, Phishing, Ransomware or Virus

Source: Pembroke Hazard Identification and Risk Assessment (HIRA)

Not all of these main natural hazard categories may be important for Pembroke to develop as Plan Objectives, and these would be noted at the end of the 3 GOALS AND OBJECTIVES.

## Overall Hazard Mitigation Plan Goals

The following 3 Goals for the **Hazard Mitigation Plan 2022** were developed by the Hazard Mitigation Committee as the vision for the community with respect to the declared disaster declarations, general hazard events, seasonal weather events and changing climate patterns resulting in unexpected events. Collectively, the **Goals** guided the formulation of **Objectives** for each of the main hazard categories. These **Goals** were revised from the **2017 Plan** to emphasize hazard mitigation instead of preparedness, response and recovery which are covered in the **Emergency Operations Plan**. The **Hazard Mitigation Goals** are displayed in **Figure 4**.

**Figure 4**  
**Hazard Mitigation GOALS**

1. To reduce the risk of injury in the Town from all natural hazards, severe weather and disasters and from the impacts of human and technological hazards.
2. To reduce the risk of potential damages in Town to public and private property, critical facilities, infrastructure, historic resources, and the natural environment from all natural hazards, severe weather, and from the impacts of human and technological hazards.
3. To enhance communication and public outreach with the Town's residents, schools, visitors, and businesses and to promote awareness of hazard mitigation planning and activities.

Source: Pembroke Hazard Mitigation Committee

## General Hazard Mitigation Objectives

Main hazard event categories of **Earth, Extreme Temperatures, Fire, Flood, Public Health, Solar Storms, Wind, Winter, Technological, and Human** are intended to encompass their respective full sub-hazards range described in this Plan. The **General Objectives** are developed by addressing the primary hazard events that could impact Pembroke. They focus on minimizing or mitigating the hazard events to support the overall **Goals** while driving the direction of **Action** development later in the Plan.

Although human and technological hazards are not natural disasters, many technological hazards are secondary to (are caused by) the natural and weather hazards. Nineteen (**19**) **General Hazard Mitigation Objectives** were crafted for the **Pembroke Hazard Mitigation Plan 2022** as displayed in **Figure 5**.

**Figure 5**  
**Hazard Mitigation OBJECTIVES**

### EARTH HAZARDS

1. Minimize the threat of potential landslide or rockslide areas along local roads and excavation areas.
2. Engage in public awareness of local earthquake activity and safety precautions.
3. Minimize the impact of drought events to agricultural areas, private and municipal wells, and other locations through public awareness.

### EXTREME TEMPERATURE HAZARDS

4. Minimize the damages to life, property and infrastructure due to temperature fluctuation resulting from climate change, including excessive heat events, heat waves, extreme cold events, and wind chill.

### FIRE HAZARDS

5. Minimize the damages to life, property, and infrastructure, including the conservation properties from wildfires, brushfires, other outdoor fires, and lightning.

#### **FLOOD HAZARDS**

- 6. Minimize the damages to life, property, and infrastructure from floodwaters, floodplains or erosion from the Suncook River, Soucook River, Merrimack River, brooks, ponds, wetlands, and waterbodies in Pembroke.**
- 7. Minimize the damages to life, property, and infrastructure caused by snow-melt and precipitation resulting in erosion and flooded roads; river scouring and ice jams, culvert washouts, dam failures, or debris (tree limbs, leafy material/ sediment), beaver dam breakage, etc.**

#### **PUBLIC HEALTH HAZARDS**

- 8. Minimize the threat or impact of public health events to the public, including close-quarter communicable diseases (coronavirus, influenza, hepatitis, meningitis), air and water quality decline, biological infestations (milfoil, emerald ash borer), arboviral (mosquito) and tick-borne diseases, addiction, etc.**

#### **SOLAR STORMS**

- 9. Minimize the impact to life, property and infrastructure from solar storms and space weather, including solar winds, geomagnetic storms, solar radiation, and radio blackout.**

#### **WIND HAZARDS**

- 10. Minimize the damages to life, property and infrastructure from heavy wind events, thunderstorms, hail, downbursts, tornadoes hurricanes, and tropical storms, including damages caused by resulting tree debris.**

#### **WINTER HAZARDS**

- 11. Minimize the damages to life, property and infrastructure from winter weather events, including storms, snow, ice and minimize damages from utility failure, blocked transportation routes, and roof collapses.**

### **HUMAN HAZARDS**

- 12. Minimize the risk of impacts and damages to life, property and infrastructure resulting from transportation crashes and fires involving transport trucks, vehicles, pedestrians, bicycles, airplanes, helicopters, drones, etc., along the flightpaths, State roadways (NH 106, NH 28, US 4) and local Pembroke roads, especially during severe weather events.**
- 13. Minimize the risk of damages to life, property and infrastructure from human terrorism and violence threats, such as active threat incidents, hostage situations, civil disturbance/ riots, politically motivated attacks, incendiary devices, sabotage, vandalism or other public harm.**
- 14. Minimize the risk and impact of mass casualty events to better protect Pembroke's citizens and guests.**

### **TECHNOLOGICAL HAZARDS**

- 15. Minimize the risk of cyber events, including overall systems takeover, takeover of the Town website, telecommunications rerouting, cloud data breach, phishing, malware, ransomware, virus installation, on Town computer systems to maintain essential operations, and provide education to minimize cyberattack risk to residents and businesses, including identity theft and telephone scams.**
- 16. Minimize the damages from multiple hazards to the aging infrastructure of the community, including bridges, culverts, dams, local roads, lines, and seek to maintain operational efficiency.**
- 17. Minimize the impact to Pembroke residents from the risks of various utility outages, such as live wire dangers and long-term outages in electrical power, internet and telecommunications services.**
- 18. Minimize the impacts of fire conflagration and explosion, especially near densely populated areas or buildings, from fuel tanks, high tension power lines and vehicles.**
- 19. Minimize the damages to life, property, and infrastructure from hazardous materials exposure, chemical spills, trucking accidents, and radiological materials incidents, including damages, impacts and exposures caused by brownfields sites, leaking underground storage tanks, and occupational sites.**

*Source: Pembroke Hazard Mitigation Committee*

## 4 HAZARD RISK ASSESSMENT

Natural disasters and technological, and human hazards that have occurred in Pembroke or have the potential to occur in the Town were assessed in a [Hazard Identification Risk Assessment \(HIRA\)](#) to determine their **Overall Risk** to the community. The major disasters declarations covering the Central NH Region (Hillsborough County and Merrimack County) were inventoried and additional hazard events occurring in Pembroke and the surrounding area have been described. FEMA Public Assistance funding to the Town is detailed for each disaster declaration. A review of climate variations is described for the region to provide perspective on how the weather may change over time.

The [State of New Hampshire Multi-Hazard Mitigation Plan 2018](#) recommends that municipalities examine multiple natural hazards, including several new hazards. Two hazards, avalanche and coastal flooding, are not discussed in Pembroke's Plan because they have no ascertained relevance to the Town. The former human hazards of Civil Disturbance/ Public Unrest, Sabotage/ Vandalism, and Hostage Situation are absorbed into the **Terrorism/ Violence** hazard category. The opportunity was available to combine several of the former flood-related hazards into the new **Inland Flooding**. Likewise, several former wind-related hazards are compiled within **Wind**. No natural hazards from the **2017 Plan** have been removed, only placed into other groupings for evaluation. Within the **Hazard Mitigation Plan 2022**, the **14** evaluated natural hazards and the **8** evaluated human or technological hazards have been incorporated under these basic categories, also displayed in **3 GOALS AND OBJECTIVES Table 8**:

- |                                      |                                |
|--------------------------------------|--------------------------------|
| ➤ <b>Earth Hazards</b>               | ➤ <b>Solar Storm Hazards</b>   |
| ➤ <b>Extreme Temperature Hazards</b> | ➤ <b>Wind Hazards</b>          |
| ➤ <b>Fire Hazards</b>                | ➤ <b>Winter Hazards</b>        |
| ➤ <b>Flood Hazards</b>               | ➤ <b>Human Hazards</b>         |
| ➤ <b>Public Health Hazards</b>       | ➤ <b>Technological Hazards</b> |

Within these basic hazard categories are numerous related subcategories, all of which are detailed in the [Hazard Identification and Risk Assessment \(HIRA\)](#). This Assessment provides a measure of **Frequency (Probability of Occurrence)**, **Location Area**, **Severity of Impact to the Town**, **Hazard Magnitude**, and **Overall Risk** for each hazard in a numerical format as determined by the Hazard Mitigation Committee. Scale definitions and the process to define hazards are discussed.

Many of these examined hazards discussed may pose little threat to the Town. The Hazard Mitigation Committee wanted to acknowledge their possibility as opposed to simply focusing on a handful of top hazards which will certainly occur in the community. Using this broad vision allows Pembroke to contemplate the impact of a variety of hazards and to develop mitigation actions and design emergency planning programs as appropriate. Only the most predominant hazards, or even multiple hazards, will



have mitigation actions developed to try to reduce the hazards' impact. These are later discussed in [Potential Mitigation Actions](#) and prioritized in the [Mitigation Action Plan](#).

## Hazard Identification and Risk Assessment (HIRA) Ratings

Twenty-two (22) natural, technological, and human hazards are evaluated within this Plan. The 14 natural hazards are ranked within in the [Hazard Identification Risk Assessment](#). Some hazards may be more likely to occur in the community than others based on past events and current conditions, and some hazards may have a greater impact than other hazards. How vulnerable Pembroke could be to natural hazards can be measured in terms of **Overall Risk**.

The location of where each hazard has occurred either in the past or may be prone to future hazard occurrences is noted in the **Hazard Locations in Town** column.

Knowing where events may be likely to occur, the 2021 Hazard Mitigation Committee examined each potential hazard for its **Probability of Occurrence in 10 Years** and its potential **Severity of Impact to the Town** affecting people, services/infrastructure and property based on past personal recollections and community hazard trends to determine the **Overall Risk** to the community.

### HIRA RATINGS EXPLANATION

The Committee identified each hazard's **Probability of Occurrence in 10 Years** score on a 1-2-3-4 scale from **Unlikely/1** (0-25% chance of occurring in 10 years, which is two **Hazard Mitigation Plan** cycles) to **Highly Likely/4** (76-100% chance in 10 years) as shown below.

#### Probability of Occurrence in 10 Years

1	<b>Unlikely</b>	0 - 25% chance
2	<b>Possible</b>	25 - 50% chance
3	<b>Likely</b>	51 - 75% chance
4	<b>Highly Likely</b>	76 - 100% chance

The Committee determined the likely **Severity of Impact to the Town** of an event based on a 1-2-3-4 scale for **3 Impact** characteristics – Human Injuries, the length of time Essential Services/Infrastructure are shut down and resulting Property Damage or Economic Impact. Not all of these characteristics must be expected because each hazard differs. The scale runs from **Limited/1** to **Catastrophic/4** and the more specific definitions are described below.

The **Probability of Occurrence in 10 Years** score was multiplied by the average of each **Severity of Impact to the Town** (Human Injury, Essential Services or Infrastructure and Property Damage or Economic Impact) score to obtain the **Overall Risk** score.

The technological and human hazards were not scored to ensure the natural hazards retained the focus of the **Hazard Mitigation Plan Update 2022**. However, **Dam Failure** was promoted to a natural hazard and was rated because of its close correlation to **Flooding**.

**Severity of Impact to the Town**

1	<b>Limited</b>	Human: Injuries treatable with first aid. Essential Services/Infrastructure: Minor “quality of life disturbance; Shutdown for 3 days or less. Property Damage or Economic Impact: Less than 10%.
2	<b>Significant</b>	Human: Significant injuries or illnesses result in no permanent disability. Essential Services/Infrastructure: Shutdown for up to 2 weeks. Property Damage or Economic Impact: 10% to 25%.
3	<b>Critical</b>	Human: Significant injuries or illnesses result in permanent disability. Essential Services/Infrastructure: Complete shutdown for at least 2 weeks. Property Damage or Economic Impact: 25% to 50%.
4	<b>Catastrophic</b>	Human: Death or multiple deaths. Essential Services/Infrastructure: Complete shutdown for 30 days or more. Property Damage or Economic Impact: Greater than 50%.

**Concern Summary of HIRA Scores**

A summarization of the scores is provided to ascertain at a glance the **Probability of Occurrence**, **Severity of Impact**, and **Overall Risk** using a **HIGH**, **MEDIUM** or **LOW Concern** designation for the numeric results. This summarization is also utilized in the following the **Description and Magnitude of Hazard Events** section.

Numeric Probability and Severity	CONCERN SUMMARY	Numeric Overall Risk Score
1	LOW	1 – 4
2	MEDIUM	5 - 7
3	HIGH	8 - 11
4	HIGH	12 - 16

### OVERALL RISK ASSESSMENT SCORES

The highest possible **Overall Risk** score a natural hazard could be ranked using this **Hazard Identification Risk Assessment (HIRA)** system is **16** while the lowest score a hazard could be ranked is **1**. The **Overall Risk** numeric score is one which can help the community weigh the hazards against one another to determine which hazards are most detrimental to the community and which hazards should have the most Actions developed to try to mitigate those hazards. The **Overall Risk** is calculated simply by adding the two scores of **Probability of Occurrence in 10 Years** and **Severity of Impact to the Town**.

Out of the **14** ranked natural hazards, Pembroke's highest ranking hazards scored an **Overall Risk** between **10.0 – 5.3** (out of a possible Risk score of **16**), displayed with calculated decimals in **Table 9**.

**Table 9**

**Highest Overall Risk Hazards and Hazard Events Since the Last Plan**

Natural Hazard Event	HIRA Overall Risk 1-16	CONCERN	Notable Hazard Events Within the Last 5 Years?*( See Table 12)	Mitigation Actions Developed For MEDIUM & HIGH Hazards? (See Mitigation Action Tables)
Public Health	10.0	HIGH	Yes	Yes
Severe Winter Weather	8.0	HIGH	Yes	Yes
Drought	8.0	HIGH	Yes	Yes
Tropical and Post Tropical Cyclones	7.0	MEDIUM	No	Yes
Wildfire Events	6.7	MEDIUM	Yes	Yes
High Wind Events	6.7	MEDIUM	Yes	Yes
River Hazards	6.0	MEDIUM	Yes	Yes
Inland Flooding	5.3	MEDIUM	Yes	Yes
Dam Failure	3.3	LOW	Yes	
Lightning	3.0	LOW	Yes	
Landslide	2.7	LOW	No	
Extreme Temperatures (Heat- Cold)	2.0	LOW	Yes	
Earthquake	2.0	LOW	No	
Solar Storms and Space Weather	1.0	LOW	No	
<p>*NO = No notable impacts since the last Plan. Stated in Table 10 as "NO Event(s) Within Last 5 Years."</p> <p>YES = Notable impact events added to Table 12. Stated in Table 10 as "Event(s) Within Last 5 Years."</p> <p>ANNUAL = Annual occurrence with variable impacts; any notable impacts added to Table 12. Stated in Table 10 as "Annual Occurrence Within Last 5 Years" whether or not a notable event was added to Table 12.</p>				

*Source: Compilation of Pembroke HMC Data*

### HAZARD IDENTIFICATION AND RISK ASSESSMENT RATINGS

Included with the **Table 10 Hazard Identification Risk Assessment (HIRA)** is whether each hazard event occurred within the last **5** years in Pembroke. This is indicated by either **\*Events(s) Within Last 5 Years\***, **\*ANNUAL Occurrences Within Last 5 Years\*** or **\*NO Event(s) Within Last 5 Years\*** beneath each *Hazard Category*. Dates and descriptions of the new hazard impacts within the last **5** years are provided in a later table, **Table 12 Local and Area Hazard Event and Disaster History (Sequential)**. The existing potential hazard locations, or those locations in Pembroke which could be currently at present day susceptible to each of the hazard categories, are provided within **Table 10** since these locations contribute to the **Severity of Impact** ratings determinations of Committee. The **HIGH, MEDIUM** or **LOW Concern** for each *natural* hazard is provided in the **Overall Risk** column.

**Table 10**

**Hazard Identification and Risk Assessment (HIRA)**

Natural, Technological, Human Hazard Categories	Potential/Susceptible (Existing) Hazard Locations in the Town <i>See also Appendix A. Critical Community and Facility Vulnerability Assessment (CCFVA)</i>	PROBABILITY of Occurrence in 10 Years	SEVERITY of Impact			OVERALL RISK (1-16)
			Human Injury Impact	Essential Services or Infrastructure Impact	Property Damage or Economic Impact	
<b>DAM FAILURE</b> <b>Water Overtop, Breach, Beaver, etc.</b> <b>*Event(s) Within Last 5 Years*</b>	<p>♦ <b>1 High Hazard (H) dam:</b> 190.02 Pembroke Dam (Renewable Energy) on the Suncook River at Main Street. <b>1 Significant Hazard (S) dam:</b> 190.03 Webster Mill Dam (Renewable Energy) on Suncook River. <b>1 Low (L) Hazard dam:</b> 190.01 China Mill Dam (Renewable Energy) on Suncook River.</p> <p>♦ <b>Dams</b> in other Towns could have a serious downstream impact should they fail or release too much water.</p> <p>♦ Other recreation ponds, <b>Non-Menace dams</b> and regular beaver dams could breach and flood roadways. NM dams are found along a tributaries of the Suncook River, at detention ponds and recreation ponds all of which are unlikely to flood but still have potential. (See <b>APPENDIX A</b> for list).</p> <p>♦ <b>Beaver dams</b> carry a high probability of flooding and potential for breakage. Beaver dams are located throughout Pembroke, and depending on size and location, could cause significant damage to roads if the natural dams breach. Regular beaver activity on Church Road, Cross Country Road, Brickett Hill, Thompson Road, North Pembroke Road requires daily checks.</p>	<b>2</b>	1	2	2	<b>3.3</b> <b>LOW</b>
<b>DROUGHT</b> <b>*Event(s) Within Last 5 Years*</b>	<p>♦ <b>Entire Town, Pembroke Reservoir.</b> Areas susceptible to <b>drought</b> and dry conditions include farms and orchards, nurseries, and maple sugar operations: Donaghey Christmas Tree Farm, Found Well Farm (greenhouse accessory (Whytemare-Donovan), Gelinas Farm (horses), Green Gold Farm (Pritchard), Pleasant View Gardens (wholesale greenhouse New England Flower Farms LLC), Townsend's Training Farm (horses) and others.</p>	<b>3</b>	2	3	3	<b>8.0</b> <b>HIGH</b>

**4 HAZARD RISK ASSESSMENT**

Natural, Technological, Human Hazard Categories	Potential/Susceptible (Existing) Hazard Locations in the Town <i>See also Appendix A. Critical Community and Facility Vulnerability Assessment (CCFVA)</i>	PROBABILITY of Occurrence in 10 Years	SEVERITY of Impact			OVERALL RISK (1-16)
			Human Injury Impact	Essential Services or Infrastructure Impact	Property Damage or Economic Impact	
	<ul style="list-style-type: none"> <li>♦ Farm animals, hay fields, produce, vegetable gardens are negatively impacted by drought. When hayfields die off and wells go dry, livestock animals in Town cannot easily be locally fed or watered. Larger farms become economically impacted when their products are unable to grow.</li> <li>♦ Water Supplies: Private water supplies for the outside the Pembroke Water Works District and public water supplies serving 25+ people. Dug wells are known to go dry.</li> <li>♦ Drought means increased risk of brush fire with dry vegetation (see <b>Wildfire</b>). Gravel roads (Class V) can be affected because Town is unable to grade them when water is low. Class VI gravel roads may become fire hazards with overhanging dry growth.</li> <li>♦ Fire ponds/ dry hydrant water supplies can run dangerously low; see <b>APPENDIX A</b> for a list of the dry hydrants and large cisterns. When fire ponds or dry hydrants are low, response time increases as the Department needs to draw from the Rivers, brooks, and ponds (see <b>Inland Flooding</b>).</li> </ul>					
<b>EARTHQUAKE</b> <b>*NO Event(s) Within Last 5 Years*</b>	<ul style="list-style-type: none"> <li>♦ <b>Entire Town.</b> The Central NH Region is seismically active and <b>earthquakes</b> are regularly felt from area epicenters. Locations with high density population or potential gathering sites to evacuate include: Suncook Village and US 3 area including schools and municipal buildings.</li> <li>♦ Damage to utility poles and wires, roadways and infrastructure could be significant. Aboveground poles, underground electric lines, underground water, sewer and natural gas lines could be susceptible.</li> <li>♦ Fuel storage locations such as the Cooperative Way businesses, Merrimack Plant (Granite Shore Electric) on Merrimack River, and other facilities store underground or aboveground fuel tanks which may be vulnerable during a strong earthquake.</li> <li>♦ Areas with the old, historic buildings are particularly susceptible to <b>earthquake</b> including public and private buildings (historic homes), Town Hall, Suncook Village, Clock Tower, old Schoolhouses, Town Grange, Congregational Church, about 10 cemeteries throughout Town.</li> </ul>	<b>2</b>	1	1	1	<b>2.0 LOW</b>
<b>EXTREME TEMPERATURES</b> <b>Excessive Heat, Heat Wave, or</b>	<ul style="list-style-type: none"> <li>♦ <b>Entire Town.</b> Groups most susceptible to <b>extreme heat or cold</b> include those located at: Pembroke Schools, Town Hall, manufactured housing neighborhoods, Suncook Village apartments.</li> </ul>	<b>2</b>	1	1	1	<b>2.0 LOW</b>

**4 HAZARD RISK ASSESSMENT**

Natural, Technological, Human Hazard Categories	Potential/Susceptible (Existing) Hazard Locations in the Town <i>See also Appendix A. Critical Community and Facility Vulnerability Assessment (CCFVA)</i>	PROBABILITY of Occurrence in 10 Years	SEVERITY of Impact			OVERALL RISK (1-16)
			Human Injury Impact	Essential Services or Infrastructure Impact	Property Damage or Economic Impact	
<b>Cold, Wind Chill</b> <b>*Heat Event(s) Within Last 5 Years*</b> <b>*NO Cold Event(s) Within Last 5 Years*</b>	<ul style="list-style-type: none"> <li>Senior residences, assisted living or those dwellings without air conditioning or those receiving fuel assistance are especially vulnerable to high heat or extreme cold events could include Meetinghouse Commons Independent Living Apartments 55+ [~45 units], Pembroke Farms Independent Living 62+ Apartments [~40 units], Pembroke Pines (Fowler) 55+ Rooming House [10 bed limit], Ashley Park Cooperative MHP [13 units], Sheetz (AHR Residential Realty) MHP [4 units], Silva's Park MHP [5 units], Silver Fox Estates MHP [21 units], Sun Briar Knoll MHP [5 units], Tanglewood MHP [22 units]. Residents should be moved to air conditioned (cooling) or warming facilities.</li> <li>Youth groups such as the 3 Pembroke Schools, Strong Foundations charter school, and daycares First Choice for Children [~40 children], Hurney's Nursery and Daycare [~32 children], It Takes a Village Child Care (Donnelly) [~12 children], Krazy Kids Indoor Play &amp; Party Center[~50 children] need to be protected from <b>hot and cold temperatures</b>.</li> <li><b>Extreme cold or heat</b> may be experienced by recreationalists in remote conservation lands, Town Forests, and other outdoor places.</li> <li>Areas vulnerable to effects of <b>extreme heat or cold</b> include agriculture and farms (see list above in <b>Drought</b>)</li> <li>See <b>APPENDIX A</b> for the list of vulnerable facilities or groups.</li> </ul>					
<b>HIGH WIND EVENTS</b> <b>Wind, Thunderstorms, Hail, Downbursts, Tornadoes, Debris</b> <b>*Event(s) Within Last 5 Years*</b>	<ul style="list-style-type: none"> <li><b>Entire Town.</b> Most <b>high wind</b> -vulnerable areas include populated buildings, high-density locations and aboveground utilities serving residents &amp; businesses.</li> <li><b>Utilities</b> at risk of failing during high wind events include telecomm towers; Eversource &amp; Unitil electric lines; transmission lines, Comcast switching stations and cable lines; water and sewer pumping stations.</li> <li><b>High density developed areas</b> can have greater impacts from <b>high winds</b>: Pembroke Schools, Town Hall, Congregational Church, manufactured home neighborhoods, apartments and independent living, childcare facilities.</li> <li><b>Construction, manufacturing, or industrial-like areas</b> like those along Cooperative Way and NH 106 and open land/excavation pits are collectively vulnerable to the effects of <b>high wind</b> events.</li> <li>Downbursts are occurring with greater regularity. The Town's <b>highest elevation points</b></li> </ul>	<b>4</b>	1	2	2	<b>6.7</b> <b>MEDIUM</b>



**4 HAZARD RISK ASSESSMENT**

Natural, Technological, Human Hazard Categories	Potential/Susceptible (Existing) Hazard Locations in the Town <i>See also Appendix A. Critical Community and Facility Vulnerability Assessment (CCFVA)</i>	PROBABILITY of Occurrence in 10 Years	SEVERITY of Impact			OVERALL RISK (1-16)
			Human Injury Impact	Essential Services or Infrastructure Impact	Property Damage or Economic Impact	
	<p>(see <a href="#">Map 1 Potential Hazards</a>) may experience the greatest <b>high wind</b> impacts, including the steep slopes and hillsides. Many town roads, private roads and Class VI roads lead up and through these hills.</p> <p>♦ Most of the Town north of US 3 is <b>wooded and forested</b> and sections would be difficult to access with trees and power lines down on the gravel, hilly residential roads. They could be difficult to access with treefall and power lines down from <b>high wind</b> events. Remote neighborhoods include manufactured housing parks and neighborhoods on roads with only one egress.</p> <p>♦ <b>Outdoor recreation spots</b> such Town Forests, Range Roads, rail trails, conservation lands, and current use lands utilize large amounts of tree cover. During <b>high wind</b> events, people recreating in the Town Forests and trail systems could experience unfavorable conditions during <b>high wind</b> events and may require rescue assistance in difficult to access locations.</p> <p>♦ <b>Agricultural</b> operations are vulnerable to damage from <b>High Winds</b> (see list above in <b>Drought</b>)</p> <p>♦ Older, or historical buildings are vulnerable to high wind damage include public and private buildings (historic homes), Suncook Village, Town Hall, Congregational Church, Clock Tower, (Old Schoolhouse), Old Schoolhouses, historical monuments and cemeteries (headstones) throughout Town could be especially vulnerable to high winds.</p> <p>♦ Floods are also possible with severe windstorm events (see <b>Inland Flooding</b>).</p>					
<b>INLAND FLOODING</b> <b>Rains, Snow Melt or Flash Floods</b> <i>*Event(s) Within Last 5 Years*</i>	<p>♦ <b>Entire Town, Floodplains of the Merrimack River, Soucook River, and Suncook River.</b> <u>Major watercourses</u> include the three Rivers, Piscataquog River Meetinghouse Brook, Hartford Brook, Pettingill Brook, Ames Brook, French's Brook are the most prominent waters flowing in Town.</p> <p><u>Major waterbodies</u> include wildlife and recreation ponds which are among the main standing bodies of water. Pembroke has no named or larger ponds.</p> <p>♦ Flooding could occur from breached <b>High, Significant, and Low Hazard Dams</b> within and connected to Pembroke. Other recreation ponds, Non-Menace dams and regular beaver dams can breach and flood roadways. See <b>Dam Failure</b> hazard above.</p>	<b>2</b>	2	3	3	<b>5.3</b> <b>MEDIUM</b>



**4 HAZARD RISK ASSESSMENT**

Natural, Technological, Human Hazard Categories	Potential/Susceptible (Existing) Hazard Locations in the Town <i>See also Appendix A. Critical Community and Facility Vulnerability Assessment (CCFVA)</i>	PROBABILITY of Occurrence in 10 Years	SEVERITY of Impact			OVERALL RISK (1-16)
			Human Injury Impact	Essential Services or Infrastructure Impact	Property Damage or Economic Impact	
	<ul style="list-style-type: none"> <li>Any of these waters could <b>flood local roads</b>, homes, buildings and waterfront properties of including the NH 106 Sliva HMP.</li> <li>Runoff from roadways or <b>heavy rain</b> or <b>snowmelt</b> can cause floods and washouts over the Entire Town. Regular <b>washout locations</b> occur. (See also <b>Aging Infrastructure</b>)</li> <li>Roads, bridges, drainage systems and related areas can flood, creating <b>flooded infrastructure</b> for many travelers. Although bridge flooding has not yet occurred, the North Pembroke Road bridge (Soucook River), NH 106 bridge (Soucook River) have come close to flooding.</li> </ul>					
<b>LANDSLIDE Soil, Rockslide or Excavation Areas</b> <b>*NO Event(s) Within Last 5 Years*</b>	<ul style="list-style-type: none"> <li><b>Slopes greater than 15%</b>, which is much of the community (see Map 1) including roads with steep ditching or embankments are most vulnerable to <b>landslide</b>. The Town has numerous hills over 1,000' in elevation, many of them with roads or trails.</li> <li>Roads with steep ditching or embankments are most vulnerable to landslide. No roads were identified by the HMC as having landslide vulnerability. (see <b>Inland Flooding</b>). Landslide is an uncommon hazard but one that could have devastating effects, including property damage.</li> <li>There are several known excavation sites in Town, including the active Continental Paving, some of which may have the potential of <b>landslide/ rockslide</b>. Many areas are reclaimed and vegetated.</li> </ul>	<b>2</b>	2	1	1	<b>2.7 LOW</b>
<b>LIGHTNING</b> <b>*Event(s) Within Last 5 Years*</b>	<ul style="list-style-type: none"> <li><b>Entire Town</b>. Areas of particular concern to <b>lightning</b> include critical facilities, high density areas, high elevations.</li> <li>The <b>Town &amp; cultural facilities</b> including Town Hall, Safety Center, and Congregational Church, and Clock Tower are tall buildings. (see also <b>High Wind</b>).</li> <li>Several municipal buildings do not have lightning rods: Town Hall and Safety Center, PWD Garage.</li> <li>Numerous <b>outdoor recreational and gathering</b> places such as School fields, Town Forests, and the various trails on conservation lands could be vulnerable to <b>lightning</b>.</li> <li>Other locations containing <b>large numbers of people</b> include Pembroke Schools, Suncook Village, and high density housing. <b>Lightning</b> and <b>Wildfire</b> and potential conflagration could result in these densely populated areas.</li> <li><b>Businesses</b> with potentially hazardous materials onsite such as fuel, gasoline, used fluids</li> </ul>	<b>3</b>	1	1	1	<b>3.0 LOW</b>

**4 HAZARD RISK ASSESSMENT**

Natural, Technological, Human Hazard Categories	Potential/Susceptible (Existing) Hazard Locations in the Town <i>See also Appendix A. Critical Community and Facility Vulnerability Assessment (CCFVA)</i>	PROBABILITY of Occurrence in 10 Years	SEVERITY of Impact			OVERALL RISK (1-16)
			Human Injury Impact	Essential Services or Infrastructure Impact	Property Damage or Economic Impact	
	(various automotive repair shops, construction and lumber yards, salvage yards), JBI Helicopter and Cooperative Way facilities could each be vulnerable to <b>lightning</b> and <b>fire</b> . ♦ Outdoor utilities and antennas would have high impacts should <b>lightning</b> strike, such as the telecommunications towers, high transmission lines, Eversource & Until electric lines, Comcast lines, and telephone switching stations. ♦ Old, historic or wooden structures and those structures without <b>lightning</b> rods would be more susceptible to damage from a strike than those buildings with the rods. Old wooden buildings at high elevations within forested areas could be especially vulnerable to <b>lightning</b> . ♦ Remote, forested areas, parks, public Town Forests, conservation areas, open recreation fields, points of higher elevation can be dangerous to people and property if struck by <b>lightning</b> , including the many conservation lands and trail systems.					
<b>PUBLIC HEALTH</b> <b>Infectious Diseases, Air &amp; Water Quality, Biological, Addiction, Arboviral, or Tick-borne</b> <b>*Event(s) Within Last 5 Years*</b>	♦ <b>Entire Town.</b> Congregated populations, older and younger residents, medical facilities and social settings can be more vulnerable to <b>infectious diseases</b> : ♦ Schools: Green Valley School (Private), PACE Academy [~66 students + ~11 staff], Pembroke Academy [~733 students + ~120 staff], Pembroke Hill School [~320 students + ~85 staff], Strong Foundations (Charter), Grades 1-8 (new addition forthcoming) [~340 students + ~65 staff], Three Rivers School [~310 students + ~63 staff], ♦ Manufactured housing neighborhoods, Ashley Park Cooperative MHP, [13 units], Sheetz (AHR Residential Realty) MHP [4 units], Silva's Park MHP [5 units], Silver Fox Estates MHP [21 units], Sun Briar Knoll MHP [5 units], Tanglewood MHP [22 units]. ♦ Independent living facilities or apartment buildings: Cornerstone Realty Future Apartments at Former Pembroke Village School [~32 units proposed], Meetinghouse Commons Independent Living Apartments 55+ [~45 units], Pembroke Farms Independent Living 62+ Apartments [~40 units], Pembroke Pines (Fowler) 55+ Rooming House [10 bed limit]. ♦ Multi-family housing developments throughout Town (including Emerson Mills, Littlefield Condos, Chickering Meadows, others. ♦ Childcare facilities: First Choice for Children [~40 children], Hurney's Nursery and Daycare	<b>3</b>	3	3	4	<b>10.0 HIGH</b>

**4 HAZARD RISK ASSESSMENT**

Natural, Technological, Human Hazard Categories	Potential/Susceptible (Existing) Hazard Locations in the Town <i>See also Appendix A. Critical Community and Facility Vulnerability Assessment (CCFVA)</i>	PROBABILITY of Occurrence in 10 Years	SEVERITY of Impact			OVERALL RISK (1-16)
			Human Injury Impact	Essential Services or Infrastructure Impact	Property Damage or Economic Impact	
	<p>[~32 children], It Takes a Village Child Care (Donnelly) [~12 children], Krazy Kids Indoor Play &amp; Party Center [~50 children].</p> <p>♦ Medical facilities: Suncook Family Dentistry Pembroke Wellness Center, Family Physicians of Pembroke, Pembroke Animal Hospital.</p> <p>♦ Local stores and eateries increase the risk of exposure to and transfer of <b>food-borne illness</b>, causing potential public health concerns. There are none in Pembroke.</p> <p>♦ The Town's local Point of Dispensing (POD) is located at the NH Technical College in Concord. Pembroke is a member of the Capital Area Public Health Network.</p> <p>♦ The many forests, conservation areas, agriculture, wooded areas, and ponds can support <b>ticks (Tick-borne)</b> hosting bacterial diseases (Lyme, Anaplasmosis, Leptospirosis, more) and <b>mosquitos (Arboviral)</b> can host many bacteria (West Nile, EEE, Equine Infectious Anemia, etc) which transmit diseases. The conservation lands and trail systems attract people, which can also enable disease transmission. Lyme disease rates are increasing according to NH Health WISDOM, with no indication of decline.</p> <p>♦ Waters and beaches susceptible to <b>high bacteria</b> counts in the summer include banks of the Merrimack River, Soucook River, and Suncook River, and any locations used as public or private beaches including White Sands. Ponds especially are prone to high cyanobacteria (blue-green algae) counts that are harmful to people, or host e. coli counts from people or wildlife.</p> <p>♦ Some of the largest sources of local <b>air pollution</b> are vehicular traffic of I-93 and Granite Shore Merrimack Station (coal-fired) across the Merrimack River in Bow. Air pollution regularly reaches the Central NH region from Canada or the US Midwest.</p>					
<b>RIVER HAZARDS</b> <b>Ice Jams, Scouring, Erosion, Channel Movement or Debris</b> <b>*Event(s) Within Last 5 Years*</b>	<p>♦ <b>Entire Town, Floodplains of the Merrimack River, Soucook River, and Suncook River.</b></p> <p><u>Major watercourses</u> include the three Rivers, Piscataquog River Meetinghouse Brook, Hartford Brook, Pettingill Brook, Ames Brook, French's Brook are the most prominent waters flowing in Town.</p> <p><u>Major waterbodies</u> include wildlife and recreation ponds which are among the main standing bodies of water. Pembroke has no named or larger ponds.</p>	<b>3</b>	1	2	3	<b>6.0</b> <b>MEDIUM</b>

**4 HAZARD RISK ASSESSMENT**

Natural, Technological, Human Hazard Categories	Potential/Susceptible (Existing) Hazard Locations in the Town <i>See also Appendix A. Critical Community and Facility Vulnerability Assessment (CCFVA)</i>	PROBABILITY of Occurrence in 10 Years	SEVERITY of Impact			OVERALL RISK (1-16)
			Human Injury Impact	Essential Services or Infrastructure Impact	Property Damage or Economic Impact	
	<ul style="list-style-type: none"> <li>♦ <b>Erosion</b> of banks could occur along locations of the Suncook River (see <a href="#">Map 5 Fluvial Geomorphic Location 2015</a> series), or the Merrimack or Soucook Rivers.</li> <li>♦ <b>Ice jams</b> could endanger the dams, bridges and nearby infrastructure and have the potential to recur, endangering travelers. An ice jam at the double decker bridge at Upper Turnpike Street over the Suncook would be most serious. The River has had ice jams in the past.</li> <li>♦ Floating <b>debris</b> down the rivers and brooks can accumulate at bridges and dams.</li> </ul>					
<b>SEVERE WINTER WEATHER</b> <b>Snow, Ice, Blizzard or Nor'Easter</b> <b>*Event(s) Within Last 5 Years*</b>	<ul style="list-style-type: none"> <li>♦ <b>Entire Town.</b> Particular areas of concern during <b>winter weather</b> include high density areas as listed in <b>High Wind Events</b>.</li> <li>♦ Utilities at risk of winter weather include telecomm towers; Eversource &amp; Unitil electric lines; transmission lines, Comcast switching stations and cable lines; water and sewer pumping stations. Telecomm tower antenna arrays as well as Town Department antennas could receive significant impacts from <b>snow, ice, and blizzards</b>.</li> <li>♦ The schools close during inclement weather and have automatic messaging alerts sent to parents about status updates.</li> <li>♦ The entire Pembroke road network is susceptible to winter conditions, including the state roads (US 3, NH 106, NH 28). Local Town roads are also often difficult to travel. Many accidents occur on North Pembroke Road and intersections during <b>storms</b>. Many local roads and the hilly gravel roads have sharp incline/ decline or cars have trouble traveling the road during winter conditions.</li> <li>♦ Neighborhoods at higher elevation include the hilly roads which can be difficult to keep clear of <b>snow and tree fall</b>.</li> <li>♦ Much of the Town is wooded and forested with most sections vulnerable to <b>snow, ice effects and power failure</b>. Homes are difficult to access with trees and power lines down on the hilly residential roads. They could be difficult to access with treefall and power lines down from <b>winter storm</b> events. Remote housing could become isolated by treefall, especially those with only one egress. The manufactured housing parks have homes less capable of withstanding snowload.</li> <li>♦ These roads and especially the one-egress roads are often blocked by fallen <b>trees or powerlines</b>, and residents cannot access their homes or leave their homes until the road is clear.</li> </ul>	<b>4</b>	2	2	2	<b>8.0 HIGH</b>

**4 HAZARD RISK ASSESSMENT**

Natural, Technological, Human Hazard Categories	Potential/Susceptible (Existing) Hazard Locations in the Town <i>See also Appendix A. Critical Community and Facility Vulnerability Assessment (CCFVA)</i>	PROBABILITY of Occurrence in 10 Years	SEVERITY of Impact			OVERALL RISK (1-16)
			Human Injury Impact	Essential Services or Infrastructure Impact	Property Damage or Economic Impact	
	<p>♦ Local government operations in the Pembroke Town Hall, Safety Center, Public Works, Transfer Station, and Pembroke Water Works (and the shared Allenstown Wastewater Treatment Facility) conduct essential business and make decisions during <b>winter weather conditions</b> that keep residents safe. These vital personnel may not live in Town or may have commuting difficulties getting to work to perform these duties.</p>					
<p><b>SOLAR STORMS AND SPACE WEATHER</b> Solar Winds, Geomagnetic Storms (Aurora Borealis), Solar Radiation or Radio Blackout <b>*NO Event(s) Within Last 5 Years**</b></p>	<p>♦ <b>Entire Town.</b> Should a <b>solar event</b> impact the Region, it is likely most electrical and radio systems will become unavailable. The Town's critical facilities must be operational to support residents Pembroke Town Hall, Safety Center, Public Works, Transfer Station, and Pembroke Water Works (and the shared Allenstown Wastewater Treatment Facility), Schools, telecomm towers, high tension power lines, underground water, sewer, and gas lines, pumping and switching stations. The <b>aurora borealis</b> is regularly seen on Mount Kearsarge to the northwest in Warner and could likely be spotted from Pat's Peak (Henniker), indicating <b>geomagnetic storms</b> are present without noticeable effects.</p> <p>♦ The Town's technology is most vulnerable to <b>space weather</b>, especially communications systems (internet, cable, cellular, landline) and the electrical grid. Private wells and private septic serve most residents but municipal water and sewer lines serve thousands of residents and businesses. Gas lines may be operational. Electricity (powerlines &amp; substations) may be interrupted, which could cause automated backup systems to operate.</p> <p>♦ Alternate support or communications systems available in the event of <b>blackout</b> or equipment failure include: Town Department back-up generators and resident generators can temporarily provide power alternatives, and the Capital Area Fire Mutual Aid Dispatch could provide regional communications, and local ham radio operators could provide assistance.</p>	<b>1</b>	1	1	1	<b>1.0 LOW</b>
<p><b>TROPICAL AND POST-TROPICAL CYCLONES</b> Hurricanes, Tropical Storms or Tree Debris</p>	<p>♦ <b>Entire Town.</b> Most <b>Tropical Events</b> would impact vulnerable areas including populated buildings, high-density locations, and utilities serving residents and business, antennas, and telecommunications towers (See listed under <b>Earthquake &amp; High Wind</b>).</p> <p>♦ Much of the Town north of US 3 is wooded and forested and sections would be difficult to access</p>	<b>3</b>	2	2	3	<b>7.0 MEDIUM</b>

**4 HAZARD RISK ASSESSMENT**

Natural, Technological, Human Hazard Categories	Potential/Susceptible (Existing) Hazard Locations in the Town <i>See also Appendix A. Critical Community and Facility Vulnerability Assessment (CCFVA)</i>	PROBABILITY of Occurrence in 10 Years	SEVERITY of Impact			OVERALL RISK (1-16)
			Human Injury Impact	Essential Services or Infrastructure Impact	Property Damage or Economic Impact	
<b>*NO Event(s) Within Last 5 Years*</b>	with trees and power lines down on the residential roads. They could be difficult to access with treefall and power lines down from Tropical events. Many of the remote neighborhoods could be difficult to access when tropical cyclone events occur. (See remote areas listed under <b>High Wind</b> ). ♦ Agricultural areas are vulnerable to damage from <b>Tropical Events</b> : (See listed under <b>Drought</b> ). ♦ Older, or historical buildings are vulnerable to <b>Tropical</b> wind damage.					
<b>WILDFIRE</b> <b>Brushfire, Outdoor Fires or Accidental</b> <b>*Event(s) Within Last 5 Years*</b>	♦ <b>Entire Town.</b> Locations most susceptible to <b>Wildfire</b> include vulnerable populations and buildings as identified in <b>Lightning</b> . Backyard burning without a permit is often the cause of <b>brushfires</b> throughout Town. The Oak Hill Fire tower in Concord at the Loudon town line is seasonally staffed. ♦ Remote, forested areas, parks, public Town Forests, conservation areas, open recreation fields, points of higher elevation than surrounding area can be dangerous to people and property during <b>Wildfire</b> . ♦ The public conservation lands and trail systems, Class VI Range Roads, could experience difficult to access <b>wildfires</b> on these lands, with people in proximity or possible danger. ♦ Much of the Town is privately owned wooded and forested lands which could be difficult to access in case of <b>wildfire</b> . There are dozens of backlot or undeveloped parcels in Town which are 50 acres or greater located on unmaintained Town roads, indicating potentially difficult access by fire apparatus. Many of the high elevation roads could be difficult to evacuate should <b>wildfire</b> encroach. ♦ Several extremely large, undeveloped parcels are located around town (See <b>APPENDIX A</b> ) ♦ Slash and brush are found on the ground on throughout Pembroke. As people venture into the woods, potential wildfires are waiting to happen.	<b>4</b>	2	1	2	<b>6.7</b> <b>MEDIUM</b>
<b>SECONDARY TECHNOLOGICAL AND HUMAN HAZARDS</b>						
<b>AGING INFRASTRUCTURE</b> <b>Bridges, Culverts, Roads, Pipes or Underground Lines</b>	♦ <b>Entire Town.</b> Most dams, culverts, and bridges could experience impacts of <b>aging infrastructure</b> . Many bridges have been threatened (but not damaged) by high water debris or ice floes, such as North Pembroke Road bridge and US 3 double decker bridge. ♦ Pembroke shares many of its bridges with neighboring communities over its three rivers. State bridges: Pem/All Bridge 107/098 over Suncook River is redlisted and scheduled for rehab	<b>not scored</b>	not scored	not scored	not scored	not scored



**4 HAZARD RISK ASSESSMENT**

Natural, Technological, Human Hazard Categories	Potential/Susceptible (Existing) Hazard Locations in the Town <i>See also Appendix A. Critical Community and Facility Vulnerability Assessment (CCFVA)</i>	PROBABILITY of Occurrence in 10 Years	SEVERITY of Impact			OVERALL RISK (1-16)
			Human Injury Impact	Essential Services or Infrastructure Impact	Property Damage or Economic Impact	
<b>*Event(s) Within Last 5 Years*</b>	<p>in 2021, Pem/Con Bridge over Soucook River is scheduled for rehab in 2021. The Town owns no redlisted bridges.</p> <p>♦ Many old or undersized culverts remain vulnerable, although the Highway Department replaces many annually. The main <b>washout</b> locations yet to be repaired include Nadine Road, Ross Road, Micol Road, Pembroke Hill Road, Cross Country Road, Buck Street (Evergreen Cemetery), Borough Road, Littlefield Condominiums, Batchelder Road, Fourth Range Road, and others.</p> <p>♦ The Town's roads are becoming more difficult to maintain and rehabilitate because of lack of funding and over 82 <b>miles of Town Class V roads and sidewalks</b>. Town roads with the highest maintenance priority include North Pembroke Rd. Weight limits need to be posted and enforced during the spring.</p> <p>♦ <b>Underground electric utilities, water, sewer, gas or telephone lines</b> are often old and subject to breakage during earthquake or <b>aging materials</b>. See also <b>Earthquake</b> for known roads over lines.</p> <p>♦ <b>Utility stations</b> like Pembroke Water Works or Allenstown Wastewater Treatment Facility, or any water &amp; sewer pumping stations require maintenance and upgrade.</p>					
<b>FIRE Vehicle, Structure, Arson or Conflagration</b> <b>*Event(s) Within Last 5 Years*</b>	<p>♦ <b>Several locations around Town</b> are potential sites for explosions and serious fires and numerous other sites that have the potential for prolonged burning. They include above ground fuel tanks, high tension power lines, areas away from cisterns or hydrants; vacant buildings, foreclosed homes or seasonal buildings; or buildings in densely populated areas like Suncook Village; or agricultural operations because of fertilizers and pesticides. See <b>Drought</b> for an agricultural operation list.</p> <p>♦ <b>High Density neighborhoods</b> such as Suncook Village, Manufactured housing neighborhoods (Ashley Park Cooperative MHP, Sheetz MHP, Silva's Park MHP, Silver Fox Estates MHP, Sun Briar Knoll MHP, Tanglewood MHP), Independent living facilities or apartment buildings (Cornerstone Realty Future Apartments at Former Pembroke Village School, Meetinghouse Commons Independent Living Apartments 55+, Pembroke Farms Independent Living 62+ Apartments, Pembroke Pines 55+ Rooming House), Multi-family housing developments throughout Town (including Emerson Mills, Littlefield Condos, Chickering Meadows, others) and other higher</p>	not scored	not scored	not scored	not scored	not scored



**4 HAZARD RISK ASSESSMENT**

Natural, Technological, Human Hazard Categories	Potential/Susceptible (Existing) Hazard Locations in the Town <i>See also Appendix A. Critical Community and Facility Vulnerability Assessment (CCFVA)</i>	PROBABILITY of Occurrence in 10 Years	SEVERITY of Impact			OVERALL RISK (1-16)
			Human Injury Impact	Essential Services or Infrastructure Impact	Property Damage or Economic Impact	
	<p>density areas could be subject to conflagration (see also <b>Lightning</b>).</p> <p>♦ Pembroke is home to several commercial and industrial activities, mills, excavation, auto repair businesses and other flammable activities (JBI Helicopter, Associated Grocers, AirGas, NG Advantage Gas, oil companies). School laboratories and other facilities could catch fire through occupational event, accident, or arson. Other businesses could be vulnerable to fire and may utilize hazardous materials in their work. The JBI Helicopter facility &amp; flight paths and businesses on Cooperative Way contain perhaps the greatest risk for fire, crash, or explosion. See <b>APPENDIX A</b> for hazardous materials and business lists.</p> <p>♦ Vehicle fires could occur anywhere, in parking lots, driveways, or roadways. US 3 from Concord to Allenstown is the most highly traveled route, followed by NH 106 along commercial and industry facilities. North Pembroke Road is used as a detour by commuters. The Pembroke Fire Department and Tri-Town Ambulance respond to crashes. See also <b>APPENDIX A</b>.</p> <p>♦ Perhaps the greatest rural concern for human-started fires are the forested trails, Range Roads and conservation lands which would be difficult for fire response. See <b>Lightning</b> and <b>High Wind</b> for other remote area lists.</p>					
<b>HAZARDOUS MATERIALS</b> <b>Haz Mat Spills, Brownfields or Trucking</b> <b>*Event(s) Within Last 5 Years*</b>	<p>♦ <b>Most likely</b> routes of vehicular traffic transport of <b>hazardous materials</b> include US 3 from Concord to Allenstown, NH 106 from Concord to Loudon, and NH 28 from Allenstown to Epsom. Other local roads like North Pembroke Road and Cooperative Way could have serious transportation accidents involving hazardous materials.</p> <p>♦ Vulnerable areas for targeted <b>mass evacuation/shelter in place</b> from <b>hazardous materials spills</b> include Suncook Village, US 3 area residences and facilities, and the Schools.</p> <p>♦ The largest or most dangerous stationary sites that store and/or handle haz mat on site (fertilizer, pesticides, fuel, etc) are listed in <b>APPENDIX A</b> but include JBI Helicopter (aviation fuel), Associated Grocers (roof tanks, aboveground anhydrous ammonia), NG Advantage Gas (5 trailer tanks) and Superior Energy (oil) and Lavallee Oil spills or explosions. See also list of agriculture operations in <b>Drought</b>. <b>Occupational stationary haz mat</b> sites where spills could occur include schools, manufacturing, industry, of which there are many in Town. Key sites would include</p>	not scored	not scored	not scored	not scored	not scored

**4 HAZARD RISK ASSESSMENT**

Natural, Technological, Human Hazard Categories	Potential/Susceptible (Existing) Hazard Locations in the Town <i>See also Appendix A. Critical Community and Facility Vulnerability Assessment (CCFVA)</i>	PROBABILITY of Occurrence in 10 Years	SEVERITY of Impact			OVERALL RISK (1-16)
			Human Injury Impact	Essential Services or Infrastructure Impact	Property Damage or Economic Impact	
	excavation sites like Continental Paving, automotive businesses, construction businesses, and the Public Works Garage and Transfer Station. ♦ Possible <b>brownfields</b> sites to be aware of include any old mill sites along the Suncook River, former Suncook River rail lines, and parcels with suspected soil contamination. There could also be properties with “illegal” long term, non-permitted junkyard use or salvage yard use occurring before the Town is notified.					
<b>LONG TERM UTILITY OUTAGE Power, Water, Sewer, Gas, Internet, Communications or Live Wire Danger *Event(s) Within Last 5 Years*</b>	<p>♦ <b>Entire Town.</b> Electrical outages are often town wide, but high density areas or vulnerable populations are of greatest concern: the high density neighborhoods and Schools (see <b>Public Health</b> for a list).</p> <p>♦ Power outages (Eversource, Unitil) may last for several days in the most remote areas before service is restored from a large event. Systems failures could affect Town businesses and local government on an isolated scale. The internet Xfinity/Comcast enables alternative communication options, and many rely on VOIP for telephones instead of landlines.</p> <p>♦ Communications failure would be worse if it occurred during a holiday or inhibited emergency dispatch and EOC operations. Some Town radios are interoperable, and they are used in more than one location. The Global Partners telecommunications tower on Plausawa Hill contains CAFMAC, County, State, and federal repeaters. Local antennas are located on Town Department buildings. Other towers on Buck Street, Center Road provide cellular services.</p> <p>♦ The Town is serviced by the Capital Area Mutual Aid Fire Compact which handles all emergency medical service and Fire dispatching. They have redundant capabilities and are regularly upgrading their systems.</p> <p>♦ Many businesses in town provide propane, natural gas, and oil services locally and statewide.</p> <p>♦ Other utility systems, such as LP gas, natural gas, generators, oil tanks, wood fuel and more, are used by residents as both back up and primary heating. See also <b>Aging Infrastructure</b> and <b>APPENDIX A.</b></p> <p>♦ Much of the Town is wooded and forested and sections would be difficult to access with excessive power lines down. See also <b>High Wind</b> or <b>Winter Weather</b>).</p>	<b>not scored</b>	not scored	not scored	not scored	not scored

**4 HAZARD RISK ASSESSMENT**

Natural, Technological, Human Hazard Categories	Potential/Susceptible (Existing) Hazard Locations in the Town <i>See also Appendix A. Critical Community and Facility Vulnerability Assessment (CCFVA)</i>	PROBABILITY of Occurrence in 10 Years	SEVERITY of Impact			OVERALL RISK (1-16)
			Human Injury Impact	Essential Services or Infrastructure Impact	Property Damage or Economic Impact	
	<p>♦ The agricultural farms (feeding or dairy animals) should be monitored (See <b>Drought</b>) during extended utility outage.</p>					
<p><b>TRANSPORTATION CRASH</b> Vehicle, Airplane, Helicopter, Rail, Interstate, Pedestrian or Bicycle <i>*ANNUAL Occurrences Within Last 5 Years*</i></p>	<p>♦ <b>US 3 from Concord to Allenstown, NH 106 from Concord to Loudon, and NH 28 from Allenstown to Epsom</b> are the main highways through Town and have the most reported <b>crashes</b>. Rerouting traffic can be dangerous resulting in other potentially severe <b>crashes</b>. Some of the more frequent crash locations occur along hilly intersections.</p> <p>♦ <b>Crashes</b> also occur throughout the community at rural intersections, along hills and s-curves. All gravel roads have a low speed limit. Winter and summer months are of particular concern. See also <b>MAPS 1-4</b>.</p> <p>♦ <b>Crashes</b> increase during hazard events, winter weather, spring snow melt (washouts) and windstorms. Few areas in Town are suitable for safe bicycle and pedestrians use other than Suncook Village, Academy Road near Pembroke Academy, and sidewalks to the other schools. The Class VI Range Roads and the local trail system could have the potential for serious crashes or conflict of use crashes.</p> <p>♦ The Town has alternative <b>crash</b> potential, such as air traffic. The JBI helicopter facility is an active heliport and keeps several helicopters onsite. The Manchester-Boston Regional Airport is nearby and supports large-engine plane traffic which have the potential of crashing in nearby communities. Nearby Concord Municipal Airport and Concord's NH National Guard have regular small plane and helicopter traffic. Pembroke is in the flightpath of all of these facilities.(See also <b>Map 1</b>)</p> <p>♦ Increased use of personal drones creates additional hazard for those on the ground.</p>	not scored	not scored	not scored	not scored	not scored
<p><b>MASS CASUALTY INCIDENT</b> As a result of any hazard event <i>*NO Event(s) Within Last 5 Years*</i></p>	<p>♦ <b>Unlikely, but Possible.</b> A <b>mass casualty</b> event could occur as a possible secondary effect of a large scale event, such as <b>Terrorism/Violence, Public Health, Transportation Crash, or High Wind Event</b>. These could occur throughout the Town.</p> <p>♦ Any <b>mass casualty</b> event could be localized to a certain area. Locations and occasions of potential public unrest include: NH Army National Guard Edward Cross Training Complex, Town Hall, Pembroke Academy, PACE School, Strong Foundations, Town &amp; School Meetings, voting day, local board meetings, visits from political candidates, large events such as Old Home Day,</p>	not scored	not scored	not scored	not scored	not scored

**4 HAZARD RISK ASSESSMENT**

Natural, Technological, Human Hazard Categories	Potential/Susceptible (Existing) Hazard Locations in the Town <i>See also Appendix A. Critical Community and Facility Vulnerability Assessment (CCFVA)</i>	PROBABILITY of Occurrence in 10 Years	SEVERITY of Impact			OVERALL RISK (1-16)
			Human Injury Impact	Essential Services or Infrastructure Impact	Property Damage or Economic Impact	
	<p>Veteran's Parade, School sports events, political rallies.</p> <p>♦ Pembroke is a member of the Capital Area Public Health Network (CAPHN) and other regional emergency groups. The Town's local primary shelter with CAPHN is located at the Allenstown Middle School in Allenstown, which may change with Allenstown's anticipated school consolidation. Secondary informal cooling/warming shelters at the Pembroke Town Hall or Library could accommodate up to 50 people total. Tri-Town Ambulance could provide EMS and transport to Concord Hospital in 15 minutes.</p>					
<b>TERRORISM/ VIOLENCE</b> <b>Active Shooter, Hostage, Public Harm, Civil Disturbance/ Unrest, Politically Motivated Attacks, Incendiary Devices, Sabotage or Vandalism</b> <i>*Events(s) Within Last 5 Years*</i>	<p>♦ <b>Possible. Terrorism/ violence</b> could possibly occur anywhere in <b>Entire Town</b> and could result in <b>mass casualty</b>. Most susceptible non-municipal sites could include Suncook Village, NH Army National Guard Edward Cross Training Complex, Pembroke Academy, Hill School, PACE School, Strong Foundations, Town &amp; School Meetings, or the Churches: First Presbyterian Church of Concord, Grace Capital Church, Hillside Baptist Church, Next Level Church, Pembroke Congregational Church, Suncook Methodist Church.</p> <p>♦ All municipal facilities in Pembroke, Town Hall with Library and Safety Center, Public Works Garage, Transfer Station, Pembroke Water Works have a risk of <b>terrorism or violence</b>.</p> <p>♦ Private manufacturing or industrial businesses with large quantities of hazardous materials could be possible <b>terrorism</b> targets, especially the JBI Helicopter or the Cooperative Way facilities.</p> <p>♦ <b>Sabotage</b> would be most likely to occur at Town, School, State or governmental facilities to halt operations or computer systems, including the telecomm towers &amp; antennas, switching stations, the Town Hall computer systems, and Pembroke Water Works or Allenstown Wastewater Treatment Facilities or pumping stations.</p> <p>♦ <b>Vandalism</b> could occur at dams, under bridges, wooden covered bridges, telecommunications or tower, cemeteries, vacant buildings, beaver dams, recreation areas, White Sands beach, etc.</p> <p>♦ <b>Hostage and active shooter</b> situations might most likely occur domestically anywhere in the Town, in municipal buildings, Churches, Schools, high density housing (see <b>Public Health</b>).</p>	<b>not scored</b>	not scored	not scored	not scored	not scored

**4 HAZARD RISK ASSESSMENT**

Natural, Technological, Human Hazard Categories	Potential/Susceptible (Existing) Hazard Locations in the Town <i>See also Appendix A. Critical Community and Facility Vulnerability Assessment (CCFVA)</i>	PROBABILITY of Occurrence in 10 Years	SEVERITY of Impact			OVERALL RISK (1-16)
			Human Injury Impact	Essential Services or Infrastructure Impact	Property Damage or Economic Impact	
	<ul style="list-style-type: none"> <li>♦ Sites of local significance (historic markers, Suncook Village) or other public places could become potential sites of <b>Terrorism/ Violence</b>.</li> </ul>					
<b>CYBER EVENT</b> <b>Municipal Computer Systems Attack, Website Overtake, Cloud Data Breach, Telephone Rerouting, Identity Theft, Phishing, Ransomware, Virus or Phone Scams</b> <i>*ANNUAL Occurrences Within Last 5 Years*</i>	<ul style="list-style-type: none"> <li>♦ <b>Entire Town.</b> Cyberattack could target Town or School websites, computer systems, cloud data systems, archival records, email phishing, etc. Town Hall, Police Department, Fire Department, Transfer Station, Public Works Department, Library and Historical Society records would be high-value targets.</li> <li>♦ Email scams and identity theft are likely regular problems for residents and businesses. Towns often post known attempts on websites to inform residents. The large businesses in Pembroke (See <b>APPENDIX A</b>) would need to be aware of the risks.</li> <li>♦ The Police Department receives phone calls from residents about internet and email scams and reports them to the appropriate authorities.</li> </ul>	not scored	not scored	not scored	not scored	not scored

*Source: Pembroke Hazard Mitigation Committee*

## Central NH Region Major Disaster Declarations, 1973-2021

The Central NH region, which encompasses parts of Merrimack County (**18** communities) and Hillsborough County (**2** communities), has been damaged by **30** presidentially-declared major disasters [DR-] and presidentially-declared emergencies [EM-] in the last **48** years between **1973-2021**.

*Although a natural disaster typically befalls multiple counties in New Hampshire, only those presidentially-declared or emergency declarations within either Hillsborough County or Merrimack County were identified in this Plan.*

*Disaster declarations* [DR-] within a county enable the ability to receive Public Assistance (PA) funding and Individual Assistance (IA) funding, Hazard Mitigation Grant Program (HMGP) *plan* funding is typically made available to all communities statewide, and for those towns with an active, approved Hazard Mitigation Plan, HMGP *project* funding becomes available. *Emergency declarations* [EM-] are often proclaimed for counties in New Hampshire to help communities receive funding for less serious hazard events that may have caused more damage in nearby declared declaration [DR-] counties or states. EM- declarations typically open Hazard Mitigation Grant Program (HMGP) plan and project funding for communities with an active hazard mitigation plan.

Over the last **16** years (**2005-2021**), the Central NH region containing communities within Merrimack and Hillsborough Counties experienced **17** presidentially- declared natural major disasters [DR-] or presidentially- declared emergency declarations [EM-] which differ between DR- or EM- depending on which county was declared. The earliest Central NH region declarations spanned **1973** to **2004** (**32** years) and yielded total **13** disasters of both [DR-] and [EM-].

### PUBLIC ASSISTANCE GRANT FUNDING

For the global COVID-19 pandemic DR-4516 from **2020**-ongoing, the Town obtained **\$216,931** in CARES and First Responder Stipend funding. The last weather disaster declared in Merrimack County in which Pembroke is located was the wind and rainstorm event in **October 2017** for which Pembroke applied for and received **\$22,503** in federal Public Assistance funding. Details of Central NH region declared disasters and emergency declarations since **1973** and federal funding provided to the Town of Pembroke are displayed in **Table 11**. Most of these disasters will be described within the following **Past Disasters and Severe Weather Events** section.



**GOVERNOR'S OFFICE FOR EMERGENCY RELIEF AND RECOVERY (GOFERR)**

The NH Governor's Office for Emergency Relief and Recovery (GOFERR) at <https://www.goferr.nh.gov/> provides transparent review and access to the state's CARES Act - Coronavirus Relief Fund allocations for the DR-4516 COVID-19 Pandemic. The US HR 748 Coronavirus Aid, Recovery, and Economic Security (CARES) Act enacted 3/27/20 provided **\$1.25b** to the state and is one of several relief bills and funding pots for COVID-19. The GOFERR is making these funds available through various programs. Municipalities, businesses, and individuals can apply to several funding programs through GOFERR.

**Table 11**

**Central NH Region Major Disaster Declarations, 1973 to 2021**

FEMA DR-	Local Disaster Name	Incident Period	FEMA Disaster Name	Includes County*		FEMA Public Assistance (PA) Funding To Pembroke**
				Merr	Hill	
	<b>TOWN ADD NEW DISASTER ROWS HERE-</b>					
<b>4516</b>	<b>2021 COVID-19 Pandemic</b>	Apr 3, 2020 – TBD	COVID-19 Novel Coronavirus Pandemic (national, global)	M	H	No PA <b>CARES \$167,944.</b> <b>CARES Election \$15,244.</b> <b>First Responder Stipend \$33,743</b>
<b>4355</b>	<b>2017 Oct Wind and Rainstorm</b>	Oct 28-20, 2017	Severe Storm and Flooding from Tropical Storm Phillippe	M	---	<b>\$22,503</b>
<b>4209</b>	<b>2015 January Blizzard</b>	Jan 26-28, 2015	Severe Winter Storm and Snowstorm	---	H	\$0
<b>4105</b>	<b>2013 February Snowstorm</b>	Feb 8-10, 2013	Severe Winter Storm and Snowstorm	M	H	<b>\$14,663</b>
<b>4095 EM-3360</b>	<b>2012 Hurricane Sandy Emergency</b>	Oct 26-Nov 8, 2012	Hurricane Sandy	EM-M	EM-H	<b>\$0</b>
<b>4049 EM-3344</b>	<b>2011 Halloween Snowstorm Emergency</b>	Oct 29-30, 2011	Severe Storm and Snowstorm	EM-M	H	<b>\$0</b>
<b>4026 EM-3333</b>	<b>2011 Tropical Storm Irene</b>	Aug 26-Sep 6, 2011	Tropical Storm Irene	M	EM-H	<b>\$8,317</b>
<b>1913</b>	<b>2010 March Flooding &amp; Winds</b>	Mar 14-31, 2010	Severe Storms and Flooding	M	H	\$0
<b>1892</b>	<b>2010 Winter Storm</b>	Feb 23-Mar 3, 2010	High Winds, Rain, Snow	M	H	<b>\$79,064</b>
<b>1812</b>	<b>2008 December Ice Storm</b>	Dec 11-23, 2008	Severe Winter Storm	M	H	<b>\$32,096</b>
<b>1799</b>	<b>2008 September Flood</b>	Sep 6-7, 2008	Heavy Rains and Floods	M	H	<b>\$7,698</b>
<b>1782</b>	<b>2008 July Tornado</b>	Jul 24, 2008	Tornado, Severe Winds, Heavy Rains	M	---	\$0



# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

FEMA DR-	Local Disaster Name	Incident Period	FEMA Disaster Name	Includes County*		FEMA Public Assistance (PA) Funding To Pembroke**
				Merr	Hill	
1695	2007 April Spring Flood	Apr 15-23, 2007	Severe Storms and Flooding	M	H	\$51,324
1643	2006 Mother's Day Flood	May 12-23, 2006	Severe Storms and Flooding	M	H	\$68,283
1610	2005 Columbus Day Flood	Oct 7-18, 2005	Severe Storms and Flooding	M	H	\$0
EM-3211	2005 Snow Emergency	March 11-12, 2005	Snowstorm	---	EM-H	\$0
EM-3207	2005 Snow Emergency	Jan 22-23, 2005	Snowstorm	EM-M	EM-H	\$6,317
EM-3193	2003 Snow Emergency	Dec 6-7, 2003	Snowstorm	EM-M	EM-H	\$0
EM-3177	2003 Snow Emergency	Feb 17-18, 2003	Snowstorm	EM-M	EM-H	\$0
EM-3166	2001 Snow Emergency	Mar 5-7, 2001	Snowstorm	EM-M	EM-H	\$0
1231	1998 Flooding	Jun 12-Jul 2, 1998	Severe Storms and Flooding	M	H	\$0
1199	1998 December Ice Storm	Jan 7-25, 1998	Ice Storms	M	H	\$0
1144	1996 Storms and Flooding	Oct 20-23, 1996	Severe Storms and Flooding	M	H	\$0
1077	1995 Flood	Oct 20-Nov 15, 1995	Storms and Floods	M	---	\$0
EM-3101	1993 Blizzard	Mar 13-17, 1993	Blizzards, High Winds and Record Snowfall	EM-M	EM-H	\$0
917	1991 Hurricane Bob	Aug 18-20, 1991	Severe Storm	---	H	N/A
876	1990 Flooding and Severe Storm	Aug 7-11, 1990	Flooding and Severe Storm	M	H	No data
789	1987 Storms and Flooding	Mar 30-Apr 11, 1987	Severe Storms and Flooding	M	H	No data
771	1986 Storms and Flooding	Jul 29-Aug 10, 1986	Severe Storms and Flooding	---	H	N/A
399	1973 Storms and Flooding	Jul 11, 1973	Severe Storms and Flooding	M	H	No data
<b>Total Public Assistance (PA) FEMA Funding to Pembroke, 1993-2021**</b>						<b>\$507,196</b>
Includes 2020 GOEFFR & First Responder Stipend \$						

Source: [http://www.fema.gov/disasters/grid/state/33?field\\_disaster\\_type\\_term\\_tid\\_1=All](http://www.fema.gov/disasters/grid/state/33?field_disaster_type_term_tid_1=All)

\*M = Merrimack County (18 towns in CNH region) H = Hillsborough County (2 towns in CNH region)

\*\* Dollar figures are rounded to the nearest \$100 and include only PA and HMGP. PA dataset available at <https://www.fema.gov/openfema-dataset-public-assistance-funded-projects-details-v1>.

To help reclaim some of the costs these disasters wrought on town property and infrastructure and for additional staff time, Pembroke applied for and received FEMA Public Assistance (PA) funds, Categories A-G, a 75% grant and 25% match program for several declared Merrimack County disasters. These PA funds have been used for overtime wages for Town employees, equipment rentals, snow removal, washout repair, road reconstruction, bridge repair, debris removal, and more.

The database where the Public Assistance funding information resides is available from **1993** to present (**2021**). Pembroke in Merrimack County was eligible for reimbursement for up to a total of **24** disasters and emergency declarations. Disaster funding was sought for and received by Pembroke for **8** of the **14** [DR-] and for **2** of the **8** [EM-] during this period. All funding awarded to Pembroke appearing in the Public Assistance database between **1993-2017** totals **\$290k**. This detail is displayed previously in **Table 11** and is summarized to \$100/\$1000 in the forthcoming **Table 12** for each disaster.

The most expensive disaster for Pembroke in terms of FEMA Public Assistance (PA) funds received for recovery was the **March 2010 Winter Storm** after which Pembroke received **\$79k** for **9** applications for project funding to help repair local Town roads and several bridges. Additional monies for the 2020-2021 COVID-19 funding was provided by the Town and totals **\$217k** to date.

## Past Disasters and Severe Weather Events

The Town of Pembroke has been affected by several significant natural disasters within the last decade and applied for and received Public Assistance (PA) funding for many of these events. Severe natural hazard events have been occurring more frequently in Merrimack County than in the past. While these events on occasion disrupted the flow of the community and isolated residents for days, the disaster impacts were relatively mild as few injuries were reported. FEMA provided Public Assistance funding to the Town for tasks such as cleanup, road repairs, tree and brush cutting, and culvert replacement.

The Hazard Mitigation Committee helped provide anecdotal descriptions of how the recently declared natural disasters or emergency declarations for the Central NH Region affected Pembroke and its residents. Public Assistance disaster funding opportunities open to communities when a disaster is declared within a county. The Town of Pembroke applied for and received this funding for several recently declared disasters.

Although New Hampshire experienced more disasters than those shown in **Table 12**, typically only those which occurred as declared disasters [DR-] or emergency declarations [EM-] in the Central NH region (Merrimack and Hillsborough Counties) were described. Sometimes a disaster occurring in a nearby county, such as Rockingham County in proximity to Pembroke, will be included. Refer to the [\*State of New Hampshire Multi-Hazard Mitigation Plan 2018\*](#) for a complete list of disasters which impacted the rest of New Hampshire.

Also identified were numerous past hazard events or severe weather events that occurred locally in the community and within the area that were impactful enough to note in **Table 12 Local and Area Hazard Event and Disaster History (Sequential)**. These past hazard events are listed consecutively with the newest events at the top of the table. If a specific category of event was not recorded in Pembroke in the last **5** years, this means the Hazard Mitigation Committee did not recall an event of significance since the **2017 Plan**.

**COLOR KEY for Table 12:**

<b>Declared Disasters (DR-) or Emergency Declaration (EM-) in Hillsborough County or Merrimack County in Central NH Region</b> M= Merrimack County H= Hillsborough County	<b>PA Funding \$ Received by Pembroke</b>	<b>Other Pembroke Local Hazard Event</b>	<b>Regional Hazard Event with Pembroke Impacts</b>
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**Table 12**

**Local and Area Hazard Event and Disaster History (Sequential)**

<b>Event</b>	<b>Declared Disaster DR-</b>	<b>Year</b>	<b>Date</b>	<b>FEMA Public Assistance</b>	<b>Area Effects Surrounding Pembroke</b>	<b>Local Effects Occurring in Pembroke</b>	<b>Hazard Category</b>	<b>Source</b>
<b>TOWN TO ADD NEW EVENT ROWS HERE</b>								Pembroke Hazard Mitigation Committee
<b>TOWN TO ADD NEW EVENT ROWS HERE</b>								Pembroke Hazard Mitigation Committee
<b>Pembroke Suncook River Dam Partial Removal Spring 2021</b>	N/A	2021	Spring	N/A	The Suncook River forms the boundary between Pembroke and Allenstown. The partial dam removal also benefits Allenstown.	The State removed a section of the Main Street Dam over Suncook River that had been clogged with debris. River now free flows with no obstruction during normal flow conditions. Debris should travel freely through the removed section.	Dam, River, Flood, Debris	Pembroke Hazard Mitigation Committee, CNHRPC
<b>Regional &amp; Pembroke Windstorms Mar 2021</b>	N/A	2021	Mar 2 & Mar 29	N/A	The storms impacted the entire CNHRPC region and much of the state in a similar manner.	Mar 2, 2021 - Windstorm closed 3 of 4 major roads in Town for 14 hours (NH 106, US 3, North Pembroke Rd) with downed tree limbs and power lines, restricting commuter traffic flow. NH 28 remained open. Additional local roads were closed from storm. Buck Street powerline impacted at Three Rivers School regularly and lost power from the same storm. [School District is Eversource only.] March 29, 2021 - smaller windstorm blew tree downs locally and onto Bridge Street.	Wind, Debris, Power Failure	Pembroke Hazard Mitigation Committee, CNHRPC

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
<b>Pembroke Haz Mat Oil Spill</b> <b>Jan 2021</b>	N/A	2021	Jan 1	N/A	Pembroke is a member of the Capital Area Fire Mutual Aid, who has expert Haz Mat staff and volunteers from around the region.	On a diesel delivery truck, a crack high in the tank caused a spill of less than 20 gallons. The spill was contained at the intersection of Klein and Cooperative Way.	Haz Mat, Fire, Explosion, Tech, Evacuation	Pembroke Hazard Mitigation Committee, CNHRPC
<b>Pembroke Severe Snow and Windstorm Events</b> <b>Dec 2020</b>	N/A	2020	Dec 5-17	N/A	Regional storms likely impacted other Central NH communities in a similar manner.	Dec 5, 2020 - Snow/rain/wind event with fallen limbs and trees Town-wide. Washout of shoulder of Beacon Hill Rd (heavy rain made the ice/snow culvert overflow). Most downed trees cause downed powerlines. Roads constantly experience trees down and power lines down. Highway & Police have to wait for Eversource or Unitil to respond before the debris can be removed. A second storm in December, 12/17/2020 was a Noreaster with 24" of snow in Pembroke.	Winter, Snow, Sleet Wind, Debris, Power Failure, Extreme Temps	Pembroke Hazard Mitigation Committee, CNHRPC
<b>Pembroke Lightning Strike</b> <b>Aug 2020</b>	N/A	2020	Aug 4	N/A	Thunderstorms and lightning were likely occurring throughout the Central NH region.	Aug 2020 - At Town Hall, power and internet were down after lightning strike. Shorted out the Comcast internet modem, but no computer equipment was damaged. Trees and wires down. Transformer blown from the storm. Congregational Church is hit often (has an old-style rod).	Lightning, Power Failure, Communications Failure, Wind, Debris	Pembroke Hazard Mitigation Committee, CNHRPC
<b>COVID-19 Pandemic</b> <b>Apr 2020-TBD</b>	4516 M-H	2021	Apr 3 - TBD	No PA CARES - \$167,944. CARES Election - \$15,244. First Responder Stipend - \$33,743.	The NH Governor issued social activities restrictions, minimal public meetings, remote meetings held, social distance practices in April 2020 for all counties. Cases closely tracked by NH Division of Health and Human Services and NH HSEM. The State EOC was activated.	Beginning in March 2020, the Town follows the Governor's orders. To date nearly 700 people have tested positive for COVID-19 in Pembroke. The Town Hall was closed to the public for several months through Oct 2020. A long period occurred with no meetings, then remote only meetings were held. From Oct 2020, most meetings held in	Public Health, Pandemic, Infectious	Pembroke Hazard Mitigation Committee, CNHRPC, NH HSEM, NH DHHS

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
						person but are socially distanced. Hand sanitizing /masking station is available, signs are posted, front door is often locked. Pembroke has been reimbursed to date for \$217k in expenses through the CARES Act.		
<b>Pembroke Haz Mat LP Explosion Mar 2020</b>	N/A	2020	Mar	N/A	Pembroke is a member of the Capital Area Fire Mutual Aid, who has expert Haz Mat staff and volunteers from around the region.	A passenger vehicle fire with an explosion occurred. The car was carrying a compressed gas cylinder that leaked. The vehicle was a total loss, no injuries reported.	Haz Mat, Fire, Explosion, Tech, Evacuation	Pembroke Hazard Mitigation Committee, CNHRPC
<b>Regional Civil Disobedience Event Sep 2019</b>	No	2019	Sep	N/A	Civil disturbance event with 67 arrested at Bow's Merrimack Station - Granite Shore Power, protesting the use of coal fuel. No injuries to protesters or police. Allenstown's and other local Police Depts participated through the Central NH Special Operations Unit. Reportedly the largest "green" civil disturbance in the State's history since the 1970s.	Pembroke Police Dept participated in the arrest through the Central NH Special Operations Unit.	Human, Civil Disobedience	Allenstown Hazard Mitigation Committee, CNHRPC
<b>Severe Storm and Flooding Jul 2019</b>	4457 --	2019	Jul 11-12	N/A for Pembroke	Declared disaster in Grafton County. Within the Central NH Region, it is likely communities experienced local flooding conditions, with wind blowing trees down, causing short power outages. <u>Not a declared disaster in Merrimack or Hillsborough Counties.</u>	<b>Pembroke could not apply for or receive PA funding.</b> The Town had likely experienced hard rains, localized flooding and culverts required cleaning to ensure road washouts did not occur. A few trees may have fallen on roads, but the storm was not particularly notable to Pembroke.	River, Wind, Storms, Debris, Flood, Utility, Aging Infrastructure	Pembroke Hazard Mitigation Committee, CNHRPC, NH HSEM
<b>Capital Area Mutual Aid Fire Compact (CAMAFC) Communications Outage Apr 2019</b>	No	2019	Apr 6	N/A	The dispatch center in Concord lost power because a tree fell on Unitol wires. The facility is protected by a large uninterruptible power supply (UPS) that protects computers, telephone & radio equipment. This UPS also is a power	About 23 communities belong to the CAMARC and were similarly impacted by the radio dispatch outage, including Pembroke. Redundancy systems are in place.	Utility Failure, Communications Failure	Pembroke Hazard Mitigation Committee, CNHRPC, CAMAFC

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
					<p>conditioner so it is always on, working in the power line entering the building insuring that incoming power is clean and on specification. The City of Concord also has a diesel backup generator for power loss, the UPS is running in the incoming line so it powers CAMAFC equipment during the very brief period it takes the generator to start and the transfer switch to transfer. This all worked seamlessly, as it has many time before. CAMAFC ran on the generator without issue but when Unitil reenergized their lines and the generator transfer was switched, the UPS failed. Despite having a backup for the backup, power to equipment was lost, resulting in damage to additional equipment beyond the UPS.</p> <p>On-duty staff immediately started to implement the continuity of operation plan. Lakes Region began dispatching for CAMAFC but the Simulcast equipment at the dispatch center was down. Initially Lakes was dispatching on their antenna sites and the audio was poor and tones were not getting through. CAMAFC was able to get the radio system running again and Lakes Region was then able to dispatch calls over the Simulcast system. CAMAFC then sent 2 dispatchers to Lakes and called others back into the Concord center to work through the problems caused by the outage.</p>			

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
Canterbury Epicenter Earthquake 2.3M (Mercalli III) Mar 2019	No	2019	Mar 16	N/A	Many local news outlets reported on this quake, which shook communities of Merrimack County at 9:23 PM. This was a widely felt earthquake (Concord, Webster, Hopkinton, Canterbury, Boscawen, Loudon, and more) although there were no reports of damage. USGS reported the epicenter was at Bryant Brook in Canterbury, just east of the Merrimack River. The depth was 4.2 km.	Pembroke does not tend to feel or hear nearby earthquakes, although its topography is similar and the distance from epicenter was about 10 miles to the northwest.	Earthquake, Earth	Pembroke Hazard Mitigation Committee, CNHRPC, wmur.com, unionleader.com, earthquake.usgs.gov, Hopkinton Dam USACE
Pembroke High Wind Events 2019	N/A	2019	Jan-Dec	N/A	Regional storms likely impacted other Central NH communities in a similar manner.	Feb 25- High winds, trees down Buck Street, North Pembroke Rd, Preeve Lane. Oct 17 - Wind/Rainstorm, trees down on North Pembroke Rd, Borough Rd, Bow Lane Rd, Cross Country Rd, Nadine Rd.	Wind, Debris, Power Failure	Pembroke Hazard Mitigation Committee, CNHRPC
Regional Thunderstorm, Severe Winds, Tornado and Debris May 2018	No	2018	May 3-5	N/A	All across the northern Central NH region, the evening of May 4 experienced heavy downpours along with strong wind gusts, straight line winds (microbursts) and possible tornadic activity. Many communities suffered significant tree and structure damage. The National Weather Service determined an F-1 tornado blew 36 miles, about 300 yards across, through Bradford, Warner and Webster in the CNHRPC Region after originating in Charlestown (Sullivan County). About 41,000 customers lost power as a result of the storm.	The tornado did not travel through Pembroke but did travel within the Central NH region. The winds accompanying this storm likely knocked down trees and power lines, blocked roads, and caused short-term power outages in Town. Downed limbs are common during windstorms and thunderstorms.	Wind, Tornado, Debris, Utility, Power Outage	Pembroke Hazard Mitigation Committee, CNHRPC, wmur.com, Concord Monitor
Severe Winter Storm and Snowstorm Mar 2018	4371 --	2018	Mar 13-14	N/A for Pembroke	Within the Central NH Region, it is likely communities experienced regular snowstorm conditions, with heavy snow and wind blowing trees and	<b>Pembroke could not apply for or receive PA funding.</b> On March 13, a large Noreaster dumped 23" of snow on Pembroke. Public Works crews	Winter, Extreme Temps, Wind, Storms, Debris, Utility,	Pembroke Hazard Mitigation Committee, CNHRPC, NH HSEM



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## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
					power lines down, causing short power outages. <u>Not a declared disaster in Merrimack or Hillsborough Counties</u>	worked overtime to clear roads of snow, debris and powerlines.	Aging Infrastructure	
<b>Concord/Hopkinton Epicenter Earthquake 2.4M (Mercalli IV) Mar 2018</b>	No	2018	Mar 7	N/A	A significant 2.4M earthquake was recorded by the USGS in March 2018 a little after 5:00am. Its epicenter indicated in Concord south of Warner Road at the Hopkinton town line on the Contoocook River at a depth of 3.2km. 90 citizen reports were filed to USGS. Weak to light shaking and a boom was heard as reported by a great number of people in Penacook, Pembroke, Dunbarton, Boscawen, Hopkinton, Webster, Salisbury, while its greatest intensity was felt in Warner and Concord. From Mar 2018, the Concord area had experienced 9 earthquakes in the past 365 days.	Pembroke residents reportedly hear few rumbles and do not usually experience the shaking of homes or sounds like a truck idling. No damages have been reported.	Earthquake, Earth	Pembroke Hazard Mitigation Committee, Earthquake rack.com, CNHRPC, concordmonitor.com, earthquake.usgs.gov, Hopkinton Dam USACE
<b>Severe Storm and Flooding Mar 2018</b>	4370--	2018	Mar 2 - 8	N/A for Pembroke	Within the Central NH Region, it is likely communities experienced local flooding conditions, with wind blowing trees down, causing short power outages. <u>Not a declared disaster in Merrimack or Hillsborough Counties</u>	<b>Pembroke could not apply for or receive PA funding.</b> The Town likely experienced early spring rains that flooded culverts and caused a few washouts.	River, Wind, Storms, Debris, Flood, Utility, Aging Infrastructure, Dam	Pembroke Hazard Mitigation Committee, CNHRPC, NH HSEM
<b>Pembroke Localized Flooding Jan-Nov 2018</b>	N/A	2018	Jan-Nov	N/A	The January 2018 extreme temperature fluctuations with storm snowfall and rapid snowmelt (floods) was experienced by the Central NH region and around the State.	Jan 12, 2018 - Washout of shoulder of Beacon Hill Rd (rain heavy, snowmelt). Nov 10 - Culvert on Brickett Hill Rd at pond on each side of road was blocked by beavers. Water overtopped the road, but road did not washout. Added secondary culvert for drainage. Beavers seem to recur in the same areas even	Rains, Dam, Inland Flood, Extreme Temps, Snow Melt, Debris	Pembroke Hazard Mitigation Committee, CNHRPC

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
						though they are trapped and removed.		
<b>Pembroke High Wind Events 2018</b>	N/A	2018	Jan-Dec	N/A	Regional storms likely impacted other Central NH communities in a similar manner.	<p>April 16, 2018 - Rain/windstorm. Trees down at North Pembroke Rd, Borough Rd.</p> <p>Oct 27 - Trees down on Borough Rd and Dudley Hill Rd.</p> <p>Dec 18- Windstorm trees down on North Pembroke Rd (closed).</p>	Wind, Debris, Power Failure	Pembroke Hazard Mitigation Committee, CNHRPC
<b>Regional Flooding, Ice Storms, Snow Melts and Ice Jams Jan 2018</b>	No	2018	Jan 13-23	N/A	During the month of January 2018 with several snowfall and melt periods, the region experienced high snow totals, flooding, and temperature fluctuations. Ice jams were common along the Contoocook and Warner Rivers.	Jan 2018 had a lot of snow and snow melt, up to 14" at one measurement. Melt water overtopped culverts on Fourth Range Road and Beacon Hill Road.	River, Flood, Extreme Temp, Winter, Debris, Ice Jam	Pembroke Hazard Mitigation Committee, CNHRPC, nhprc.org
<b>Regional CAMAFC Radio Communications Disruptions by Solar Storms 2018-2021</b>	No	2018-	2021	N/A	<p>The Town is a member of the Capital Area Fire Mutual Aid Compact (CAFMAC) of about 23 member communities in 4 counties. Mutual aid is provided and received as needed.</p> <p>Area towns reported 2018-2021 geomagnetic storms affected radio transmissions. Reception has been better since CAFMAC transferred to the SimulCast system and has undergone upgrades.</p> <p>In June 2018, a minor G1 geomagnetic storm contributed to ending the Northeast drought.</p> <p>In late August (26-27) 2018, the aurora borealis was visible across the planet, including in NH at high elevations. This event was classified as a strong G3 geomagnetic storm.</p> <p>In May (16-17) 2021, a G2 moderate geomagnetic storm with aurora borealis</p>	<p>Although Pembroke could have been impacted by solar / geomagnetic storms, it has not yet been affected.</p> <p>Plausawa Hill, Buck Street, and Center Road are the telecomm towers, with Plausawa hosting antennas and repeaters for CAMAFC, state, county and local radios.</p> <p>The Town is a member of CAMAFC.</p>	Solar Storms, Communications Interruption, Utility	Pembroke Hazard Mitigation Committee, CNHRPC, visibleearth.nasa.gov

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
					was forecast for New Hampshire. From Aug 31- Sep 1 2021, a G2 storm was observed again impacting NH with a positive polarity coronal hole high speed stream influence with solar wind speeds of >800km/s.			
<b>Severe Windstorm and Flood Oct 2017</b>	4355 M	2017	Oct 28-30	\$22,503	Merrimack and Hillsborough Counties experienced downed trees on powerlines, debris to clean up, and some flooding of drainage catch basins and culverts. The storm impacted northern NH, with 6 counties declared disasters. Power was out for an estimated 270,000 customers.	<b>Pembroke applied for and received \$22,503 in FEMA Public Assistance funding</b> for debris removal. Pembroke experienced fallen trees and limbs Town-wide, took several days to clean up debris. Borough Rd, Pine St, Buck St, Church Rd, Upper Beacon Hill Rd, N Pembroke Rd, Dudley Hill Rd, Batchelder Rd, Thompson Rd, Pheasant Run, and several more. Cleaning up for 2 weeks, then snow. Had to wait until spring snow melt. PD - everyone worked double shifts 12 on/12 off. Rerouting traffic, marked and barricaded/Wellness checks.	Wind, Storms, Debris, Tropical, Utility, Aging Infrastructure	Pembroke Hazard Mitigation Committee, CNHRPC
<b>Severe Storms and Flooding Jul 2017</b>	4329 --	2017	Jul 1-2	N/A for Pembroke	The entire State, North Country and Central NH region experienced severe storms with rain, wind, lightning, thunder and flooding. <b>Not</b> a declared disaster in Merrimack or Hillsborough counties.	<b>Pembroke could not apply for or receive federal PA funds.</b> The Town likely conducted debris clean up along roads but noted the storm was not out of the ordinary.	River, Wind, Storms, Flood, Lightning, Debris	Pembroke Hazard Mitigation Committee, FEMA CNHRPC, WMUR, NOAA
<b>NH Geomagnetic Storm May 2017</b>	No	2017	May	N/A	The aurora borealis (geomagnetic storm) likely reached all of NH although only those with equipment to capture the image likely knew it was occurring. In Warner, the Northern Lights were photographed overlooking Mount Kearsarge. No known effects from the storm.	Pembroke was likely subject to any potential geomagnetism or solar radiation. Radio communications (Capital Area Mutual Aid Fire Compact and local) interference could have occurred.	Solar Storms, Geomagnetic, Potential Communications failure	Warner Hazard Mitigation Committee, CNHRPC
<b>April Fool's Snowstorm Apr 2017</b>	No	2017	Apr 1-2	N/A	A spring snowstorm impacted New England, with 50,000 without	Pembroke may have received heavy snowfall, ice jams, power failures	Winter, Extreme Temp	Pembroke Hazard Mitigation

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Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
					power in NH alone and 180,000 in the NE. Massachusetts was buried in nearly 2 feet of snow. The Central NH Region experienced more snowfall than the rest of the state, with Henniker at 15", Pembroke and Concord at 13", and Pembroke at 12".	and road washouts because of trees down on roadways, and rapid melting the following day with warmer temperatures. Yet the storm was not especially notable to the Town.	Changes, Snow, Utility, Debris, Storms, Rain, Flood, Inundation	Committee, Hopkinton Dam USACE, wmur.com, CNHRPC, USA Today
<b>Severe Snowstorm-Town Meeting Blizzard Mar 2017</b>	<b>4316 --</b>	<b>2017</b>	<b>Mar 14-15</b>	<b>N/A for Pembroke</b>	Many other NH towns had to choose whether to close or not to accommodate the blizzard, which became a legal issue to sort out. <b>Not</b> a declared disaster in <u>Merrimack or Hillsborough</u> counties.	<b>Pembroke could not apply for or receive federal PA funds.</b> A state-wide blizzard occurred during Town Meeting, (Election Day Storm). March 14, 2017 - Noreaster/wind event. 17" of snow, fallen trees on Forest Range Rd, North Pembroke Rd, Borough Rd.	Winter, Extreme Temp, Snow, Crash, Debris	Pembroke Hazard Mitigation Committee, CNHRPC
<b>Pembroke Beaver Dam Flooding Feb-May 2017</b>	N/A	2017	Feb-May	N/A	N/A	Feb 25- Town or State culvert on Thompson Rd at intersection with NH 28 at small brook flowing into Suncook blocked by beavers. Flooded backyards. May 5- Culvert on Cross Country Rd (brook) blocked by beavers. Flooded backyards.	Dam, Inland Flood, Debris	Pembroke Hazard Mitigation Committee, CNHRPC
<b>Webster Epicenter Earthquake 1.9M (Mercalli III) Feb 2017</b>	No	2017	Feb 27	N/A	Residents of Contoocook, Webster and Warner in Central NH communities also felt this earthquake. Since it occurred overnight, there were fewer reports. The USGS reported its epicenter north of the Blackwater River in the hilly area between Battle Street and Clothespin Bridge Road at a depth of 8.9km.	The USACE registered this earthquake on their Hopkinton Dam monitoring equipment. No damages reported in Pembroke.	Earthquake, Earth	Webster Hazard Mitigation Committee, Earthquaketrack.com, CNHRPC, earthquake.usgs.gov, Hopkinton Dam USACE
<b>Pembroke &amp; Regional Drought Conditions 2017- 2021</b>	N/A	2017-	2021	N/A	Variable drought conditions were experienced by Merrimack County and the Central NH Region.	2021 - No official fire pond with dry hydrants in Pembroke. Some ponds on private property are available to draft from. The Town Hydrant system or Suncook, Soucook or	Drought, Extreme Temps	Pembroke Hazard Mitigation Committee, CNHRPC

**4 HAZARD RISK ASSESSMENT**

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
						<p>Merrimack Rivers are where Dept draws from. On Suncook, some areas are no longer accessible because of drought season. Rely mostly on Mutual Aid System to fill tankers, using wet hydrants to fill in Pembroke.</p> <p>Summer 2020- At least 4 wells on 4th Range Road reported as going dry or having pumping issues due to drought and weather conditions. One resident had to hydro frack his well. One resident had to bring in tanks of water to serve her home and livestock after two wells went dry. (Testimony from Planning Board public hearing, summer 2020). Smaller brooks crossing the culverts were dry.</p> <p>May 2020- Voluntary water restrictions in place for Pembroke Water Works customers. Moderate Drought.</p> <p>Summer 2018- Drought</p> <p>2017- Voluntary water restrictions for Pembroke Water Works customers due to drought conditions.</p>		
<b>Pembroke Extreme Heat ANNUAL 2017-2021</b>	N/A	2017-	2021	N/A	The Central NH Regions communities experience similar temperatures. The Concord Airport weather reporting station has been reliably used for temps for nearly 100 years.	Police Dept performs about 5-6 wellness checks per month for households because of family member/ school/ town concerns regarding extreme heat or extended cold temps. Tri-Town Ambulance does similar wellness checks periodically, not due to weather necessarily.	Extreme Temps, Excessive Heat, Cold, Public Health	Pembroke Hazard Mitigation Committee, CNHRPC
<b>Pembroke Brushfires ANNUAL 2017-2021</b>	N/A	2017-	2021	N/A	These local brushfires could have crossed Town boundaries. Assisted by Capital Area Fire Mutual Aid.	Some of the more notable brushfires (smaller than a wildfire) included: May 2016 Brush Fire - 10' x 50' Roadside Fire.	Wildfire, Fire, Human	Pembroke Hazard Mitigation Committee, CNHRPC

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
						<p>Oct 2017 Brush Fire - Brush Pile.</p> <p>Jul 2018 Brush Fire - large pile - 30' diameter 10' high.</p> <p>Apr 2019 Brush Fire - Permit Fire - Brush Pile.</p> <p>2020: 6/26 Brush Fire - 1/4 acre. 5/25 Brush Fire. 5/20 Brush Fire - 100'x200'. 4/26 Brush Fire.</p> <p>2021: 3/21 Brush fire. 4/4 Brush Fire - 30'x30'. 4/8 Brush Fire - non permit brush pile. 4/10 Brush Fire - non permit controlled burn. 4/24 Brush Fire - 0.65 acre illegal campfire spread. 4/24 Brush Fire - 100'x50'.</p>		
<b>Hazard Events 2017-2022 (Since Last Plan)</b>								
<b>Pembroke Haz Mat Natural Gas Leaks 2016-2021</b>	N/A	2016-	2021	N/A	Pembroke is a member of the Capital Area Fire Mutual Aid, who has expert Haz Mat staff and volunteers from around the region.	Between 2016-2021, the Pembroke Fire Dept logged 45 calls for response to NG Natural Gas on Cooperative Way due to faulty equipment gas leak. Adequate repairs seem to have been made in 2021.	Haz Mat, Fire, Explosion, Tech, Evacuation	Pembroke Hazard Mitigation Committee, CNHRPC
<b>Central NH Region and Pembroke Excessive Heat 2016-2017</b>	No	2016	-2017	N/A	NH and the Central NH region experienced high heat records throughout 2016 and 2017.	In Pembroke, higher elevation dug wells likely went dry, but the Fire Department was not specifically requested to make water provision. The Library was available for cooling some days.	Extreme Temp, Excessive Heat, Public Health, Drought	Pembroke Hazard Mitigation Committee, CNHRPC
<b>Salisbury Epicenter Triple Earthquakes 1.8M/1.6M/1.3M Oct 2016</b>	No	2016	Oct 31	N/A	Epicenters of three quakes in Salisbury occurred a few minutes apart, one 1.8M with a depth of 6.1 km, one with 1.6M with a 5.0km depth, and one with 1.3M with 5.0km depth. Three separate epicenters were located, the 2 first quakes south of West Salisbury Road and the last 1 north of the Blackwater River at Bay Road.	Pembroke likely felt some rattling from these small earthquakes, with its epicenters only about 20 miles from Town. No damage or injuries reported in Town.	Earth, Earthquake	Pembroke Hazard Mitigation Committee, Earthquaket rack.com, CNHRPC, earthquake.usgs.gov



# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
NH Severe Wind Rain & Thunderstorm Jul 2016	No	2016	Jul 23	N/A	The entire region and the State experienced a severe storms with rain, wind, lightning and thunder. A possible microburst was reported. As many as 72,000 customers lost electricity. A similar storm earlier in the week brought several confirmed microbursts and also downed trees.	Pembroke likely experienced many of these conditions on their gravel roads. Washouts would have resulted along with downed trees and power lines.	Flood, Debris Impacted Infrastructure, Wind, Lightning, Rains, Utility, Power Outage, Washout	Pembroke Hazard Mitigation Committee Concord Patch, CNHRPC, WMUR, NOAA
Warner Epicenter Earthquake 2.8M (Mercalli IV) Mar 2016	No	2016	Mar 21	N/A	Epicenter in Warner on Schoodac Brook just south of I-89, with 2.8 magnitude at a depth of 7.3km. 124 citizen reports made to USGS. Felt in the Central NH Region and most of Merrimack County, light in Hillsborough County. Felt most strongly in Hopkinton, Allenstown, Warner, Webster, Salisbury, Franklin, Bradford, Concord, and Hillsborough. This quake was believed to have snapped one of the underground water lines in the Town of Warner, and people exited buildings onto Main Street wondering what happened.	Reports were made to the USGS from Pembroke residents feeling the earthquake as a rumble or loud noise. No damage or injuries reported in Town.	Earth, Earthquake	Pembroke Hazard Mitigation Committee, Earthquake rack.com, CNHRPC, earthquake.usgs.gov
Pembroke Town Website Sabotage Jan 2016	No	2016	Jan	N/A	N/A	Town website was hacked in 01-16, with many subpages not available, and links to lead to ad pages.	Sabotage, Human	Pembroke Hazard Mitigation Committee
Regional Tornado, Severe Thunderstorms Jul 2015	No	2015	Jul 31	N/A	In Warner, NWS confirmed an EF-0 tornado touched down in the evening. It had a maximum wind speed of 75 mph and was 100 yards wide. Town officials said the tornado ripped the roof off a barn, but there were no injuries reported.	The Town escaped the brunt of this tornado, although heavy winds could have toppled trees and powerlines. No significant damages were reported.	Wind, Tornado, Debris, Utility	Pembroke Hazard Mitigation Committee, WMUR, CNHRPC
NH Geomagnetic Storm June 2015	No	2015	Jun	N/A	The aurora borealis (geomagnetic storm) likely reached all of NH although only those with equipment to capture the image likely	Pembroke was likely subject to any potential geomagnetism or solar radiation. Radio communications (CAMAFC or local)	Solar Storms, Geomagnetic, Potential Communication	Pembroke & Warner Hazard Mitigation Committees



# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
					knew it was occurring. In Warner, the Northern Lights were photographed overlooking Mount Kearsarge. No known effects from the storm.	interference could have occurred.	ations failure	CNHRPC
<b>Epsom Epicenter Earthquake 2.2M Aug 2015</b>	No	2015	2-Aug	N/A	Epicerter around Epsom in the Central NH Region in Merrimack County, felt in nearby locations including Concord, Pembroke, Allenstown, Loudon Chichester and Pittsfield	Reports may have been made to the USGS from Pembroke residents feeling or hearing the earthquake.	Earth, Earthquake	Earthquaket rack.com
<b>Boscawen Epicenter Earthquake 2.3M (Mercalli III) May 2015</b>	No	2015	May 24	N/A	Epicerter in lower Boscawen on Queen Street north of Flaghole Pond with 2.3M at a depth of 5km. 61 citizen reports were made at the USGS.	Boscawen is 20 miles from Pembroke. No damage or injuries reported in the Town. Nearby, the USACE registered this earthquake on their Hopkinton Dam monitoring equipment.	Earth, Earthquake	Pembroke Hazard Mitigation Committee Earthquaket rack.com, CNHRPC, earthquake.usgs.gov, Hopkinton Dam USACE
<b>Contoocook Epicenter Earthquake 2.1M Apr 2015</b>	No	2015	Apr 25	N/A	The US Geological Survey recorded the 2.1 magnitude tremor near Contoocook just before 6 AM. It was the second small earthquake in NH in as many days. A 2.3 magnitude earthquake was recorded near Sanbornton early Wednesday morning.	Pembroke residents may have felt a slight shaking or noise outside. Nearby, the USACE registered this earthquake on their Hopkinton Dam monitoring equipment	Earth, Earthquake	CNHRPC, nhpr.org, Hopkinton Dam USACE
<b>Severe Winter Storm and Snowstorm - January Blizzard 2015</b>	4209 H	2015	Jan 26-28	N/A for Pembroke	Predicted at near blizzard conditions, the end of January 2015 snowstorm's major declaration ended up having a Hillsborough County wide per capita impact of \$3.88, making the storm a fairly expensive one at \$3.3 million dollars in Public Assistance over three southern NH counties. Snow approached 30" in some areas with heavy snow and 50 mph whiteout wind conditions. The closest reporting weather station, Concord Airport (CON), had	Pembroke was not eligible for FEMA Public Assistance funding for protective measures and debris removal. Pembroke did not apply for and/or receive Public Assistance funding. Blizzard with snow, ice & rain resulted in numerous calls for downed trees down. Snow fell between Jan. 24-28, for 5 consecutive days. The Town likely experienced power failures, debris impacted infrastructure (trees and power lines fallen on	Winter, Extreme Temp, Utility, Winds, Debris, Snow	Pembroke Hazard Mitigation Committee, CNHRPC, fema.gov, Boston Globe

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
					accumulated 29" of heavy snow, 50 mph whiteout wind conditions in the region. Not declared in Merrimack County.	roads) and a great amount of snow.		
<b>Merrimack County &amp; Pembroke Emerald Ash Borer 2015-2020</b>	N/A	2015-	2020	N/A	N/A, although Emerald Ash Borer is a regional and statewide issue. Regulations do not permit firewood to cross county lines.	Between 2015-2020, the Town of Pembroke lost nearly every ash tree to the Emerald Ash Borer. Only a minority have not been infected. Active logging operations identify them. The problem has been increasing over the years. The Town Forest was infested. Residents and the Town are removing the dead and diseased trees.	Public Health, Biological/ Invasive	Pembroke Hazard Mitigation Committee, CNHRPC
<b>Pembroke / Merrimack County Drought Severe Emergency 2015-2018</b>	No	2015	-2018	N/A	Severe Drought (D2), Moderate Drought (D1) and Abnormally Dry (D0) intensities were found in communities of Merrimack County and Hillsborough in 2016. The State's counties had been experiencing levels of drought for over a year. The NH DES issued a series of statements and tips for homeowner water conservation. Residents and municipalities had been requested to voluntarily conserve water. Some communities or water precincts enacted water restrictions or bans for certain water usage.	The Severe Drought (D2) conditions caused some problems in Pembroke, with dug wells going dry. In response to the Extreme Drought (D3) conditions as of 09/15/16 which cover the entire community, Pembroke Water Works is requesting residents to conserve water and voluntarily reduce water usage.	Drought, Extreme Temp, Increased Wildfire Risk	Pembroke Hazard Mitigation Committee, US Drought Monitor NH, NH DES, CNHRPC
<b>Regional Lyme Disease Epidemic 2015 - 2018</b>	No	2015-	2018	N/A	Likely experienced by other Central NH region communities during the same time period.	Central NH region residents are known to have been subjected to and tested for Lyme Disease; many are positive. Spring is particularly bad. Pembroke contains rural, forested developments and the conservation lands are used for outdoor recreation. Lyme Disease is not known to be a significant local problem.	Public Health (Epidemic), Tick-borne	CNHRPC, NH Dept of Environmental Services, Capital Area County Public Health Network, Pembroke Hazard Mitigation Committee

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
<b>Hazard Events 2005-2014</b>								
<b>Regional Thanksgiving Day Snowstorm Nov 2014</b>	No	2014	Nov 27	N/A	Large amount of snowfall fell in a very short period of time ahead of typical seasonal expectations. Power outages were prolific, with a peak of about 200,000 outages, from the Public Service of New Hampshire, Unitil (Concord area), and NH Electric Co-op. Nearby Concord and the towns on the eastern side of the Central NH region accumulated only 6-12" of snow according to PSNH, far less snow than southern and western NH. This was not a presidentially declared disaster in NH.	Pembroke experienced a large amount of snowfall in a very short period of time ahead of typical seasonal expectations. Power outages throughout Town. First Range Rd out 5 days. EOC was open. Portable signage brought in to open Allenstown Elementary School as joint shelter for both towns. FD provided wellness checks	Extreme Temp, Winter, Utility, Wind, Ice, Debris Impacted Infrastructure	Pembroke Hazard Mitigation Committee, Concord Monitor, CNHRPC, Eversource Thanksgiving Nor'easter 2015, PUC After Action Report, Washington Post, WMUR, NHPR
<b>Regional Hopkinton Public Health EEE in Human Fall 2014</b>	No	2014	Fall	N/A	The New Hampshire Department of Health and Human Services (DHHS) is announcing the second human case of Eastern Equine Encephalitis (EEE) this season in New Hampshire, in an adult from Hopkinton. The first human case of EEE in New Hampshire this season was confirmed on August 22nd in Conway, NH. Other EEE positive tests this year include 6 mosquito batches and a mule; there have been no positive test results so far for West Nile Virus (WNV).	N/A, although Hopkinton is 3 communities to the west of Pembroke. Due to this human case of mosquito-transmitted EEE, the risk level for human illness in Hopkinton was raised to high, and the immediate area designated a moderate risk by NHDHHS.	Extreme Temp, Public Health, Epidemic	Hopkinton Town website, Hopkinton Hazard Mitigation Committee, NH DHHS
<b>Pembroke Opioid Epidemic Public Health 2014-2016</b>	No	2014-	-2016	N/A	The State of NH is in the news in 2015/2016 regarding an opioid/heroin epidemic.	Pembroke increased calls for PD and Tri-Town service as result of opioid usage in Town.	Public Health, Human	Pembroke Hazard Mitigation Committee, CNHRPC
<b>Pembroke Fires 2013</b>	No	2013	---	N/A	Although it did not seem to occur from Pembroke in 2013, wildfires can cross community borders.	A total of 1 structure fire and 3 vehicle fires were reported in Pembroke in 2013 (4 total)	Fire, Human	National Reporting System, NH Department of Safety, Pembroke Fire Department

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
<b>Warner Epicenter Earthquake 2.6M (Mercalli IV) Oct 2013</b>	No	2013	Oct 11	N/A	Epicenter in Warner along Warner River, north of Davisville Exit 7, 2.6 magnitude at a depth of 4.0km. Felt in the Central NH Region/northern Hillsborough County, most strongly in Hopkinton, Pembroke, Bradford, Warner, Concord, Salisbury, Franklin. 124 citizen reports made to the USGS.	Pembroke residents may have heard a sonic boom or felt mild shaking, but typically any impacts are very mild. No injuries or damages reported.	Earthquake, Earth	Pembroke Hazard Mitigation Committee, CNHRPC, earthquake.usgs.gov
<b>NH Severe Storms, Flooding and Landslide Jun-Jul 2013</b>	4139 --	2013	Jun 26 – Jul 3	N/A for Pembroke	This declared disaster for Grafton, Sullivan and Cheshire Counties included landslides from the heavy rain. Public Assistance (PA) was available for these 3 Counties and Hazard Mitigation Assistance (HMA) became available statewide. Damage per capita was high – Grafton (\$39.58), Sullivan (\$24.48), and Cheshire (\$21.46). <u>Not declared in Merrimack or Hillsborough Counties.</u>	<b>Pembroke could not apply for or receive PA funding.</b> Pembroke likely experienced heavy rains, road washouts during this event.	Landslide, Storms, Flood, Wind	FEMA, CNHRPC, Pembroke Hazard Mitigation Committee
<b>Regional and Pembroke Communications Failure Apr 2013</b>	No	2013	Apr 15	No	The bombing incident occurred in Boston during the Boston Marathon. Its effects were felt throughout New England and the country.	On Apr 15 after the Boston Marathon bombing, some Pembroke callers likely could not communicate because the lines and towers were overwhelmed. No local carriers were operational.	Terrorism/Violence, Communications Failure	Regional Hazard Mitigation Committees, CNHRPC
<b>Severe Winter Storm and Snowstorm - Feb 2013</b>	4105 M-H	2013	Feb 8-10	\$14,663	Winter Storm FEMA-3360-DR had blizzard conditions with wind gust of 50-60 MPH and over 20 inches snow fell on much of New Hampshire and the New England area. Disaster declarations received for emergency protective measures in eight counties of the State, including Merrimack and Hillsborough.	<b>Pembroke applied for and received \$14,663 in FEMA Public Assistance funding</b> for snow removal. Without power for several days. Up to 20" of heavy wet snow, trees downed. North Pembroke Road, The Pines had lots of trees down.	Winter, Extreme Temp, Wind, Snow, Debris	FEMA, Pembroke Hazard Mitigation Committee, CNHRPC
<b>Pembroke Fires 2012</b>	No	2012	---	N/A	Although it did not seem to occur in Pembroke in 2012,	Eight structure fires, 4 vehicle fires, 2 debris fires, and 2 wildfires	Wildfire, Fire, Human	National Reporting System, NH

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
					wildfires can cross community borders.	were reported in Pembroke in 2012 (21 total)		Department of Safety, Pembroke Fire Department
<b>Hurricane Sandy Oct 2012</b>	4095 -- EM-3360 M-H	2012	Oct 26-Nov 8	\$0	Hillsborough County and Merrimack County received a disaster declaration for Emergency Protective Measures. Five counties experienced severe damage from heavy winds and moderate flooding, 218,000 customers without power. Fallen trees and debris closed roads, building and vehicle damage.	<b>Pembroke did not apply for or receive FEMA emergency funding</b> for emergency protective measures and debris removal. The storm did not greatly affect Pembroke, only moderate rains experienced.	Tropical, Wind, Flood, Debris, Utility, Communications Failure	Pembroke Hazard Mitigation Committee, FEMA, Nashua Telegraph, CNHRPC
<b>Earthquake 4.0M Hollis ME Epicenter Oct 2012</b>	No	2012	16-Oct	N/A	With the epicenter near Hollis Center, Maine, a 4.0 earthquake was measured and felt not only in Central NH, but throughout New England. Reportedly sounding like a jumbo jet and lasting for 10 seconds, calls came in to local Fire Departments inquiring about the event. By two hours later, no calls reporting damages or injuries had been received.	Reports may have been made to the USGS from Pembroke with an earthquake of this magnitude as it was felt around the Central NH Region. Some residents in Pembroke felt the earthquake which had its epicenter in Hollis, Me. No damage was reported.	Earthquake, Earth	Concord Monitor, Earthquake-track.com, CNHRPC, Pembroke Hazard Mitigation Committee
<b>Regional Rainstorm and Microburst Jul 2012</b>	No	2012	Jul 17	N/A	About 20,000 electric customers lost power during this summer wind and rainstorm. Power lines down & failure for several days. Trees and debris along roadways required clean up. Four main roads in Hopkinton were blocked for 2-3 days, including South Road, College Hill Road, Hatfield Road, and Thain Road. The 60-80 mph microburst traveled in a north-south direction crossing Route 127 and US Route 4/202. Property damage occurred.	Pembroke likely experienced heavy rains and winds and perhaps some fallen tree limbs.	Wind, Downburst, Thunderstorm	Hopkinton Hazard Mitigation Committee, WMUR, CNHRPC

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
NH Severe Storm and Flooding May 2012	4065 --	2012	May 29-31	N/A for Pembroke	This declared disaster for Cheshire County. Public Assistance (PA) was available and Hazard Mitigation Assistance (HMA) became available statewide. Damage per capita was high – Cheshire (\$26.04). <u>Not declared in Merrimack or Hillsborough Counties.</u>	<b>Pembroke could not apply for or receive PA funding.</b> There were no specific issues in Town noted. Any flooding, treefall or other problems were handled as normal Dept response.	Flood, Storms, Wind, Debris	FEMA, CNHRPC
Allenstown Chemical Bombs Feb 2012	No	2012	Feb	N/A	Six chemical bombs (made with common household chemicals) were found at a NH DOT shed, and others at houses. No damage of consequence occurred.	N/A, although Allenstown abuts Pembroke to the east and shares utilities.	Human, Explosion, Haz Mat	Allenstown Hazard Mitigation Committee 2013
Pembroke Fires 2011	No	2011	---	N/A	Although it did not seem to occur in Pembroke in 2011, wildfires can cross community borders.	One structure fires and 1 vehicle fire were reported in Pembroke in 2011 (2 total)	Fire, Human	National Reporting System, NH Department of Safety, Pembroke Fire Department
Halloween Snowstorm Oct 2011	4049 H EM-3344 M	2011	Oct 29-30	\$0	FEMA-4049-DR. Towns in Central NH were impacted by this shocking, early severe snowstorm, although a major disaster declaration was <u>not declared in Merrimack County.</u> Halloween festivities were cancelled in most communities, to the heartbreak of young children. In Hillsborough County, damages were at the equivalent of \$5.11 per capita (400,721 people in 2010). The storm was also declared in Rockingham County.	<b>Pembroke did not apply for or receive FEMA Public Assistance funding</b> for debris removal, public buildings, and protective measures. Pembroke experienced similar effects with deep, unexpected snow but no particular issues.	Winter, Extreme Temp, Snow	FEMA, Pembroke Hazard Mitigation Committee, CNHRPC
Bow Route 3A Downburst Sep 2011	4026	2011	Sep 5	N/A	In nearby Bow, a 60mph microburst damaged or destroyed a dozen campers in the area of Route 3A between Grandview and Down Road. No injuries were reported. Telephone service at the Town's Police dispatch center was also disrupted.	Bow is on the other side of the Merrimack River from Pembroke. No local damage was reported, but likely tree limbs fell on roads or powerlines.	Wind, Downburst, Debris Impacted Infrastructure	Union Leader, CNHRPC



# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
<b>Tropical Storm- Irene Aug-Sep 2011</b>	4026 M EM-3333 H	2011	Aug 26-Sep 6	\$8,317	Carroll, Coos, Grafton, and Merrimack Counties suffered severe impacts to roads and bridges as a result of flooding from Tropical Storm Irene, which also caused power outages. <u>Merrimack County</u> reimbursement to towns was \$4.29 per capita (146,455 people in 2010), a total of \$11m was allocated. Major Disaster was not declared for <u>Hillsborough County</u> , but an Emergency Declaration.	<b>Pembroke received \$8,317 in FEMA emergency funding</b> for emergency protective measures and debris removal. Slight damage in Pembroke, although fared better than surrounding towns.	Tropical Wind, Flood, Debris, Utility, Power Failure, Debris Impacted Infrastructure	FEMA, Pembroke Hazard Mitigation Committee, CNHRPC, NH State Climate Office 8/11 Summary
<b>April Fool's Snowstorm Apr 2011</b>	No	2011	Apr 1	N/A	A Nor'easter snowstorm impacted the State, causing over 30,000 power outages, most by PSNH. Snow fell in depths of up to 8" but stopped by noon. Although dozens of accidents were reported, no serious injuries were reported.	The snowstorm with heavy, wet snow likely brought down trees and powerlines in Town. Storm was not especially notable in Pembroke.	Extreme Temp, Snow, Wind Chill, Power Failure, Debris Impacted Infrastructure	CNHRPC, wmur.com, CNHRPC, cbsnews
<b>Regional &amp; Pembroke Extreme Temperature s (Heat) ANNUAL 2011-2016</b>	N/A	2016	2021	N/A	The Central NH Region and surrounding communities likely experienced similar temperatures.	The Hazard Mitigation Committee notes that although there have been no known extreme cold impacts to the Town since 2016, quick and extreme annual temperature fluctuations have been observed but not specifically recorded. Cold weather is usually discussed with the context of a winter storm event. Yet, warmer weather is experienced with shorter winters in Pembroke.	Extreme Temps, Excessive Heat, Public Health	Pembroke Hazard Mitigation Committee, CNHRPC
<b>Pembroke Fires 2010</b>	No	2010	---	N/A	Although it did not seem to occur in Pembroke in 2010, wildfires can cross community borders.	Seven structure fires, 2 vehicle fires, 1 debris fire, 1 special outside fire and 5 wildfires were reported in Pembroke in 2010 (16 total)	Wildfire, Fire, Human	National Reporting System, NH Department of Safety, Pembroke Fire Department



# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
<b>Concord Hospital Bomb Threats Oct 2010</b>	No	2010	1-Oct	N/A	A bomb threat was called in to Concord Hospital as a result of a child custody issue and the group known as the "Oathkeepers." The FBI was contacted, but nothing was found in the Hospital during a bomb sweep. Phone lines were flooded with calls by the Oathkeepers to inhibit using the landlines. The incident was determined to be harassment instead of an actual event.	N/A, although Concord abuts Pembroke the west	Human, Terrorism	Concord Hazard Mitigation Task Force 2011
<b>Canterbury Earthquake Epicenter 3.2M (Mercalli V) Sep 2010</b>	No	2010	Sep 26	N/A	"A magnitude 3.4 [sic] earthquake rattled buildings and nerves across much of New Hampshire Saturday night. The quake occurred at 11:28 p.m. and was centered about 10 miles north of Concord, according to the U.S. Geological Survey. State police said they received reports from residents across the state who reported what they thought was an explosion. The quake was felt in places like Fremont, Derry, Durham, Penacook and Raymond. There were no reports of damage." The quake was in fact felt all over the state, Southern ME and MA, but most reports were received from the Central NH region. Numerous area residents from across the state called WMUR's newsroom to report shaking and tremors in their home. Many said the quake felt like a "low rumbling" that rattled windows and shook homes for several seconds. Several residents also reported hearing a loud "boom" before feeling their	Epicenter in Canterbury is about 15 miles to the northeast of Pembroke. Residents in Pembroke may have felt the earthquake as a very minor sensation. No damage was reported.	Earth, Earthquake	Pembroke Hazard Mitigation Committee, Union Leader, CNHRPC, earthquake.usgs.gov, wmur.com

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
					homes shake. One emergency dispatcher with the town of Canterbury reported receiving 400 calls in 20 minutes. After study and analysis, USGS reported a 3.2M quake at a depth of 5.0 km and a total of 2,494 citizen reports. The epicenter was in Canterbury just east of I-93 and Cold Brook, north of Soapstone Road and south of Cogswell Road.			
<b>Quebec-Ottawa Earthquake 5.0M (Mercalli VI-VII) Jun 2010</b>	No	2010	Jun 23	N/A	Earthquake lasted about 30 seconds, epicenter in Val-de-Bois Quebec (Ottawa) at a depth of 22 km. The shaking that occurred in Ottawa was rated the strongest in 200 years. Damages occurred in Ottawa. The tremors were felt in Central NH. 288 aftershocks were located.	No known impacts to Pembroke specifically, but this large quake was felt regionwide.	Earthquake, Earth	CNHRPC, Geological Survey of Canada
<b>Loudon Pleasant View Greenhouse Fire Jan 2010</b>	No	2010	21-Jan	N/A	Pleasant View Gardens suffered a fire which destroyed about 30,000 square feet of greenhouses, plus a building. The cause is undetermined. This was a significant commercial fire.	N/A, although Loudon abuts Pembroke to the north. Pleasant View Gardens also has a greenhouse location in Pembroke.	Fire, Public Health (Air Quality)	Loudon Hazard Mitigation Committee, Pembroke Hazard Mitigation Committee
<b>Canadian Wildfires Air Pollution May 2010</b>	No	2010	May 31	N/A	The smoke from the wildfires was seen and smelled across Central NH. On Memorial Day weekend, brush fires from Canada impacted the air quality of New Hampshire Residents from more than 50 wildfires that are burning out of control in Quebec. Over 150,000 acres in central Quebec, north of Montreal and Quebec City, about 500 miles north of Manchester, reduced visibility to 1.75 miles in Concord. No air quality alert was issued, although people	Pembroke likely experienced the effects of this smoke, smog, and fine particulate matter. High elevations would have been most susceptible, as would those who exercised outdoors.	Wildfire, Health (Air Quality)	Union Leader 2010, CNHRPC

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					with respiratory issues were urged to remain indoors.			
<b>Severe Storms and Flooding</b> <b>Mar 2010</b>	<b>1913 M-H</b>	<b>2010</b>	<b>Mar 14-31</b>	<b>\$0</b>	Severe storms and flooding occurred over two weeks and damaged roads and bridges. <u>Merrimack County</u> reimbursement to towns for repair was \$0.28 per capita (146,455 people in 2010) and in <u>Hillsborough County</u> reimbursements were \$1.80 per capita (400,721 people in 2010).	<b>Pembroke did not apply for or receive FEMA Public Assistance funding</b> for roads & bridges, debris removal, or protective measures. The Suncook River caused moderate flood damage to residences but was not as extensive as the 2006 and 2007 floods.	Wind, Tropical, Flood, Utility, Debris	Pembroke Hazard Mitigation Committee, FEMA
<b>Severe Winter Storm and Flooding</b> <b>Feb-March 2010</b>	<b>1892 M-H</b>	<b>2010</b>	<b>Feb 23-Mar 3</b>	<b>\$79,064</b>	This severe weather event included high winds, rain, and snow over a week-long period. The primary impact was debris removal and repair reimbursement for fallen trees and powerlines. In <u>Merrimack County</u> , the reimbursement to communities was the equivalent of \$10.39 per capita (146,455 people in 2010), with <u>Hillsborough County</u> at \$3.68 per capita (400,721 people in 2010). In the Concord area, 21,000 Unil customers were out of power at the peak outage period.	<b>Pembroke applied for and received \$79,064 FEMA Public Assistance funding</b> for roads and bridges & debris removal, protective measures and recreational projects. Power outages, with trees down on wires, roads, cars, and buildings. The flooding from this storm was worse than the snow and ice damage.	Extreme Temp, Snow, Wind, Flood, Debris, Aging Infrastructure	Pembroke Hazard Mitigation Committee, FEMA, Unil, CNHRPC
<b>Vermont Yankee Tritium Contamination</b> <b>Jan 2010</b>	No	2010	Jan 7	N/A	The Vermont Yankee Nuclear Power Plant notified the Vermont Department of Health that groundwater monitoring samples taken in November 2009 contained tritium. An investigation was launched, and a major source of leakage was found in steam pipes inside the Advanced Off-Gas (AOG) drain line to be clogged and corroded. The samples taken show the movement of the	Pembroke may be affected in the future as groundwater sources are connected. The Connecticut River travels the NH / VT border.	Radiological, Health (Water Quality)	Vermont Department of Health 2012, CNHRPC

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Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
					tritium contamination in the groundwater into the Connecticut River. Health risks are being investigated.			
Severe Winter Storm – Dec 2008 Ice Storm	1812 M-H	2008	Dec 11-23	\$32,096	Accumulating ice, snow, rain, and strong winds caused downed trees and power lines, with power outages and traffic accidents resulting. In Hillsborough County, debris removal and repair cost reimbursement FEMA the equivalent of \$10.07 per capita (146,455 people in 2010). In Hillsborough County, debris removal costs were \$6.35 per capita (400,721 people in 2010). The major disaster was declared in all 10 counties. New England was blanketed with ice and snow during the winter storm. Weight of ice caused branches to snap, and trees to either snap or uproot, bringing down power lines and poles across the region. About 400,000 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 \$5m. Event was the largest power outage in NH history.	Pembroke received \$32,096 in FEMA Public Assistance funding for debris removal, public buildings, and protective measures. Pembroke went 6 days without electricity and communications. Numerous roads were closed due to downed trees and power lines. Shelter was offered in neighboring Town of Hooksett. Pembroke police and fire officials conducted door-to-door notifications to homeowners to assess their needs and offer assistance	Winter, Extreme Temps, Cold, Wind, Utility, Debris, Communications Failure	Pembroke Hazard Mitigation Committee, FEMA, CNHRPC, Concord Monitor
Severe Storms and Flooding (Hurricane Hannah) – Sep Flood 2008	1799 M-H	2008	Sep 6-7	\$7,698	Heavy rain from the remnants of tropical storm Hanna resulted in flooding on small rivers and streams in the Central NH area. The remains of tropical storm Hanna moved through eastern New England dumping 3 to 6 inches of rain in New	Pembroke received \$7,698 in FEMA Public Assistance funding for protective measures, debris removal and work on North Pembroke Road. Road washouts were the major problem during this event.	Tropical, Flood, River, Wind, Storms, Debris, Aging Infrastructure	FEMA, Pembroke Hazard Mitigation Committee, CNHRPC

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Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
					Hampshire in about 8 hours causing rapid rises on area streams. In <u>Merrimack County</u> , damage to road systems totaled the equivalent of \$1.48 per capita (146,455 people in 2010) for town reimbursement. <u>Hillsborough County's</u> damage was much higher at \$6.90 per capita (400,721 people in 2010)			
Severe Winds, Heavy Rains & Tornado <b>July 2008</b>	1782 M	2008	Jul 24	N/A for Pembroke	An EF3 tornado touched down in Rockingham County then proceeded into another county. Then in <u>Merrimack County</u> , the tornado was rated up to an F-3 and killed a woman in Deerfield trapped in a collapsed house. In the county, there was substantial damage totaled the equivalent of \$1.12 per capita (146,455 people in 2010) for the towns' debris removal reimbursement costs. A total of 123 residences statewide were affected, with 17 destroyed and another 37 suffering major damage. Damage was estimated to exceed \$10 million. Not declared in <u>Hillsborough County</u> .	<b>Pembroke was not eligible to apply for or receive FEMA Public Assistance funding</b> for debris removal, protective measures, roads and bridges. The path did not travel through Pembroke but tree damage may have occurred. In abutting Epsom, 84,000 acres were destroyed and there was significant damage to personal property, destroying or damaging 9 homes. Pembroke Public Works assisted Epsom with clean-up duties during the recovery phase.	Wind, Tornado, Downburst, Storm, Debris, Power Outage	FEMA, Pembroke Hazard Mitigation Committee, CNHRPC
Epsom Cumberland Farms Explosion <b>Jul 2008</b>	No	2008	Jul	N/A	Cumberland Farms propane explosion of July 2008 resulted in the closure of Route 4.	N/A, Epsom abuts Pembroke to the east and are connected to NH 28.	Fire, Explosion, Technological	Epsom Hazard Mitigation Committee 2009
Regional Severe Thunderstorm <b>Aug 2007</b>	No	2007	25-Aug	N/A	Severe thunderstorm downed trees in nearby Allenstown. Numerous severe thunderstorms developed in NH. Wind damage was widespread with these storms along with a few reports of large hail.	Pembroke likely experienced similar issues as Allenstown is an abutting town.	Thunderstorm, Rain, Wind, Hail	Allenstown Hazard Mitigation Committee
Pembroke Severe	No	2007	15-Jul	N/A	Similar effects may have been experienced by area communities.	A severe thunderstorm downed trees in Pembroke. Severe	Thunderstorm, Wind, Hail	Pembroke Hazard

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Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
Thunderstorm Jul 2007						thunderstorms produced large hail and damaging winds across portions of southern New Hampshire during the early afternoon of July 15th.		Mitigation Committee
Severe Storms and Flooding - Spring Flood April 2007	1695 M-H	2007	Apr 15-23	\$51,324	Extensive flooding caused by severe storms impacted seven counties. In the Central NH region, Indirect peak discharge measurements on stream gages on the Suncook River at Short Falls Road in Epsom were 14,100 ft <sup>3</sup> , which was determined to be greater than 100-year flood discharge levels. The heavy rain combined with snow melt to cause small rivers and streams in much of New Hampshire to flood. Over land, the strong winds downed numerous trees. The downed trees caused widespread power outages, especially near the coast, and numerous road closures. The storm also brought heavy rain to the region which, when combined with snow melt, produced widespread flooding across much of the region.	<b>Pembroke received \$51,324 in FEMA Public Assistance funding</b> for roads & bridges and protective measures. Projects were for roads and bridges, repairing Memorial Field's boat ramp and access road, water control facilities, debris removal and repairing washed out culverts. In Pembroke, North Pembroke Road was impacted the most. North Pembroke Bridge was closed.	Flood, River, Wind, Storms, Tropical, Debris, Erosion, Aging Infrastructure	FEMA, USGS Flood of 2007, Pembroke Hazard Mitigation Committee, CNHRPC, National Oceanic and Atmospheric Administration 2007, Epsom Hazard Mitigation Committee 2009 for regional information, USGS Flood of April 2007 in New Hampshire
Webster Pillsbury Lake Dam Breach May 2006	1643	2006	May 15	N/A	The Pillsbury Lake Dam in Webster, holding back an artificial lake of about 70 acres, was breached by flooding due to heavy rains. Floodwaters punched out a 20-foot breach in the dam. The dam created the Pillsbury Lake District with about 180 households. The Lake's level fell from 15 feet at its deepest point to about 2 feet at that same point following the event.	N/A, although Webster is 2 communities to the northwest of Pembroke.	Flood, Dam Failure	Concord Monitor

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Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
<b>Bow Landslide During Mother's Day Floods May 2006</b>	1643	2006	May 14-17	N/A	Backyard material slid toward a Bow home on Mother's Day catching a family, with one young child and expecting another, by surprise. No one was injured by the mudslide but thousands of dollars of property damage were caused. The debris and mud that slid and caused the damage came from land that didn't belong to the family. They had to move out for 10 days until a contractor deemed the property safe.	N/A, although Bow abuts Pembroke to the south.	Earth, Landslide, Erosion	WMUR News
<b>Suncook River Avulsion in Epsom May 2006</b>	1643	2006	May 14-17	N/A	The Suncook River through Epsom changed its course during this recent heavy rain event and its resultant flooding. The River shifted hundreds of meters, flowing around two dams, creating about a mile of new river through a sand pit a half mile from its original course, and leaving a similar length of dry riverbed. The water carved through peat bogs and tore away a corner of a sand excavation pit. Local communities of Epsom, Allenstown, and Hillsborough later dealt with siltation and erosion issues from the new river course	After the Suncook River avulsion occurred, the confluence of the Suncook and the Merrimack contained so much sand that sandbars have developed and people could often walk across areas. The after-effects of the avulsion is a long-term problem for Pembroke and other communities along the Suncook and Merrimack Rivers.	Flood, Channel Movement	Concord Monitor, Pembroke Hazard Mitigation Committee
<b>Severe Storms and Flooding – Mother's Day Flood May 2006</b>	1643 M-H	2006	May 12-23	\$68,283	Extensive flooding caused by severe storms impacted seven counties including Merrimack and Hillsborough Counties. The USGS recorded the highest flows on record for several rivers including the Contoocook River in Davisville village, Soucook River in Concord, and in the	<b>Pembroke received \$68,283 in FEMA Public Assistance funding</b> for Memorial Field, Town roads, road erosion, and traffic control/evacuations. Erosion around the Webster Dam was occurring, had to fix with emergency measures. Evacuated condos Emerson Mills. A lot of undercutting of the Pembroke, China	Flood, River, Wind, Tropical, Storms, Debris, Erosion, Landslide, Aging Infrastructure	Pembroke Hazard Mitigation Committee, FEMA, USGS, CNHRPC, Epsom Hazard Mitigation Committee 2009 for regional information



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					Piscataquog River in Goffstown. In Epsom, the Suncook River Avulsion occurred at Bear Island and the nearby excavation area. There were nine bridges / culverts washed out as well as dams breached. Epsom sustained flooding damage to the following areas: Northwood Lake Dam overtopped, damage to the Old Mill Dam (until the river changed direction), Kingstowne Mobile Home Park flooded, Webster Park Lane was underwater, Millhouse Road was flooded, Black Hall Road flooded, the Epsom Elementary School athletic fields flooded and the equipment hut was lost due to flooding, Center Hill Bridge washed out, Baker Road flooded, Swamp Road was under water. Damage, overtop & erosion to culverts of River Road, North Road, Blakes Brook, Mountain Road, Echo Valley Road, Griffin Road, NH 107, Old Richie Road, Mt Delight, as well as Leighton Brook culvert.	Mills and Webster Mills dams occurred.		
<b>Regional Train Wildfire</b> <b>April 2006</b>	No	2006	29-Apr	N/A	A freight train sparked brush fires along tracks in Bow, Hooksett and Manchester. In Bow, a 50' by 350' fire was spreading toward the woods when officials arrived on the scene. Concord Fire Chief said that fires sparked by trains are not unusual and they are typically caused by exhaust coming out of the stack.	N/A, although Bow abuts Pembroke to the south and the railroad line travels past Eversource, the location of anhydrous ammonia concern.	Fire, Crash, Tech	WMUR News
<b>Concord Statehouse Iraq Public Unrest</b> <b>Mar 2006</b>	No	2006	18-Mar	N/A	A reported 400 citizens marched in Concord to recognize the 3-year anniversary of the beginning of the war in Iraq. The protestors	N/A, although Concord abuts Pembroke to the west and is connected by US 3 and NH 106.	Human, Public Unrest, Civil Disturbance	NH Independent Media Center

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Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
					marched around downtown Concord and finished in front of the statehouse.			
<b>Regional Power Failure and Wind Chill Feb 2006</b>	No	2006	18-Feb	N/A	55 mph wind gusts, resulting from a cold front in the region, felled trees which blocked roads and downed power lines. 80,00 homes and businesses in the state reportedly lost power. Unitil had outages in every town it serves. A reported 25,000 customers in the Concord area lost power.	Pembroke experienced power failure for an unknown number of days.	Wind Chill, Extreme Temps, Power Failure, Heavy Winds	Concord Monitor, Pembroke Hazard Mitigation Committee
<b>Severe Storms and Flooding - Columbus Day Flood Oct 2005</b>	1610 M-H	2005	Oct 7-18	\$0	Extensive flooding caused by severe storms impacted five counties, including Merrimack and Hillsborough. Alstead experienced several fatalities as the result of dam failure. During October 7-18, 2005, the State of NH experienced two major rainfall events. According to USGS the bulk of rainfall occurred during two major rainfall events; one on October 8-9 and one on October 14-16. Rainfall volumes were generally higher in the event of October 8-9 in southwestern NH, leading to major flooding in that region.	<b>Pembroke did not apply for or receive FEMA Public Assistance funding</b> for protective measures. Many residences on Bachelder Road were flooded by the Suncook River.	Flood, River, Wind, Tropical, Storms, Debris, Erosion, Aging Infrastructure	Pembroke Hazard Mitigation Committee, FEMA, CNHRPC
<b>Regional Thunderstorms and Lightning Jun 2005</b>	No	2005	12-Jun	N/A	During a thunderstorm, lightning struck and severely damaged the historic Loudon Town Hall on Clough Hill Road. Winds from severe thunderstorm knocked down trees and power lines down in the towns of Warner, Hopkinton, Concord, Bow, Loudon, and Webster in Merrimack County.	Pembroke likely experienced many lightning strikes, power outages, and heavy rain downfalls. The lightning would have been especially noticeable from the higher elevations.	Thunderstorm, Lightning, Severe Winds, Debris	Pembroke Hazard Mitigation Committee, CNHRPC, Area Hazard Mitigation Committees
<b>Snow Emergency</b>	EM-3211 H	2005	Mar 11-12	N/A	Cheshire, Hillsborough, Rockingham and	<b>Pembroke could not apply for FEMA Public</b>	Winter, Extreme	Pembroke Hazard

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Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
Mar 2005					Sullivan Counties were eligible for emergency protective measures under the Public Assistance program because of this severe winter snowstorm. <u>Merrimack County was not eligible.</u>	<b>Assistance funding</b> for snow removal and protective measures. In Pembroke, tree damage was likely severe on the higher elevation and Class V roads. The Town was likely without electricity for days. The Highway Department probably worked overtime to clear the roads for residents.	Temps, Snow, Debris	Mitigation Committee, CNHRPC, FEMA
Canterbury Explosion at Gold Star Sod Farm Jan 2005	No	2005	23-Jan	N/A	A near-fatal explosion occurred at the Gold Star sod farm in Canterbury. Gasoline fumes ignited a propane heater, triggering a fiery explosion and fire that consumed a large workshop and part of the main storage building. Fire crews from several departments battled the fire and laid sand down as a buffer between a nearby river in order to prevent contamination as pesticides and other chemicals burned.	N/A, although Canterbury is 2 communities to the north of Pembroke.	Fire, Explosion, Technological, Hazardous Materials	Concord Monitor
Snow Emergency Jan 2005	EM-3207 M-H	2005	Jan 22-23	\$6,317	Record and near record snowstorm for 8 NH counties including Merrimack and Hillsborough. Emergency protective measures declared for reimbursement.	<b>Pembroke received \$6,317 in FEMA Public Assistance funding</b> for snow removal. Record snows fell during this time period causing many closures. A transportation system shutdown likely occurred in Pembroke, and Town emergency services were delayed.	Winter, Extreme Temps, Snow, Debris	Pembroke Hazard Mitigation Committee, CNHRPC, FEMA
Hazard Events 1973-2004								
Hopkinton Earthquake 2.3M Epicenter Aug 2004	No	2004	Aug 28	N/A	An earthquake measuring 2.3 on the Richter Scale was centered in the Hopkinton area at Hopkinton Lake (Hopkinton-Everett Reservoir) east of Stumpfield Road at a depth of 5.8km Shaking and noise were reported, but no damage occurred.	Reports may have been made to the USGS by local residents feeling the earthquake as a rumble or loud noise. Hopkinton is within 15 miles of Pembroke.	Earth, Earthquake	Earthquake Monitor, CNHRPC, earthquake.usgs.gov, Pembroke Hazard Mitigation Committee

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<b>Henniker-Hopkinton Earthquake 2.2M Epicenter Jan 2004</b>	No	2004	Jan 20	N/A	An earthquake measuring 2.3 on the Richter Scale was centered in the Henniker- Hopkinton town line on Line Hill Road at a depth of 3.6km.	Residents may have felt the earthquake as a rumble or heard a loud noise. Hopkinton is within 15 miles of Pembroke.	Earth, Earthquake	Concord Monitor, January 2004, Earthquake Monitor, CNHRPC, earthquake.usgs.gov
<b>Snow Emergency Dec 2003</b>	EM-3193 M-H	2003	Dec 6-7	\$0	Record snow fall event impacting much of New England. In NH, 8 counties received emergency protective measures, including Merrimack and Hillsborough.	<b>Pembroke did not apply for or receive FEMA Public Assistance funding</b> for snow removal. Record snowfalls in the area, residents lost power due to winter snowstorm with high winds and falling trees.	Winter, Extreme Temp	Pembroke Hazard Mitigation Committee, CNHRPC, FEMA
<b>Snow Emergency Feb 2003</b>	EM-3177 M-H	2003	Feb 17-18	\$0	Record and near record snowstorm for 5 NH counties including Merrimack and Hillsborough. Emergency protective measures declared for reimbursement.	<b>Pembroke did not apply for or receive FEMA Public Assistance funding</b> for snow removal. Record or near record snowfalls, residents lost power due to winter snowstorm with high winds and falling trees.	Winter, Extreme Temp	Pembroke Hazard Mitigation Committee, CNHRPC, FEMA
<b>NH Drought Emergency Aug 2002</b>	No	2002	Aug	N/A	All counties in the State of NH except Coos County. One of the hottest Augusts on record in Concord along with drought conditions since March made for a high fire danger in New Hampshire. Numerous forest fires were reported, including a 30-acre blaze in New Durham.	In Pembroke, wells went dry for about 2 weeks. Wells affected were mostly dug wells. Pembroke likely experienced loss of hay crops, lowering of the Rivers, and other brooks.	Drought, Extreme Temp, Earth, Increased Wildfire Risk	Pembroke Hazard Mitigation Committee, CNHRPC Concord Monitor 8/20/02, NHDES
<b>Deering Airplane Crash Mar 2001</b>	No	2001	Mar	N/A	N/A, but Deering is within the Central NH region.	A small plane crashed upon landing at Deering Airport (now called the Hawthorne-Feather Airpark), causing minor damage to the airplane but no injuries.	Crash, Fire, Wildfire, Haz Mat, Health (Water Quality)	Deering Hazard Mitigation Committee, CNHRPC
<b>Snow Emergency Mar 2001</b>	EM-3166 M-H	2001	Mar 5-7	\$0	Record and near-record snowfall from late winter storm, emergency declaration was issued for protective measures. Merrimack, Hillsborough and 5 other counties declared eligible.	<b>Pembroke did not apply for or receive FEMA Public Assistance funding</b> for protective measures, including snow removal. Likely numerous power outages and blizzard-like conditions were probably experienced in Pembroke.	Winter, Extreme Temp, Wind	Pembroke Hazard Mitigation Committee, CNHRPC, FEMA

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Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
<b>Regional Downbursts and Severe Winds</b> <b>Jul 1999</b>	No	1999	6-Jul	N/A	Severe storms in July 1999 bring strong damaging winds and 3 downbursts. Two deaths occurred. The roof of the Ralph Pill building in Concord is blown off during a storm. The downburst was designated a macroburst (at least 2.5 miles in diameter). Other communities in the Central NH Region experienced damages	The macroburst swept through Concord which abuts Pembroke. Pembroke likely experienced similar conditions and treefall. No historical perspectives were available for the event.	Severe Wind, Downburst	Concord Monitor, NH HSEM, CNHRPC, Pembroke Hazard Mitigation Committee
<b>Concord Terrorism/ Bomb Threats</b> <b>Oct 1998</b>	No	1998	Oct, Oct 27	N/A	On Oct 27, the lit fuse of a bomb left in the Concord Library stacks set off smoke alarms that may have saved the lives of many people. The individual allegedly responsible for the bomb scare left notes complaining about state government. A few days later, about a dozen buildings were evacuated after the New Hampshire Technical Institute in Concord received an anonymous call warning that three bombs had been placed on campus. This event followed the bomb scares at the Concord Library.	N/A, although Concord is one of the nearby employment and shopping hubs of the Central NH Region and abuts Pembroke. Should any terrorism event have impacted Concord, Pembroke residents may have been impacted.	Terrorism, Incendiary, Sabotage	AP Online, 11/01/98, NH HSEM, CNHRPC
<b>Allenstown Lightning Strikes</b> <b>Aug 1998</b>	No	1998	Aug	N/A	In abutting Allenstown, lightning struck the antenna on the roof of the Town Hall, started a fire, and blew out several computers inside. The same thing happened to the Fire Station.	N/A, Allenstown abuts Pembroke to the east.	Lightning, Fire	Allenstown Hazard Mitigation Committee
<b>Severe Storms and Flooding</b> <b>Jun-Jul 1998</b>	1231 M-H	1998	Jun 12-Jul 2	\$0	Heavy flooding in six disaster declaration counties, including Merrimack and Hillsborough Counties. Damages of \$3.4m for all counties.	<b>Pembroke did not apply for or receive FEMA Public Assistance funding.</b> In Pembroke, road washouts and lowland flooding are likely to have occurred from the heavy rains.	Flood, Wind, Debris, Aging Infrastructure	FEMA, CNHRPC, Pembroke Hazard Mitigation Committee
<b>Ice Storm of Jan 1998</b>	1199 M-H	1998	Jan 7-25	\$0	This ice storm was the first to test our statewide and local	<b>Pembroke did not apply for or receive FEMA</b>	Extreme Temp, Ice, Winter,	FEMA, US Army Corps of Engineers

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Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
					emergency management systems and utility providers. Tree and infrastructure damage was extensive and power failures lasted up to two weeks in some parts of the state. In the Central NH Region, many lost power for over a week. This ice storm had severe impacts throughout most of the State, with 52 communities impacted. FEMA Disaster Declaration #1199, Six injuries and one death resulted. Damage totaled \$12,446,202. In addition, there were 20 major road closures, 67,586 people left without electricity, and 2,310 people without phone service.	<b>Public Assistance funding.</b> Power outages occurred for a few hours. In addition, there was some limb damage to trees.	Utility, Debris	NH Storms database, Pembroke Hazard Mitigation Committee, CNHRPC
<b>NH Mass Casualty/Terrorism Aug 1997</b>	No	1997	Aug	N/A	Five people were left dead after a series of shootings which began in Bow by a man who was angered over long simmering land disputes. The individual was eventually apprehended in Colebrook, NH.	N/A for Pembroke specifically, but this tragedy occurred in the Central NH region.	Terrorism, Mass Casualty	NH HSEM, CNHRPC
<b>Severe Storms and Flooding Oct 1996</b>	1144 M-H	1996	Oct 20-23	\$0	Heavy rains caused flooding in six counties, including <u>Merrimack and Hillsborough Counties</u> . Damage totaled \$2.3m for all counties.	<b>Pembroke did not apply for or receive FEMA Public Assistance funding.</b> As Pembroke is within Merrimack County, the Town likely experienced heavy rains and flooding of the Suncook, Soucook, and Merrimack River.	Flood, Storms, Debris, Erosion	FEMA, NH HSEM, CNHRPC
<b>Pembroke Snowstorm Feb 1996</b>	No	1996	Feb	No	Snow, ice, bitter temperatures throughout central NH	Snow, ice, bitter temperatures were experienced in Pembroke.	Extreme Temp, Severe Winter Weather, Wind Chill, Snow	Pembroke Hazard Mitigation Committee
<b>Storms and Floods Oct-Nov 1995</b>	1077 M	1995	Oct 20-Nov 15	N/A for Pembroke	Four NH counties were damaged by excessive rain, high winds and flooding, including Merrimack County. Not	<b>Pembroke did not apply for or receive FEMA Public Assistance funding.</b> It is likely several gravel roads	Flood, Winds, Aging Infrastructure	FEMA, Federal Register, CNHRPC, Pembroke



# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
					declared in <u>Hillsborough County</u> .	were washed out in Pembroke.		Hazard Mitigation Committee
<b>Newbury Terrorism/Active Shooter</b> <b>Nov 1993</b>	No	1993	Nov 1	N/A	A shooting at the Newbury Town Hall was ignited by tax and land disputes. Two town workers were killed, another was wounded, and the gunman shot and killed himself.	N/A for Pembroke specifically, but this tragedy occurred nearby. Newbury is about 50 miles northwest of Pembroke. All NH communities were impacted by this terrible event.	Terrorism/ Violence, Mass Casualty, Active Shooter	NH HSEM, CNHRPC
<b>Blizzard</b> <b>Mar 1993</b>	EM-3101 M-H	1993	Mar 13-17	\$0	Blizzards, High Winds and Record Snowfall. It is likely the Central NH Region experienced heavy snow, tree fall. Emergency declaration for <u>Merrimack and Hillsborough Counties</u> .	<b>Pembroke did not apply for or receive FEMA Public Assistance funding</b> for emergency snow plowing. Pembroke likely experienced power outages throughout town during this storm.	Winter, Extreme Temp, Wind, Utility	NH HSEM, CNHRPC, FEMA, Pembroke Hazard Mitigation Committee
<b>Severe Storm-Hurricane Bob</b> <b>Aug 1991</b>	917 H	1991	Aug 18-20	No data available	Public assistance was available for <u>Hillsborough County</u> and 2 other counties as a result of damages caused by Hurricane Bob. The 2 seacoast counties fared the worst. Not declared in Merrimack County.	As Pembroke is within Merrimack County, it likely experienced heavy rains, wind gusts, tree debris, power outages and possibly some flooding.	Severe Winds, Hurricane, Tropical	FEMA, CNHRPC
<b>Flooding and Severe Storm</b> <b>Aug 1990</b>	876 M-H	1990	Aug 7-11	No data available	Moderate to heavy rains caused flooding in eight counties, including <u>Merrimack and Hillsborough Counties</u> . Damage totaled \$2.3m for all counties	As Pembroke is within Merrimack County, the Town likely experienced heavy rains, tree debris, power outages and possibly some flooding.	Flood, Severe Winds	FEMA, NH HSEM, CNHRPC
<b>Pembroke Severe Hail Storm</b> <b>Jul 1990</b>	No	1990	Circa Jul	N/A	N/A, but it is reasonable to assume the region's communities experienced some of these issues	A severe hailstorm caused damage in Town, including damage to the Town Hall and Fire Station. The storm started out in the west side of Pembroke and moved to east of Pembroke Street to the Epsom town line, where a hail pile lasted 3 days. Hail broke windows, stripped leaves off trees and broke branches, and caused damage to widow unit air conditioners. In addition, siding on a home on Church Street had to be replaced as a result of the storm.	Severe Winds, Hail, Thunderstorm	Pembroke Hazard Mitigation Committee



# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
Severe Storms and Flooding Mar-Apr 1987	789 M-H	1987	Mar 30-Apr 11	No data available	Flooding caused by snowmelt and intense rain was felt in seven counties, including Merrimack and Hillsborough Counties which were declared disaster areas. Nearly \$5m in damages.	Heavy showers resulted in flooding along the Suncook River. The River was 7-8 feet higher than its normal level. Farmland and tomato crops were flooded.	Flood, Debris, Extreme Temps	Pembroke Hazard Mitigation Committee, CNHRPC, FEMA, NH HSEM, US Army Corps of Engineers
Severe Storms and Flooding Jul-Aug 1986	771 H	1986	Jul 29-Aug 10	No data available	Severe summer storms with heavy rains, tornadoes, flash floods, and severe winds, damaged the road network statewide. Disaster declared in Cheshire, Sullivan and Hillsborough Counties. Not declared in Merrimack County.	Pembroke's gravel roads likely washout during these storms. Trees likely fall onto roads along with power lines.	Flood, Wind, Landslide, Erosion, Debris	FEMA, NH HSEM, CNHRPC, Pembroke Hazard Mitigation Committee
Pembroke Hurricane Gloria Sep 1985	No	1985	Sep 27	N/A	The hurricane was experienced across NH and Merrimack and Hillsborough Counties.	On September 27, 1985 Hurricane Gloria was responsible for one fatality in Pembroke. A woman was struck and killed by windblown debris.	Severe Winds, Hurricane, Tropical	Pembroke Hazard Mitigation Committee, CNHRPC
Earthquake 4.5M Sanbornton Jan 1982	No	1982	Dec	N/A	An earthquake originating near in Sanbornton in Belknap County measured 4.5M and was felt in various locations throughout the State. The area it was felt includes all of northern Hillsborough County including the Concord area communities in Central NH. The earthquake was known to have cracked the original glass panes in one Warner resident's home.	A Sanbornton-centered earthquake could have caused some slight noise and shaking in Pembroke. Sanbornton is about 40 miles to the northeast of Pembroke.	Earth, Earthquake	CNHRPC, Earthquake-track.com,
Concord Beaver Meadow Tornado Jul 1979	No	1979	Jul 27	N/A	In Concord, a small twister was sighted at Beaver Meadow, where 13 trees were toppled, including a 100-foot tall pine. The duration was about 15-20 seconds.	N/A, although Concord and the Beaver Meadow area abuts Pembroke to the west.	Wind, Tornado	Concord Monitor
NH Blizzard of Feb 1978	No	1978	Feb 5-7	N/A	RSI Index of Category 5 (Extreme). This snowstorm is described as "a natural disaster of major proportions" and stunned all of New England. The storm was caused by an	It is likely many of the same snow depths and effects occurred across Pembroke as occurred in Merrimack County and New England. The entire Central NH	Extreme Temperatures, Severe Snowstorms, Blizzard, Windchill, Power	Pembroke Hazard Mitigation Committee; American Meteorological Society, Northeast

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
					intense coastal Nor'easter that produced winds in excess of hurricane force and very high snow totals. Most of southern New England received more than three feet of snow, 25-33" in NH and higher throughout New England. Abandoned cars along roadways immobilized infrastructure and blocked major interstates. For over a week, New England remained paralyzed by the storm. All of New Hampshire was impacted. Governor Meldrim Thomson Jr. declared a state of emergency.	Region was brought to a standstill.	Failure, Debris	States Emergency Consortium, CNHRPC
<b>Allenstown &amp; Pembroke Suncook River Ice Jams</b> <b>Mar 1977</b>	No	1977	Mar 14	N/A	In the Central NH region in March of 1977, ice break-up caused a major jam in the Suncook River, causing flooding both in Allenstown and Pembroke. Homes and roads were flooded. More than 100 buildings were evacuated in Allenstown and Pembroke combined. In the State, an ice jam caused major disruption to the road networks as a result of road washouts.	Silva's Trailer Park, on North Pembroke Road was flooded by the Suncook at the Concord Town Line.	River, Ice Jam, Flood, Winter, Extreme Temps, Debris Impacted Infrastructure	US Army Corps of Engineers, CNHRPC, Pembroke Haz Mit Committee
<b>Severe Storms and Flooding</b> <b>Jul 1973</b>	399 M-H	1973	Jul 11	No data available	All counties in the State of NH experienced storm damage and were declared disaster areas, including Merrimack and Hillsborough Counties.	Torrential downpours inundated the area, including Pembroke which likely experienced road washouts and lowland flooding.	Flood, Wind, Washout, Erosion	FEMA, CNHRPC, Pembroke Hazard Mitigation Committee
<b>Quebec Earthquake 4.8M</b> <b>Jun 1973</b>	No	1973	15-Jun	N/A	An earthquake originating near the Quebec border at a scale of 4.8 was felt in various locations throughout NH.	N/A, although some Pembroke residents may have felt the effects.	Earth, Earthquake	Northeast States Emergency Consortium, CNHRPC
<b>Hazard Events Before 1973</b>								

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
<b>Regional Earthquake Dec 1970</b>	No	1970	Dec 25	N/A	The origin and magnitude are unknown but likely impacted the Central NH Region.	Some Pembroke residents may have felt the earthquake effects.	Earth, Earthquake	CNHRPC, Earthquake-track.com, Pembroke Hazard Mitigation Committee
<b>Pembroke Suncook River Ice Jams Feb 1970</b>	No	1970	12-Feb	N/A	Three separate jam sites on the Suncook River - at an abandoned dam located close to the Route 28 bridge, causing evacuation of 5 homes and 50 trailers. The second jam near the Route 3 bridge, flooded roads and 40 families were forced to evacuate. Last ice jam was at the Webster Dam and resulted in eight flooded basements	Pembroke shares its border at the Suncook River with Allenstown. Two of these jams may have affected Pembroke.	Ice Jam, Flood, Severe Winter Weather, River	US Army Corps of Engineers NH Ice Jams Database
<b>Pembroke Soucook River Ice Jam Apr 1959</b>	No	1959	3-Apr	N/A	Reported by the US Army Corps of Engineers, "Maximum annual gage height of 12.03 feet, affected by backwater from ice, reported at USGS gage Soucook River near Concord, on April 3, 1959."	Ice jam recorded on the Soucook River. Pembroke's Soucook River border is shared with Concord. Gage is just north of the North Pembroke Bridge.	Ice Jam, River, Flood, Severe Winter Weather	US Army Corps of Engineers NH Ice Jams Database
<b>Pembroke Soucook River Ice Jam Mar 1958</b>	No	1958	19-Mar	N/A	Reported by the US Army Corps of Engineers, "Maximum annual gage height, 10.48 feet due to an ice jam recorded at USGS gage Soucook River near Concord, New Hampshire on March 19, 1968."	Ice jam recorded on the Soucook River. Pembroke's Soucook River border is shared with Concord. Gage is just north of the North Pembroke Bridge.	Ice Jam, River, Flood, Severe Winter Weather	US Army Corps of Engineers NH Ice Jams Database
<b>Older Hurricanes 1954-1991</b>	No	1954 to 1991		N/A	Many older hurricanes have impacted New Hampshire including the 1954 – 1991 Hurricanes: Carol on August 31, 1954 (tree and crop damage), Edna on September 11, 1954, Donna on April 12, 1960 (heavy flooding), Dora on August 28, 1971, Bell on August 10, 1976, Gloria on September 27, 1985, and Bob in 1991.	Downed trees, wind damage, and flooding were likely experienced in Pembroke during many of these hurricanes. This resulted in extensive crop and tree damage. No specific damages were noted.	Tropical, Wind, Flood, River, Debris, Power Failure	Pembroke Hazard Mitigation Committee, NH Homeland Security and Emergency Management, CNHRPC

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
<b>Regional Snowstorm and Rapid Snowpack Melt</b> <b>Mar 1953</b>	No	1953	Mar	N/A	Similar rain or snowstorms and rapid snowpack melt likely impacted the Central NH region. The highest level of water in the Blackwater Dam was measured, with the capacity at 93%. No flooding was reported. Uncertain as to exactly what type of storm caused this effect. A total of nearly 8" of precipitation in March 1953. The Hopkinton-Everett Flood Control Reservoir (1963) has not yet been constructed for this event. Contoocook River flooding was likely experienced	Local river flooding, including the Soucook River and Suncook River in Pembroke likely occurred.	Inland Flood, Extreme Temps, Debris	FEMA, NH HSEM, US Army Corps of Engineers, CNHRPC
<b>Regional Earthquake</b> <b>Dec 1940</b>	No	1940	Dec 20-24	N/A	The earthquake was reportedly felt in all of New Hampshire. The greatest earthquake felt in all of New Hampshire caused "a heavy rumble" and "was accompanied by the rattling of windows and the crashing of dishes" in the Central NH region.	Pembroke residents may have felt shaking or rattling and may have heard loud noises.	Earth, Earthquake	CNHRPC, Local Histories
<b>10 Severe Snowstorms</b> <b>1940-1978</b>	No	1940 to 1978		N/A	Ten severe snowstorms are documented in south-central NH during this time span, Feb 14-15, 1940 (depths over 30" and high winds), Feb 14-17, 1958 (20-33"), Mar 18-21, 1958 (22-24"), Mar 2-5, 1960 (up to 25"), Jan 18-20, 1961 (up to 25", blizzard conditions), Jan 11-14, 1964 (up to 12"), Jan 29-31, 1966 (up to 10"), Feb 22-28, 1969 (24-98", slow-moving storm), Dec 25-28, 1969 (12-18"), Jan 19-21, 1978 (up to 16").	Although it is unknown precisely what Pembroke experienced, it is likely many of the same snow depths occurred, as well as debris on roads, difficulty traveling, crashes, and power outages.	Extreme Temp, Winter, Snowstorm, Utility, Power Outage, Debris Impacted Infrastructure	American Meteorological Society, CNHRPC
<b>Regional Hurricane of</b> <b>Sep 1938</b>	No	1938	Sep 21	N/A	Hurricane made landfall as a 3 on the Saffir-Simpson Scale, killed about 682 people and damaged or destroyed over 57,000 homes.	The hurricane of September 1938 impacted Pembroke with some flooding and winds (Town Historians). Thirteen people died in	Tropical, Wind, Hurricane, Flood, Debris	CNHRPC, USGS 1938 report, Pembroke Hazard Mitigation

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
					<p>Most deadly New England hurricane. Central New Hampshire was inundated with water. This was also the worst hurricane to ever strike New England, resulting in 564 deaths and over 1,700 injuries (Northeast States Emergency Consortium). Downed trees caused extensive damage to homes, businesses and community infrastructure. President Roosevelt ordered emergency aid be sent to NH, including Hillsborough County. Thirteen people died in New Hampshire.</p>	<p>New Hampshire; no deaths occurred in Pembroke. This was the worst hurricane to ever strike New England, resulting in 564 deaths and over 1700 injuries. Like the rest of the state, Pembroke sustained tree damage, resulting in a great loss of lumber.</p> <p>In Pembroke, areas along the Merrimack River experienced heavy flooding. The area where Carlson's dealership in Concord on Route 3 is located now had 11 ft of water in the hollow. This made travel difficult and cut off Pembroke from Concord.</p> <p>Along the Suncook River, the Emerson Mill, Webster Mill, and Route 3 bridge experienced high, flowing water. Several pictures were taken of these and other locations to document the conditions which have not reoccurred since the 1938 hurricane.</p>		Committee, Wikipedia, Concord Monitor, Freak Winds of New Hampshire
<b>Regional Flood of Mar 1936</b>	No	1936	Mar 11-21	N/A	<p>Simultaneous high snowfall totals, heavy rains, and warm weather combined to hit all of New England. Floods killed 24 people, caused \$133,000,000 in damage, and made 77,000 people homeless in New England. The great flooding of 1936 resulted from heavy rains and rapid snowpack melt. Snow north of Concord contributed to the higher waters in the Winnepesaukee, Contoocook and Pemigewasset Rivers that were largely responsible for the destruction in Concord and surrounding area.</p>	<p>In Pembroke, lowlands near the Suncook River were flooded. During the March floods of 1936, an ice jam occurred in the Merrimack River and resulted in road flooding and evacuations in Pembroke</p>	<p>Flood, River, Ice Jam, Winter, Rapid Snow Melt, Erosion, Scouring, Debris Impacted Infrastructure</p>	<p>Concord Monitor, Union Leader, Army Corps of Engineers Ice Jam Database, CNHRPC, USGS 1938 report, Pembroke Hazard Mitigation Committee, Epsom Town Historian for regional information</p>

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Pembroke	Local Effects Occurring in Pembroke	Hazard Category	Source
					NH issued boil water warnings to everyone.			

*Source: Compilation of Events by Pembroke Hazard Mitigation Committee; CNHRPC*

## Description and Magnitude of Hazards

A compilation of past hazards that have occurred in Pembroke and the Central NH Region area is provided in the prior Table of **Local and Area Hazard Events**. **Existing and Susceptible Hazard Locations in Town** are areas to watch, areas of particular susceptibility and may be vulnerable to future events. **Potential Future Hazards** are determined based on the past hazard events, possibilities, and existing issues in Town to provide focus to future potential problem areas and to help with mitigation action development and are provided in the **Potential Future Hazards** section.

Each hazard is generally described and then is noted how and where it could occur in Pembroke. For all hazards examined in this Plan, a table of the **Hazard Locations in Town** and the **Potential Future Hazards** is provided at the end of this Plan Chapter.

Cumulative hazard events were researched using a wide variety of sources for the **original Pembroke Hazard Mitigation Plan 2004** and the **2010** and **2017 Plan Updates** which were the basis for many of the past disaster events and then were updated to the present day. The **2017 Plan** provided recent information on many of the extreme disasters experienced between **2005-2008**. Sources and techniques included interviewing local townspeople, researching Town Histories and related documents, and collecting information from governmental or non-profit websites. Presidentially declared disasters or other significant hazard events are described for the surrounding area or Merrimack County for the **Hazard Mitigation Plan Update 2022** and some of them may have affected the community. These disasters were also considered by the Committee when determining the risk evaluation.

Committee member experiences, knowledge, and recollections generally comprise the **Local and Area Hazard Events** and **Hazard Locations in Town**. While additional hazards might have occurred in Town, those events in the Plan are what the Committee chose to list, or were familiar with to list, to comprise the hazard events within the in Tables. The same is true for the **Potential Future Hazards** section.

Numeric of Probability and Severity	CONCERN SUMMARY	Numeric of Overall Risk Score
1	LOW	1 - 4.9
2	MEDIUM	5 - 7.9
3	HIGH	8 - 11.9
4	HIGH	12 - 16



## **EARTH HAZARDS**

Earth hazards include geologic events such as the small earthquake NH residents experience. The Central NH area is seismically active and small earthquakes (less than **2.5** magnitude on the Richter Scale) occur about **1-2** times per year. Landslides can occur because of earthquakes, rain, flooding and result in erosion along roadways and watercourses.

Radon is a naturally occurring radioactive gas with carcinogenic properties. The gas is a common problem in many states, including New Hampshire, seeping into homes from basements. Radon may also enter homes dissolved in drinking water from drilled wells. High levels of radon in water from individual drilled wells is a common occurrence in New Hampshire. Radon is no longer being addressed by the *State of New Hampshire Multi-Hazard Mitigation Plan 2018* as no new studies have made specific data available. It is generally known that radon exists throughout in the State and in communities, including the Central NH Region. Arsenic is a new concern that often co-occurs with radon. Radon is known to be present throughout New Hampshire and is addressed on an individual basis, no longer addressed in the **Pembroke Hazard Mitigation Plan** because of the lack of State monitoring and available action.

There are several types of **EARTH** hazards examined in the **Hazard Identification and Risk Assessment**:

Main Hazard Category	Specific Hazards Included		
<b>EARTH</b>	<b>DROUGHT</b>	<b>EARTHQUAKE</b>	<b>LANDSLIDE</b> Soil, Rockslide or Excavation Areas

### **Drought**

The overall ratings of **Drought** in Pembroke from the **HIRA** are:

Natural, Technological, Human Hazard Categories	Probability of Occurrence in 10 Years (1-4)	Human Injury Impact (1-4)	Essential Services or Infrastructure Impact (1-4)	Property Damage or Economic Impact (1-4)	OVERALL RISK (1-16)
<b>DROUGHT</b>	<b>3</b> <b>HIGH</b>	<b>2</b> MEDIUM	<b>3</b> HIGH	<b>3</b> HIGH	<b>8.0</b> <b>HIGH</b>

A drought is defined as a long period of abnormally low precipitation, especially one that adversely affects growing or living conditions. Droughts are becoming less rare in New Hampshire that they have been in the past. They have different, widespread damages compared with floods and are more difficult to define. The effect of droughts is indicated through measurements of soil moisture, groundwater levels, and streamflow. However, not all indicators will be minimal during a drought. For example, frequent minor rainstorms can replenish the soil moisture without raising ground-water levels or increasing streamflow. Low streamflow also correlates with low ground-water levels and commonly cause diminished water supply because ground water discharge to streams and rivers maintains streamflow during extended dry periods.



In the case of drought, residential (dug wells especially) and Town water supplies would be threatened. The [Pembroke Water Works](#) has the capability to implement or recommend volunteer water restrictions during dry conditions within the district area. The remaining residences, non-residential buildings and Town facilities rely either on community water systems pumped from bedrock or on individual well water systems which are not easily replenished during periods of drought. During the **2015-2020** drought period, many residences notified the Town of their dug wells going dry. The residents either made private arrangements for potable water or they dug new bedrock wells. All farms, orchards, tree farms, and conservation areas in Town would be affected by drought. Additionally, wildfires have the potential of being more severe and commonplace during periods of drought, more difficult to contain. The Fire Department uses larger water sources like the Merrimack, Suncook, and Soucook Rivers for pumping into tankers.

### Magnitude of Drought

**Table 13** displays overall drought magnitude as measured by the US Drought Monitor (USDM) and Palmer Hydrological Drought Index (PHDI), the extent of hydrological drought in the form of long-term, cumulative monthly moisture conditions. The weekly [US Drought Monitor for NH](#) can be accessed online. The Palmer indices are developed by algorithms taking into consideration precipitation, temperature data, and the local Available Water Content (AWC) of the soil.

**Table 13**  
**US Drought Monitor Intensity Scale**

Category	Description	Description of Possible Impacts	Palmer Drought Severity Index (PDSI)
D0	Abnormally Dry	Going into drought: - Short-term dryness, slow planting, growth of crops or pastures Coming out of drought: - Some lingering water deficits - Pastures or crops not fully recovered	-1.0 to -1.9
D1	Moderate Drought	- Some damage to crops, pastures - Streams, reservoirs or wells low, some water shortages developing or imminent - Voluntary water use restrictions requested	-2.0 to -2.9
D2	Severe Drought	- Crop or pasture losses likely - Water shortages common - Water restrictions imposed	-3.0 to -3.9
D3	Extreme Drought	- Major crop/pasture losses - Widespread water shortages or restrictions	-4.0 to -4.9
D4	Exceptional Drought	- Exceptional and widespread crop/pasture losses - Shortages of water in reservoirs, streams and wells creating water emergencies	-5.0 or less

Source: <https://droughtmonitor.unl.edu/AboutUSDM/AbouttheData/DroughtClassification.aspx>

as compiled by CNHRPC, accessed 02-22-19

## Earthquake

The overall ratings of **Earthquake** in Pembroke from the **HIRA** are:

Natural, Technological, Human Hazard Categories	Probability of Occurrence in 10 Years (1-4)	Human Injury Impact (1-4)	Essential Services or Infrastructure Impact (1-4)	Property Damage or Economic Impact (1-4)	OVERALL RISK (1-16)
EARTHQUAKE	2 MEDIUM	1 LOW	1 LOW	1 LOW	2.0 LOW

An earthquake is a rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. **Earthquakes** can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and often cause **landslides, flash floods, fires**, and possibly snow avalanches, which are not considered relevant to Pembroke's geography. Larger earthquakes usually begin with slight tremors but rapidly take the form of one or more violent shocks, and end in vibrations of gradually diminishing force called aftershocks. The underground point of origin of an earthquake is called its focus; the point on the surface directly above the focus is the epicenter. The magnitude and intensity of an earthquake is determined by scales such as the Richter scale and Mercalli scale. Geologic events are often associated with California, but New England is considered a moderate risk earthquake zone. New Hampshire experiences regular, minor earthquakes with its bedrock geology.

### Magnitude of Earthquake

Earthquake hazard magnitude can be measured by the Richter Scale as shown in **Table 14**, just as its intensity can be measured by the Modified Mercalli Instrumental Intensity (MMI) scale. The two scales do not correlate consistently among sources but utilizing a combination of scales and descriptions on USGS and NOAA sites, **Table 14** approximates the Richter to Mercalli comparison. For practical purposes, descriptions of potential impacts to people, furnishings, the built environment and the natural environment are provided to better place earthquake magnitude in perspective.

**Table 14**  
**Modified Mercalli and Richter Magnitude Scales**

Approx Richter Magni- tude Scale	Mercalli Instru- mental Intensity Scale	Damage Category	Perceived Shaking	Potential Impacts			
				People's Reaction	Furnishings	Built Environment	Natural Environment
<b>&lt; 3</b>	<b>I</b>	<b>Instrumental</b>	Not felt	Not felt.	N/A	Passing truck vibrations and noises	Changes in level and clarity of well water are occasionally associated with great earthquakes at distances beyond which the quakes are felt by people
<b>3 – 3.4</b>	<b>II</b>	<b>Just Perceptible</b>	Weak	Felt by a few.	Delicately suspended objects may swing.	N/A	Trees and bodies of water sway.
<b>3.5 - 4</b>	<b>III</b>	<b>Slight</b>	Weak	Felt by several. Vibrations like a truck passing.	Hanging objects may swing appreciably. Vehicles rocked slightly.	N/A	N/A
<b>4.1 – 4.4</b>	<b>IV</b>	<b>Moderate</b>	Light	Felt by many. Sensation like heavy truck striking building.	Dishes rattle. Vehicles rocked noticeably.	Walls creak, windows rattle.	N/A
<b>4.5 – 4.8</b>	<b>V</b>	<b>Rather Strong</b>	Moderate	Felt by nearly all. Frightens a few.	Pictures swing out of place; small objects move; a few objects fall from shelves within the community.	A few instances of cracked plaster and cracked windows in the community.	Trees and bushes shaken noticeably.
<b>4.9 – 5.4</b>	<b>VI</b>	<b>Strong</b>	Strong	Frightens many. People move unsteadily	Many objects fall from shelves.	A few instances of fallen plaster, broken windows and damaged chimneys within the community.	Some fall of tree limbs and tops, isolated rockfalls and landslides, and isolated liquefaction.
<b>5.5 - 6</b>	<b>VII</b>	<b>Very Strong</b>	Very strong	Frightens most. Some lose balance.	Heavy furniture overturned	Damage negligible in buildings of good design and construction but considerable in some historic, poorly built or badly designed structures; weak chimneys broken at roof line, fall of unbraced parapets.	Tree damage, rockfalls, landslides, and liquefaction are more severe and widespread with increasing intensity. Water is stirred and muddy.
<b>6.1 – 6.5</b>	<b>VIII</b>	<b>Destructive</b>	Severe	Many find it difficult to stand	Very heavy furniture moves conspicuously.	Damage slight in buildings designed to be earthquake resistant but	N/A

**4 HAZARD RISK ASSESSMENT**

Approx Richter Magni- tude Scale	Mercalli Instru- mental Intensity Scale	Damage Category	Perceived Shaking	Potential Impacts			
				People's Reaction	Furnishings	Built Environment	Natural Environment
						severe in historic or some poorly built structures. Widespread fall of chimneys, walls and monuments. Powerlines fallen.	
<b>6.6 - 7</b>	<b>IX</b>	<b>Ruinous</b>	Violent	Some forcibly thrown to the ground	N/A	Damage considerable in some buildings designed to be earthquake resistant; buildings shift off foundations if not bolted.	N/A
<b>7.1 – 7.3</b>	<b>X</b>	<b>Disastrous</b>	Extreme	N/A	N/A	Some well-built wooden structures destroyed. Most ordinary masonry structures collapse; damage moderate to severe in many buildings designed to be earthquake resistant. Dams destroyed.	N/A
<b>7.4 – 8.1</b>	<b>XI</b>	<b>Very Disastrous</b>	N/A	N/A	N/A	Few if any masonry structures remain standing. Bridges destroyed. Rails bent greatly. Wide cracks in ground. Pipelines break	Waves seen on the ground
<b>&gt; 8.1</b>	<b>XII</b>	<b>Catastrophic</b>				Total damage. Lines of sight and level are distorted. Objects thrown into air.	Waves seen on the ground

Source: National Oceanic and Atmospheric Administration (NOAA), USGS and other sources compiled by CNHRPC Feb 2021

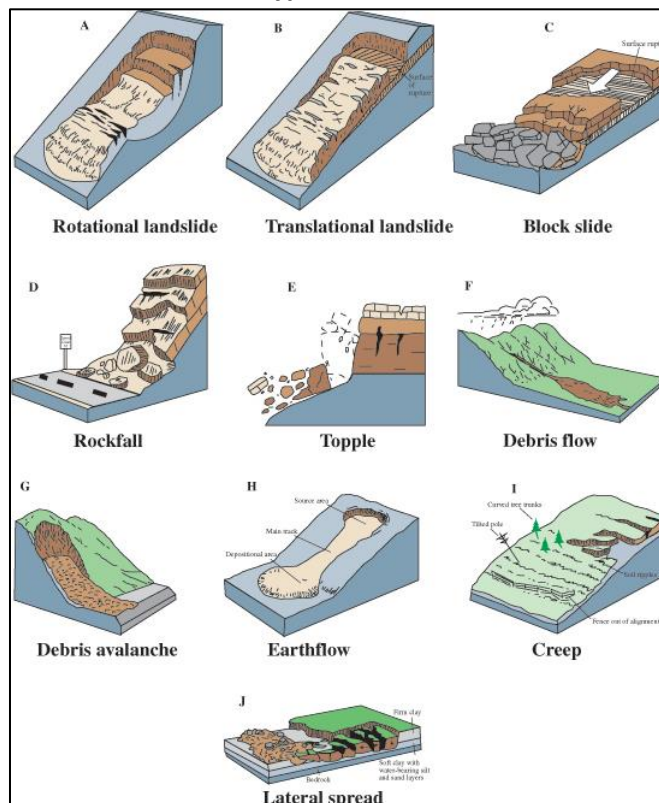
## Landslide

The overall ratings of **Landslide** in Pembroke from the **HIRA** are:

Natural, Technological, Human Hazard Categories	Probability of Occurrence in 10 Years (1-4)	Human Injury Impact (1-4)	Essential Services or Infrastructure Impact (1-4)	Property Damage or Economic Impact (1-4)	OVERALL RISK (1-16)
<b>LANDSLIDE</b>	<b>2 MEDIUM</b>	2 MEDIUM	1 LOW	1 LOW	<b>2.7 LOW</b>

A landslide is the downward or outward movement of slope-forming materials reacting under the force of gravity, including: mudflows, mudslides, debris flows, rockslides, debris avalanches, debris slides, and earth flows. Erosion of soil may also contribute to landslides. **Landslides** could damage or destroy State roads or local Class V roads, electrical and telephone lines, buildings, sewers, bridges, dams, forests, parks, and farms and landslides are dangerous to people. A display of different types of landslides is shown in **Figure 6**.

**Figure 6**  
**Basic Types of Landslides**



Source: US Geological Survey (USGS)

## Magnitude of Landslide

There is no known standardized measurement of landslide magnitude available.

## EXTREME TEMPERATURE HAZARDS

Extreme temperature hazards include diverse hazards such as severe cold or windchill, excessive heat, and heatwaves. Excessive heat or extreme cold can create other hazards such as public health issues, utility outages. The severity of these hazards is influenced by New Hampshire's changing climate and severe weather systems. This category is meant to encompass all the hazards which can be influenced by the extreme weather temperatures that New England, New Hampshire, the Central NH Region, and Pembroke are experiencing.

There are several types of **EXTREME TEMPERATURE** hazards examined in the **Hazard Identification and Risk Assessment**:

Main Hazard Category	Specific Hazards Included
<b>EXTREME TEMPERATURES</b>	EXTREME TEMPERATURES Excessive Heat, Heat Wave, Cold or Wind Chill

The environmental temperature spectrum is addressed under extreme temperatures, from very cold to very hot.

The overall ratings of **Extreme Temperatures** in Pembroke from the **HIRA** are:

Natural, Technological, Human Hazard Categories	Probability of Occurrence in 10 Years (1-4)	Human Injury Impact (1-4)	Essential Services or Infrastructure Impact (1-4)	Property Damage or Economic Impact (1-4)	OVERALL RISK (1-16)
<b>EXTREME TEMPERATURES</b> Excessive Heat, Heat Wave, or Cold or Wind Chill	<b>2</b> <b>MEDIUM</b>	<b>1</b> LOW	<b>1</b> LOW	<b>1</b> LOW	<b>2.0</b> <b>LOW</b>

### Extreme Heat or Heatwave

A heat wave is a period of abnormally and uncomfortably hot and unusually humid weather that typically lasts two or more days. The National Weather Services' Heat Index is used to measure humidity against temperature to develop a "real feel" temperature. Heat disorders on the body are quick and can be deadly. These now normal hot temperatures in the summer are commonly known as **excessive heat**.

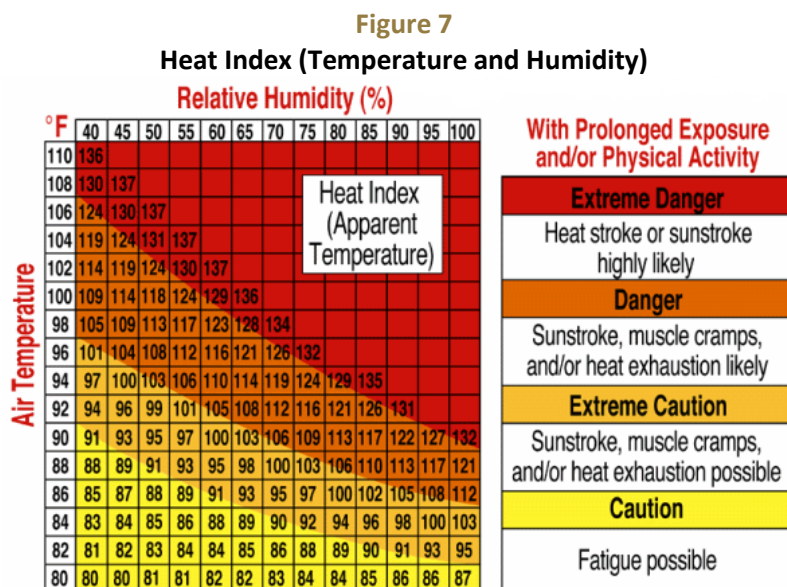
The National Weather Service categorizes a **Hot Day** when temperatures reach **90°** or warmer. An official **Heat Wave** is defined as three or more consecutive days with the temperature reaching or exceeding **90°**.

Extreme heat weather is forecasted with the following levels of high temperatures. **Excessive Heat Outlooks** are issued when the potential exists for an excessive heat event in the next **3-7** days. An Outlook provides information to those who need considerable lead-time to prepare for the event.

<p>🌡️ <b>Excessive Heat Watch</b></p> <p><b>BE PREPARED</b></p>	<p>A <b>Heat Watch</b> is issued when conditions are favorable for an excessive heat event in the next <b>24 to 72</b> hours. A Watch is used when the risk of a heat wave has increased but its occurrence and timing is still uncertain.</p>
<p>🌡️ <b>Excessive Heat Warning</b></p> <p><b>BE AWARE</b></p>	<p>An Excessive <b>Heat Warning</b> is issued within <b>12</b> hours of the onset of extremely dangerous heat conditions. The general rule of thumb for this Warning is when the maximum heat index temperature is expected to be <b>105°F</b> or higher for at least <b>2</b> days and nighttime air temperatures will not drop below <b>75°F</b>; however, these criteria vary across the country, especially for areas not used to extreme heat conditions. If you don't take precautions immediately when conditions are extreme, you may become seriously ill or even die.</p>
<p>🌡️ <b>Heat Advisory</b></p> <p><b>TAKE ACTION</b></p>	<p>A <b>Heat Advisory</b> is issued within <b>12</b> hours of the onset of extremely dangerous heat conditions. The general rule of thumb for this Advisory is when the maximum heat index temperature is expected to be <b>100°F</b> or higher for at least <b>2</b> days, and nighttime air temperatures will not drop below <b>75°F</b>; however, these criteria vary across the country, especially for areas that are not used to dangerous heat conditions. Take precautions to avoid heat illness. If you don't take precautions, you may become seriously ill or even die</p>

#### Magnitude of Excessive Heat of Heat Wave

Excessive heat is measured by the [NWS Heat Index and the NWS Excessive Heat Warning Classifications](#). As both the air temperature and the humidity rise, so will the danger level to people. Heat disorders will become more likely with prolonged exposure or strenuous activity as shown in **Figure 7**.



Source: weather.gov



The **Caution** stage describes how fatigue is possible, while **Extreme Caution** temperatures can result in sunstroke, muscle cramps, or heat exhaustion. The **Danger** temperatures could cause sunstroke, while at the **Extreme Danger** temperatures, heatstroke or sunstroke is likely according to the humidity and temperature Heat Index. Since heat index values were devised for shady, light wind conditions, exposure to full sunshine can increase heat index values by up to **15°F**. Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.

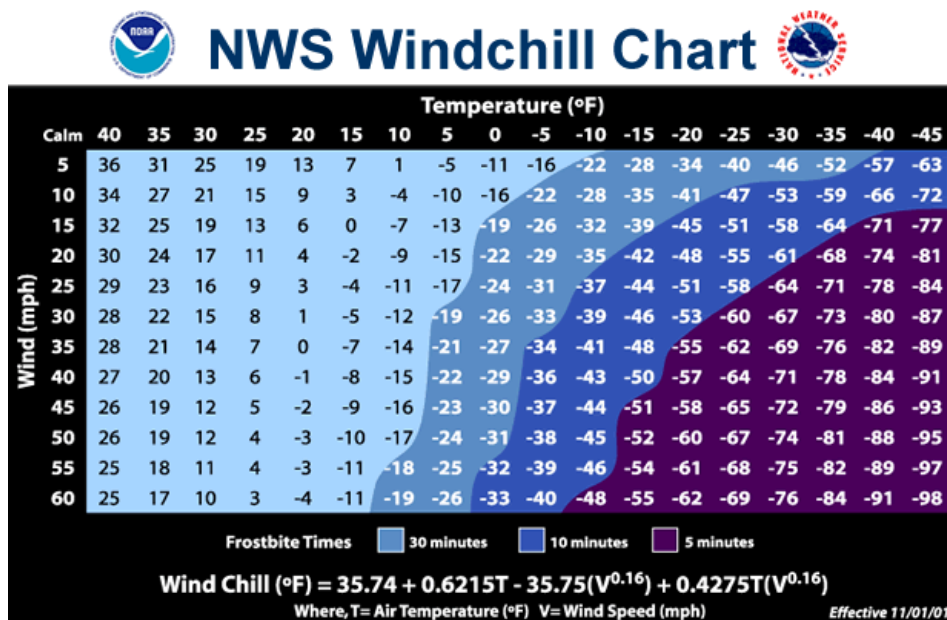
### Extreme Cold or Wind Chill

Extreme cold temperatures are associated with continental Arctic air masses. The actual temperatures reached depend specifically on the nature of the cold air mass and where it originated. In general, those from the Arctic regions are the coldest. Though cold temperatures are dangerous, they become more so in conjunction with strong winds. The combination produces a wind-chill factor, which is heat loss measured in Watts per meter squared (Wm-2). A wind-chill factor of **1400** Wm-2 is equivalent to a temperature of **-40° F**. At **2700** Wm-2, exposed flesh freezes within a half-minute.

### Magnitude of Extreme Cold or Wind Chill




Extreme cold magnitude can be measured for **windchill** using the **NWS Windchill Temperature (WCT) Index** as displayed in **Figure 8**, measuring the wind and temperature leading to how quickly frostbite can occur. The **extreme cold weather** warning stages describe the potential impacts of the weather.

Figure 8  
Windchill Temperature (WCT) Index







Source: [National Weather Service](https://www.weather.gov/eaa/windchill)

Cold weather warnings incrementally warn people of the dangers of **extreme cold**. The [National Weather Service](#) provides watches, advisories, and warnings.

 <b>Wind Chill Watch</b>  <b>BE PREPARED</b>	NWS issues a wind chill watch when dangerously cold wind chill values are possible. As with a warning, adjust your plans to avoid being outside during the coldest parts of the day. Make sure your car has at least a half tank of gas and update your winter survival kit.
 <b>Wind Chill Advisory</b>  <b>BE AWARE</b>	NWS issues a wind chill advisory when seasonably cold wind chill values, but not extremely cold values, are expected or are occurring. Be sure you and your loved ones dress appropriately and cover exposed skin when venturing outdoors. A <b>Wind Chill Advisory</b> is issued for New Hampshire when wind chill values are expected to be <b>-20°F to -29°F</b> and winds are greater than <b>5 mph</b> .
 <b>Wind Chill Warning</b>  <b>TAKE ACTION</b>	NWS issues a wind chill warning when dangerously cold wind chill values are expected or are occurring. A <b>Wind Chill Warning</b> is issued for New Hampshire when wind chill values are expected to be <b>-30°F</b> and winds are greater than <b>5 mph</b> .

In addition to cold winds, the National Weather Service provides **extreme cold** guidance for several stages of weather alerts that are usually directed towards vegetation and crops. However, these freezing stages can also apply to watercourses, to animals kept outdoors or in barns, and to infrastructure such as bridges, dams, and roads (“black ice”).

 <b>Frost Advisory</b>  <b>BE AWARE</b>	A <b>Frost Advisory</b> is issued when areas of frost are expected or occurring, posing a threat to sensitive vegetation. Frost develops on clear, calm nights and can occur when the air temperature is in the mid-30°Fs. Each plant species has a different tolerance to cold temperatures.
 <b>Freeze Watch</b>  <b>BE PREPARED</b>	NWS issues a <b>Freeze Watch</b> when there is a potential for significant, widespread freezing temperatures (below 32°F) within the next 24-36 hours. A freeze watch is issued in the autumn until the end of the growing season and in the spring at the start of the growing season.
 <b>Freeze Warning</b>  <b>TAKE ACTION</b>	When temperatures are forecasted to go below 32°F for a long period of time, NWS issues a <b>Freeze Warning</b> . This temperature threshold kills some types of commercial crops and residential plants.
 <b>Hard Freeze Warning</b>  <b>TAKE ACTION</b>	NWS issues a <b>Hard Freeze Warning</b> when temperatures are expected to drop below 28°F for an extended period of time, killing most types of commercial crops and residential plants.

The **extreme cold** is difficult to define because what constitutes **extreme cold** varies in different parts of the country. Generally, in New Hampshire **extreme cold hazards** can arise through a combination of wind chill, below freezing cold temperatures, and winter storm events. In the Northeast, **extreme cold** means temperatures below zero (**-0°F**). Extended **extreme cold** durations are often referred to as cold snaps.

Although New Hampshire residents are used to frosts, freezes and vegetation protection, **extreme cold** may cause water pipes to freeze and burst in homes that are poorly insulated or without enough heat. The demand for additional heating fuel is necessary during **extreme cold** events, and often electricity failure is experienced during winter storms with **extreme cold**. Exposure to cold conditions can cause frostbite or hypothermia and become life-threatening. Infants, children, and elderly people are most susceptible. Most New Hampshire households are become used to winter storm events and use woodstoves, or propane or electric generators to keep homes warm during extreme cold when power failure occurs. Recommendations are to maintain at least **72** hours' worth of fuel, food, water, medical supplies, medications, and warm clothing in a storm emergency kit as well as to keep vehicles fueled.

Frostbite is damage to body tissue caused by **extreme cold**. A wind chill of **-20°F** will cause frostbite in just **30** minutes. Frostbite causes a loss of feeling and a white or pale appearance in extremities, such as fingers, toes, ear lobes or the tip of the nose. Additional exposure can turn the appendage purple, a dangerous condition. If symptoms are detected, get medical help immediately. If help must wait, slowly re-warm affected areas. However, if the person is also showing signs of hypothermia, warm the body core before the extremities.

Hypothermia is a potentially deadly condition when the body temperature drops to less than **95°F** through exposure to **extreme cold**, or extended cold or water submersion. For those who survive, there are likely to be lasting kidney, liver and pancreas problems. Warning signs include uncontrollable shivering, memory loss, disorientation, incoherence, slurred speech, drowsiness and apparent exhaustion. Take the person's temperature and if below **95°F**, seek medical care immediately. If help must wait, place the person into a lukewarm bath to warm the core gradually.

## FIRE HAZARDS

Fire can be caused by several agents and can spread rapidly to consume property and endanger lives. This **2022 Plan** examines **lightning**, and **wildfire** (natural) fire sources and places other **fires (vehicles, structure, arson, explosions)** with **Technological Hazards**.

Wildfire is a significant concern and can quickly get out of control without good infrastructure, easily accessible forested backlots and practiced procedures. Lightning or human folly can cause wildfire. Locations of older narrow graveled roads, densely packed residential areas, cul-de-sacs, and roads or areas of Town with only **1** access/egress are among the most vulnerable locations for fire and wildfire hazards. Rural, forested areas of the community or recreation and conservation areas are often the most vulnerable to both **wildfire** and **lightning**.

There are several types of natural **FIRE** hazards examined in the **Hazard Identification and Risk Assessment**:

Main Hazard Category	Specific Hazards Included	
<b>FIRE</b>	<b>WILDFIRE</b> Brushfire, Outdoor Fires or Accidental	<b>LIGHTNING</b>

## Wildfire

The overall ratings of **Wildfire** in Pembroke from the **HIRA** are:

Natural, Technological, Human Hazard Categories	Probability of Occurrence in 10 Years (1-4)	Human Injury Impact (1-4)	Essential Services or Infrastructure Impact (1-4)	Property Damage or Economic Impact (1-4)	OVERALL RISK (1-16)
<b>WILDFIRE</b> <b>Brushfire, Outdoor Fires or Accidental</b>	<b>4</b> <b>HIGH</b>	<b>2</b> MEDIUM	<b>1</b> LOW	<b>2</b> MEDIUM	<b>6.7</b> <b>MEDIUM</b>

Wildfire is defined as any unwanted and unplanned fire burning in forest, shrub or grass. Wildfires are frequently referred to as forest fires, brush fires, shrub fires or grass fires, depending on their location and size. They often occur during drought and when woody debris on the forest floor is readily available to fuel the fire. The threat of wildfires is greatest where vegetation patterns have been altered by past land-use practices, fire suppression and fire exclusion. Because fire is a natural process, fire suppression can lead to more severe wildfires due to vegetation buildup. With the Town's conservation lands, **wildfire** seems particularly relevant. The burning of brush, permitted or not, can become an uncontrollable brushfire in dry or unsuitable conditions.

Increased severity over recent years has decreased capability to extinguish wildfires. Wildfires are unpredictable and usually destructive, causing both personal property damage and damage to community infrastructure and cultural and economic resources.

### Magnitude of Wildfire






Although there are several potential indices, the current standard of measuring wildfire magnitude is utilizing the National Wildfire Coordinating Group (NWCG)'s wildfire classification scale. **Table 15** displays the wildfire classification size per the number of acres burned.

**Table 15**  
**National Wildfire Coordinating Group Wildfire Classification Scale**

Fire Class	Sizes in Acres
Class A	1/4 acre or less
Class B	> 1/4 acre to < 10 acres
Class C	10 acres to < 100 acres
Class D	100 acres to < 300 acres
Class E	300 acres to < 1,000 acres
Class F	1,000 acres to < 5,000 acres
Class G	5,000 acres or more

*Source: National Wildfire Coordinating Group*

The [New Hampshire Department of Natural and Cultural Resources Division \(NHDNCR\) of Forest and Lands \(DFL\)](#) helps to promote daily fire danger ratings which community members can readily understand. The Fire Department posts the information in a prominent location, at the Fire Station. The **National Fire Danger Rating System (NFDRS)** categories are as follows:

 <b>Low</b> <b>GREEN</b>	Fire starts are unlikely. Weather and fuel conditions will lead to slow fire spread, low intensity and relatively easy control with light mop-up. Controlled burns can usually be executed with reasonable safety.
 <b>Moderate</b> <b>BLUE</b>	Some wildfires may be expected. Expect moderate flame length and rate of spread. Control is usually not difficult and light to moderate mop-up can be expected. Although controlled burning can be done without creating a hazard, routine caution should be taken.
 <b>High</b> <b>YELLOW</b>	Wildfires are likely. Fires in heavy, continuous fuel such as mature grassland, weed fields and forest litter, will be difficult to control under windy conditions. Control through direct attack may be difficult but possible and mop-up will be required. Outdoor burning should be restricted to early morning and late evening hours.
 <b>Very High</b> <b>ORANGE</b>	Fires start easily from all causes and may spread faster than suppression resources can travel. Flame lengths will be long with high intensity, making control very difficult. Both suppression and mop-up will require an extended and very thorough effort. Outdoor burning is not recommended.
 <b>Extreme</b> <b>RED</b>	Fires will start and spread rapidly. Every fire start has the potential to become large. Expect extreme, erratic fire behavior. NO OUTDOOR BURNING SHOULD TAKE PLACE IN AREAS WITH EXTREME FIRE DANGER.

## Lightning

The overall ratings of **Lightning** in Pembroke from the **HIRA** are:

Natural, Technological, Human Hazard Categories	Probability of Occurrence in 10 Years (1-4)	Human Injury Impact (1-4)	Essential Services or Infrastructure Impact (1-4)	Property Damage or Economic Impact (1-4)	OVERALL RISK (1-16)
<b>LIGHTNING</b>	<b>3 HIGH</b>	1 LOW	1 LOW	1 LOW	<b>3.0 LOW</b>

The [NOAA National Severe Storms Laboratory defines lightning](#) as: a giant spark of electricity in the atmosphere between the clouds, the air, or the ground. In the early stages of development, air acts as an insulator between the positive and negative charges in the cloud and between the cloud and the ground. When the opposite charges build up enough, this insulating capacity of the air diminishes, forming a rapid discharge of electricity (lightning). The flash of lightning temporarily equalizes the charged regions in the atmosphere until the opposite charges build up again.

All thunderstorms contain lightning, but not all lightning is caused by thunderstorms. Lightning can also be seen during volcanic eruptions, surface nuclear detonations, and heavy snowstorms. During a lightning discharge, the sudden heating of the air causes it to expand rapidly. After the discharge, the air contracts quickly as it cools back to ambient temperatures. This rapid expansion and contraction of the air causes a shock wave that we hear as thunder, a shock wave that can damage building walls and break glass. Lightning strikes can cause death, injury, and property damage. Lightning is often referred to as the “underrated killer.” Lightning can strike where it is not raining, or even before rain reaches the ground.

There are four main types of lightning:

- ➞ Cloud-to-ground (CG) strike is the most common type of lightning, reaching toward the surface.
- ➞ Cloud flashes like intra-cloud (IC) or sheet lightning occur either in the same cloud or from cloud-to-air (CA) and do not reach the ground.
- ➞ Cloud-to-cloud (CC) or spider lightning travel among and illuminate multiple clouds.
- ➞ Transient luminous events (TLE) are rarely observed from the ground and occur in the high atmosphere above the storms.

Where the CG lightning will strike downward, a channel current of **1-2** inches develops toward the earth’s surface. As lightning nears the ground, objects like trees, telephone poles, and buildings start sending up static electricity sparks to meet this channel. Taller objects such as trees and historic buildings with cupolas, or hills are more likely than the surrounding ground to produce one of the connecting sparks and so are more likely to be struck by lightning. Yet lightning can strike the ground in an open field even if the tree line is nearby. The National Weather Service more provides information about [lightning safety](#).

### Magnitude of Lightning

Lightning can be measured to determine how likely it may be for starting fires. Using a Level system of **1** to **6** corresponding with storm development and the number of lightning strikes, the [Lightning Activity Level \(LAL\)](#) measures the magnitude of lightning strikes as displayed in **Table 16**.

**Table 16**  
**Lightning Activity Level (LAL)**

Level 1-6	LAL Cloud and Storm Development	Cloud to Ground Strikes per 5 Minutes	Cloud to Ground Strikes per 15 Minutes
<b>LAL 1</b>	No thunderstorms.	n/a	n/a
<b>LAL 2</b>	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a 5- minute period.	1 to 5	1 to 8
<b>LAL 3</b>	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5-minute period.	6 to 10	9 to 15
<b>LAL 4</b>	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a 5-minute period.	11 to 15	16 to 25
<b>LAL 5</b>	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a 5-minute period.	> 15	> 25
<b>LAL 6</b>	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.	6 to 10	9 to 15

*Source: National Weather Service*



## **FLOOD HAZARDS**

Floods are defined as a temporary overflow of water onto lands that are not normally covered by water. Flooding results from the overflow of major rivers and tributaries, storm surges, and/or inadequate local drainage. Floods can cause loss of life, property damage, crop/livestock damage, and water supply contamination. Floods can also disrupt travel routes on roads and bridges. However, floods can be beneficial to the low lying agricultural areas which are used for active farm and by enriching the soil.

Floodplains are usually located in lowlands near rivers, and flood on a regular basis. The term **100-year flood** does not mean that a flood will occur once every **100** years. It is a statement of probability that scientists and engineers use to describe how one flood compares to others that are likely to occur. It is more accurate to use the phrase **1% annual chance flood**. This phrase means that there is a **1%** chance of a flood of that size happening in any single year. The **500-year** floods are phrased as **0.2%** annual chance of flood.

Inland floods are most likely to occur in the spring due to the increase in rainfall and melting of snow; however, floods can occur at any time of year. A sudden thaw during the winter or a major downpour in the summer can cause flooding because there is suddenly a lot of water in one place with nowhere to drain. Flooding is the most common natural disaster to affect New Hampshire, a common and costly hazard.

**Dam Breach, Release or Failure** has a close relationship with **Flood Hazards**, uses the NH DES Dam Hazard Classification categories, and has therefore been rated along with the natural hazards.

There are several types of **Flood Hazards** examined in the **Hazard Identification and Risk Assessment**:

Main Hazard Category	Specific Hazards Included	
<b>FLOOD</b>	<b>INLAND FLOODING</b> Rains, Snow Melt, or Flash Floods	<b>RIVER HAZARDS</b> Ice Jams, Scouring, Erosion, Channel Movement or Debris
	<b>DAM FAILURE</b> Water Overtop, Breach, Beaver, etc.	

### **Inland Flooding**

The overall ratings of **Inland Flooding** in Pembroke from the **HIRA** are:

Natural, Technological, Human Hazard Categories	Probability of Occurrence in 10 Years (1-4)	Human Injury Impact (1-4)	Essential Services or Infrastructure Impact (1-4)	Property Damage or Economic Impact (1-4)	OVERALL RISK (1-16)
<b>INLAND FLOODING</b> Rains, Snow Melt or Flash Floods	<b>2</b> <b>MEDIUM</b>	<b>2</b> MEDIUM	<b>3</b> HIGH	<b>3</b> HIGH	<b>5.3</b> <b>MEDIUM</b>

**Inland flooding** hazards from storms, spring temperatures, rains and more can be measured by Special Hazard Flood Areas (SFHAs) and river gage flood stage heights.

#### Magnitude of Inland Flooding

Flooding magnitude, or how severe flooding could occur in Pembroke, can be measured by the following SFHA Flood Zone scale in **Table 17**. “Flood” encompasses all types of flooding including **Rains, Snow Melt, Floods and Flash Floods** and is often the result of other natural hazards, such as **Tropical and Post Tropical, Severe Storms**, etc.

#### Special Flood Hazard Areas (SFHAs)

**Base Flood Elevations (BFEs)** are abundant within Central NH along the **Merrimack River, Contoocook River, Blackwater River, Warner River, Soucook River, and Suncook River** on the DFIRMs of **2009** (Hillsborough County) and **2010** (Merrimack County). In Pembroke (**#330119**) New Hampshire (**33011C**), there are several DFIRMs identifying floodplains. DFIRM panels are not printed when floodplains are not present in an area.

DFIRMs illustrate the location of floodplains as a significant upgrade from the previous series of outdated paper maps, known as FIRMs. These new **2010** maps for Pembroke are now set on an aerial photography background that displays roads, buildings, forested areas, waterbodies and watercourses. Pembroke’s Zoning Ordinance references the **2010** maps appropriately as the official DFIRMS. The general Flood Zone types appear in **Table 17**.

**Table 17**  
**Special Flood Hazard Area (SFHA) Zones on 2010 DFIRMS**

Special Flood Hazard Areas on Pembroke DFIRMs	
<b>Zone A</b>	<b>1% annual chance of flooding</b> <ul style="list-style-type: none"> <li>• <b>100-year</b> floodplains <i>without</i> Base Flood Elevations (BFE)</li> </ul>
<b>Zone AE</b> (with or without floodways)	<b>1% annual chance of flooding</b> <ul style="list-style-type: none"> <li>• <b>100-year</b> floodplains <i>with</i> Base Flood Elevations (BFE)</li> <li>• some identified as <b>floodways</b> with stream channel and/or adjacent floodplain areas</li> <li>• areas must be kept free of encroachment so 1% annual chance of flood will not substantially increase flood height</li> </ul>
<b>Zone X</b>	<b>0.2% annual chance of flooding</b> <ul style="list-style-type: none"> <li>• <b>500-year</b> floodplain <i>without</i> Base Flood Elevations (BFE)</li> <li>• sheet flow flooding less than 1-foot deep</li> <li>• stream flooding where the contributing drainage area is less than 1 square mile</li> <li>• areas protected from 100-year floodplains by levees</li> <li>• OR areas determined to be outside the 0.2% annual chance of flood (see DFIRMs)</li> </ul>

Sources: FEMA and NH Geographically Referenced Analysis and Transfer System (NH GRANIT) websites

Pembroke DFIRMs can be viewed online at and downloaded from the [NH Geographically Referenced Analysis and Transfer System \(NH GRANIT\)](#) website. Alternatively, the DFIRMs' respective paper FEMA 2010 Floodplain Maps in the Town Office could be consulted. Should the **Zone A** or **Zone X** or **Zone AE** flood to either the **100**-year or **500**-year level, the DFIRM areas will help **measure the location of the floodplain and potential magnitude of the flood.**

### **Rapid Snowpack Melt**

Warm temperatures and heavy rains cause rapid snowmelt. The water cannot seep into the frozen ground in early spring and so it runs off into streets and waterways. Quickly melting snow coupled with moderate to heavy rains are prime conditions for flooding.

There is the possibility of damages from the rapid snowpack melt because of the flooding from the **Merrimack River, Soucook River, or Suncook River** and the various brooks along the roads, roadside wetlands, and from the culverts directing the watercourses. Locations in Pembroke that may be vulnerable to rapid snowpack melt include undersized or unmaintained culverts, roads, driveways, slopes, yards or fields, or any of the Town's fast moving brooks or drainage areas. Damage to roads is expected.

### **Magnitude of Rapid Snowpack Melt**

**Rapid snowpack melt** is a type of flooding. On its own, it has no known magnitude measurement. However, the hazard can share **Flooding's** Special Flood Hazard Areas (SFHAs) table or the list of road washouts found later in this **4 HAZARD RISK ASSESSMENT** chapter.

### **River Hazards**

There are several types of **RIVER** hazards examined in the **Hazard Identification and Risk Assessment:**

Main Hazard Category	Specific Hazards Included
<b>RIVER</b>	RIVER HAZARDS Ice Jams, Scouring, Erosion, Channel Movement or Debris

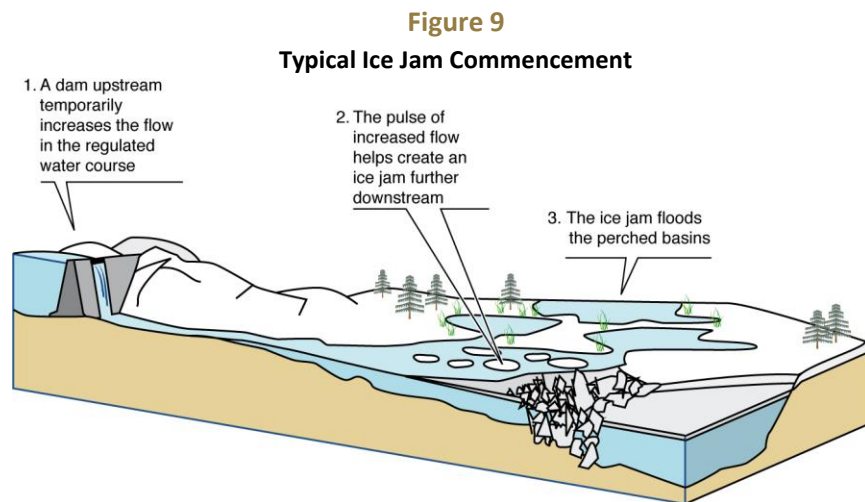
River hazards are considered different from flooding in this **Hazard Mitigation Plan**. They include ice jams, scouring of banks and infrastructure, erosion of banks and shoreline, channel movement, and woody material debris. These types of incidents could occur on large brooks or other watercourses as well as rivers.

The overall ratings of **River Hazards** in Pembroke from the **HIRA** are:

Natural, Technological, Human Hazard Categories	Probability of Occurrence in 10 Years (1-4)	Human Injury Impact (1-4)	Essential Services or Infrastructure Impact (1-4)	Property Damage or Economic Impact (1-4)	OVERALL RISK (1-16)
<b>RIVER HAZARDS</b> Ice Jams, Scouring, Erosion, Channel Movement or Debris	<b>3</b> <b>HIGH</b>	<b>1</b> LOW	<b>2</b> MEDIUM	<b>3</b> HIGH	<b>6.0</b> <b>MEDIUM</b>

### River Ice Jams

Rising waters in early spring often break ice into chunks, which float downstream, pile up and cause flooding. Small rivers and streams pose special flooding risks because they are easily blocked by jams. Ice in riverbeds and against structures presents significant flooding threats to bridges, roads, and the surrounding lands. A visual of how ice jams often form is displayed in **Figure 9**.



Source: USGS, Internet Accessed May 2015

### Magnitude of River Ice Jams

There is no known widely-used magnitude scale for **river ice jams**. River ice jams can cause debris impacted infrastructure when they apply pressure to bridges and dams.

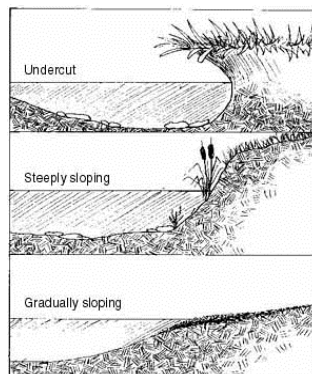
The US Army Corps of Engineers (ACOE) maintains the [Ice Jam Database, Bulletins & Surveys](#) website which locates where known ice jams are presently occurring and where they have occurred in the past. Reports can be generated in various formats so emergency responders can identify the locations of prior ice jams and begin to mitigate the effects of future events.

### **Fluvial Erosion, Bed Scouring and Channel Movement**

Fluvial erosion is the wearing away of the river/stream bank and floodway. Bed scouring is the wearing away of the bed of the river or stream, typically shown as a pool type formation at downstream culvert outflows. Watercourses with high elevation change (stream gradient) are particularly prone to flash-flooding conditions and most vulnerable to erosion and scouring. During flooding or even high flow events, rivers can erode their banks and migrate into their floodplains. A migrating river, when channel movement is occurring, has the potential to impact nearby structures (berms, dams, buildings, etc.) or infrastructure such as river or stream crossings (culverts and bridges) or transportation features (roads, drainage structures, rail, etc.) in its migration path.

**Fluvial geomorphology** is the study of how processes of flowing water in rivers work to shape river channels and the land around them. Fluvial assessments are a collection of field data undertaken within designated river reaches. A **river reach** is a length of stream that has characteristics similar enough that condition data collected within that length is representative of the entire reach. **Figure 10** displays visual bank erosion characteristics. In Pembroke, fluvial geomorphology is most pertinent to the **Merrimack River, Soucook River, and the Suncook River.**

**Figure 10**  
**Bank Erosion Characteristics**



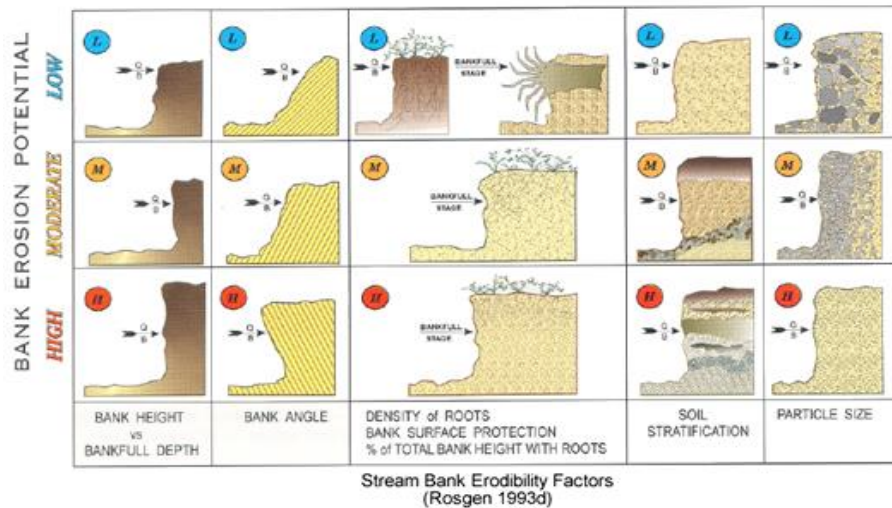
*Source: US Geological Survey (USGS)*

### **Magnitude of (Fluvial) Riverbank Erosion**

**River and streambank erosion** magnitude can be measured by the US EPA Bank Erosion Prediction Index (BEHI), which is used with the Near Bank Stress (NBS) quantification. Taken into consideration for the BEHI are the bank height versus bankfull depth, bank angle, density of roots, soil stratification, and particle size at a river reach. **Figure 11** displays the visual version of the index.

Figure 11

Bank Erosion Prediction Index (BEHI)



Source: US Environmental Protection Agency (US EPA)

## Dam Failure

Dam breach and the resulting failure cause rapid loss of water that is normally impounded by the dam. These kinds of floods are extremely dangerous and pose a significant threat to both life and property as they are quick, unexpected, and if they occur during a flooding event, dam failures can overload an already burdened water channel.

The overall ratings of **Dam Failure** in Pembroke from the **HIRA** are:

Natural, Technological, Human Hazard Categories	Probability of Occurrence in 10 Years (1-4)	Human Injury Impact (1-4)	Essential Services or Infrastructure Impact (1-4)	Property Damage or Economic Impact (1-4)	OVERALL RISK (1-16)
<b>DAM FAILURE</b> Water Overtop, Breach, Beaver, etc.	<b>2</b> MEDIUM	1 LOW	2 MEDIUM	2 MEDIUM	<b>3.3</b> MEDIUM

## Magnitude of Dam Failures

Although dam failure is considered a **Technological Hazard**, it is often a secondary hazard caused by flooding conditions and has been rated along with the natural hazards. Classifications of dams and their magnitude of failure can be measured by the [NH DES Dam Hazard Classifications](#) shown in **Table 18**.



**Table 18**  
**New Hampshire Dam Hazard Classifications**

<b>Dam Classification</b>	
<b>NON-MENACE Structure</b>	<b>Inspection</b>
<b>NM</b> Means a dam that is not a menace because it is in a location and of a size that failure or misoperation of the dam would not result in probable loss of life or loss to property, provided the dam is: <ul style="list-style-type: none"> <li>○ Less than six feet in height if it has a storage capacity greater than 50 acre-feet;</li> <li>○ Less than 25 feet in height if it has a storage capacity of 15 to 50 acre-feet.</li> </ul>	Every 6 years *
<b>LOW Hazard Structure</b>	<b>Inspection</b>
<b>L</b> Means a 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 any of the following: <ul style="list-style-type: none"> <li>○ No possible loss of life.</li> <li>○ Low economic loss to structures or property.</li> <li>○ Structural damage to a town/city road or private road accessing property other than the dam owner's that could render the road impassable or interrupt public safety services.</li> <li>○ The release of liquid industrial, agricultural, or commercial wastes, septage, or contaminated sediment if the storage capacity is less than two-acre-feet and is located more than 250 feet from a water body or water course.</li> <li>○ Reversible environmental losses to environmentally-sensitive sites.</li> </ul>	Every 6 years
<b>SIGNIFICANT Hazard Structure</b>	<b>Inspection</b>
<b>S</b> Means a 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 any of the following: <ul style="list-style-type: none"> <li>○ No probable loss of lives.</li> <li>○ Major economic loss to structures or property.</li> <li>○ Structural damage to a Class I or Class II road that could render the road impassable or otherwise interrupt public safety services.</li> <li>○ Major environmental or public health losses, including one or more of the following:                             <ul style="list-style-type: none"> <li>◆ Damage to a public water system, as defined by RSA 485:1-a, XV, which will take longer than 48 hours to repair.</li> <li>◆ The release of liquid industrial, agricultural, or commercial wastes, septage, sewage, or contaminated sediments if the storage capacity is 2 acre-feet or more.</li> <li>◆ Damage to an environmentally-sensitive site that does not meet the definition of reversible environmental losses.</li> </ul> </li> </ul>	Every 4 years
<b>HIGH Hazard Structure</b>	<b>Inspection</b>
<b>H</b> Means a 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 from: <ul style="list-style-type: none"> <li>○ Water levels and velocities causing structural failure of a foundation of a habitable residential, commercial, or industrial structure, which is occupied under normal conditions.</li> <li>○ Water levels rising above the first floor elevation of a habitable residential, commercial, or industrial structure, which is occupied under normal conditions when the rise due to dam failure is greater than one foot.</li> <li>○ Structural damage to an interstate highway, which could render the roadway impassable or otherwise interrupt public safety services.</li> <li>○ The release of a quantity and concentration of material, which qualify as "hazardous waste" as defined by RSA 147-A:2 VII.</li> <li>○ Any other circumstance that would more likely than not cause one or more deaths.</li> </ul>	Every 2 years

Source: NH Department of Environmental Services (NHDES) Dams Bureau [Fact Sheet WD-DB-15](#), 2012



### **PUBLIC HEALTH HAZARDS**

Public health issues can be measured in many ways. Students and the elderly are vulnerable to seasonal health outbreaks as they tend to congregate in large numbers and in shared environments where physical contact is common. Large groups can make bioterrorism more effective.

It is difficult to predict where an epidemic would occur due to human, mosquito and wildlife mobility. Commonly occurring epidemics following extreme heat or cold can include **influenza**, norovirus, rhinovirus (viruses), Lyme disease, Anaplasmosis and Babesiosis, *Borrelia miyamotoi* or Powassan (tickborne diseases), Eastern Equine Encephalitis (EEE), West Nile, Jamestown Canyon Virus or Zika (arboviral, mosquito-borne diseases) and any could occur in Pembroke. The Town has swampy areas around its rivers, wetlands and brooks which are prime breeding ground for **mosquitoes**. Large deer herds that roam can carry **deer ticks** in the Town's heavily forested sections and into State Forests. The **coronavirus** global pandemic is contagious between humans in aerosol /droplet form and is much more contagious and deadly than influenza.

Other wide-spread public health hazards include **water quality degradation** (failing septic systems, flooding, pipes breaking, runoff, haz mat spills) that could sicken residents using the public water supplies (those serving over 25 people), dug wells or bedrock wells, or could cause aquatic and wildlife deaths. Epidemics could result from water quality issues.

**Air quality** could decline from ground-level ozone or fine particulates and is monitored by the [NH Department of Environmental Services](#). Air Quality Action Days are announced when monitoring sites report poor breathing air.

**Food-borne illnesses** could result from improperly handled or cooked food, either at home or at restaurants, cafeterias, or from markets or farms.

There are several types of **PUBLIC HEALTH** hazards examined in the **Hazard Identification and Risk Assessment**:

Main Hazard Category	Specific Hazards Included
<b>PUBLIC HEALTH</b>	<b>PUBLIC HEALTH</b> Infectious Diseases, Air & Water Quality, Biological, Addiction, Arboviral or Tick-borne

Most of these diseases can cause epidemics transmitted through food, water, environment, or personal contact. An epidemic could also result from bioterrorism, whereby an infectious agent is released into a susceptible population. Drug addiction is reportedly high in New Hampshire and is considered a public health hazard. There are many facets public health hazards could take in Pembroke. The Town of Pembroke is an active member of the [Capital Area Public Health Network](#) and has a designated Point of Dispensing (POD) location at the NH Technical Institute Community College in Concord.

The overall ratings of **Public Health** in Pembroke from the **HIRA** are:

Natural, Technological, Human Hazard Categories	Probability of Occurrence in 10 Years (1-4)	Human Injury Impact (1-4)	Essential Services or Infrastructure Impact (1-4)	Property Damage or Economic Impact (1-4)	OVERALL RISK (1-16)
<b>PUBLIC HEALTH</b> Infectious Diseases, Air & Water Quality, Biological, Addiction, Arboviral, or Tick-borne	<b>3</b> <b>HIGH</b>	<b>3</b> HIGH	<b>3</b> HIGH	<b>4</b> HIGH	<b>10.0</b> <b>HIGH</b>

### Coronavirus (Respiratory Infectious)

Coronaviruses are a large family of viruses, but only several types are known to commonly cause infections in people, with these common human coronaviruses usually causing mild to moderate respiratory illness (like the common cold). Newer human coronaviruses, like Severe Acute Respiratory Syndrome (SARS), Middle Eastern Respiratory Syndrome (MERS), and the COVID-19 can cause more severe symptoms. The COVID-19 is originally thought to have spread from animals to humans, but now person-to-person spread is occurring. The virus is spread through the air by coughing and sneezing; by close personal contact, such as touching or shaking hands; and by touching an object or surface with the virus on it, then touching mouth, nose, or eyes before washing hands.

The NH Department of Health and Human Services maintains a [COVID-19 dashboard website](#) with current information, statistics, legislation, and testing locations, and resources. Social distancing (staying at least **6** feet away from people outside of one's household), wearing cloth facial masks, sanitizing hands, monitoring for symptoms, working from home, remote schooling, and staying at home when possible are the ways to fight the COVID-19. Yet, one year into the pandemic (**Mar 2020-Mar 2021**), NH residents are feeling stifled and as restrictions ease, a surge of new cases occurs even as vaccines are administered.

Within the last **14** days (**October 1-14, 2021**), **44** Town of Pembroke residents have tested positive for the deadly respiratory coronavirus COVID-19. During this same time, **923** Merrimack County residents have tested positive. In New Hampshire, new cases total **7,276** within the last **14** days. Since **March 2, 2020**, a total of **128,047** NH residents have tested positive for COVID-19. Of these, **13,128** cases are Merrimack County residents. A grand total of **674** Town of Pembroke residents to date have tested positive for COVID-19. Although vaccinations began in **December 2020** over a planned phasing process for New Hampshire residents, only **54.7%** of the state's population is fully vaccinated as of **October 14, 2021**. See **Figure 12** and **Figure 13** for case details.

To date as of **October 2021**, with over **45 million** positive cases in our country, over **730,000** people have died in the United States alone from COVID-19 complications. Globally, nearly **242 million** people have tested positive and nearly **5 million people** have died to date per the [Johns Hopkins Coronavirus Resource Center](#). The pandemic is ongoing as of the writing of this **Plan** and will be a serious long-term problem for humans, especially as new variants in the coronavirus emerge and coronavirus may be becoming endemic.

Figure 12

Current New 14 Days NH COVID-19 Cases and Cumulative (Total) NH COVID-19 Cases through 10-14-21

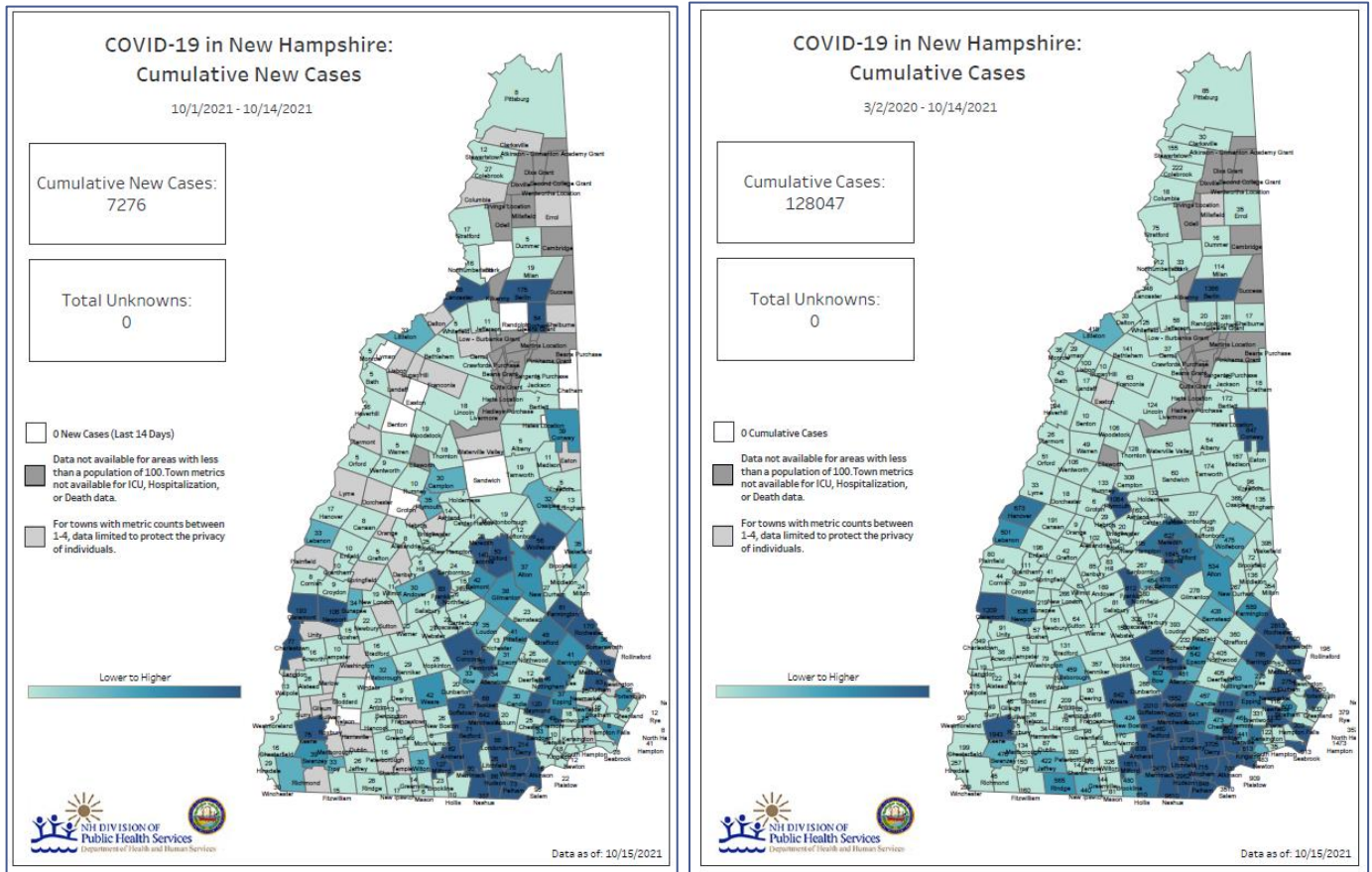
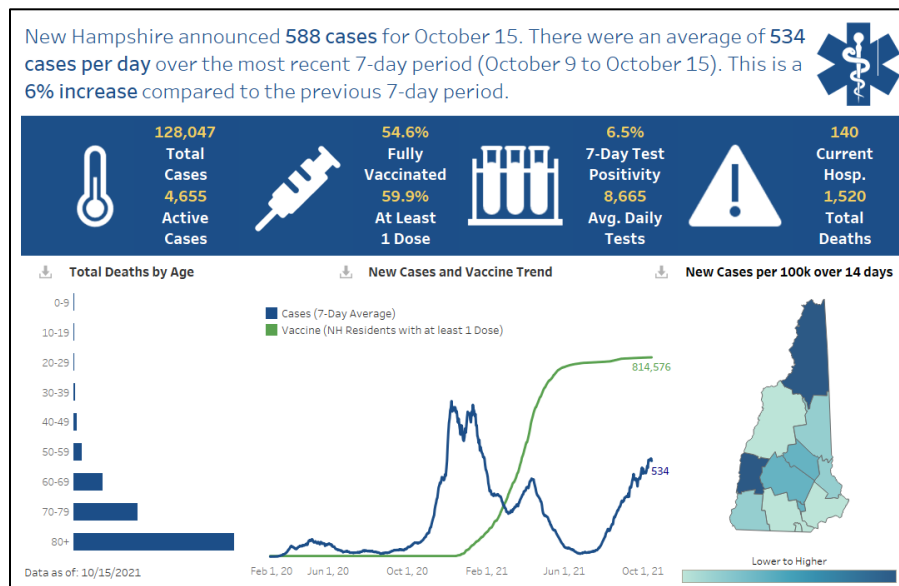


Figure 13

NH COVID-19 Statistics Overview



Source for Figures: NH Division of Health and Human Services  
Dashboard COVID-19

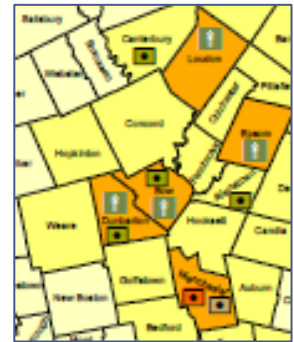
<https://www.nh.gov/covid19/>

### Influenza (Respiratory Infectious)

A magnitude scales for **Pandemic Severity Index (PSI) for Influenza** and resulting Community Mitigation Strategies is available from the US Center for Disease Control (US CDC). The [State of New Hampshire Influenza Pandemic Public Health Preparedness and Response Plan 2007](#) included the **PSI for Influenza** classification system and the Community Strategies. As a growing high-density community, Pembroke may be particularly vulnerable to influenza.

### Arboviral Transmission Diseases

New Hampshire developed guidelines for phased response to the arboviruses (mosquito-borne) Eastern Equine Encephalitis (EEE) and West Nile Virus (WNV) and Jamestown Canyon Virus (JCV). Annually, the [NH DHHS publishes the State of New Hampshire Arboviral Illness Surveillance, Prevention, and Response Plan 2021](#) and its associated [Arboviral Risk Map 2021](#). Risk Categories determine human illness probability and the recommended response to outbreaks. Regionally, cases of Jamestown Canyon Virus (JCV), human Jamestown Canyon Virus (JCV), and West Nile Virus (WNV) have made appearances in 2020 and 2021.



The new [State of New Hampshire Zika Virus Response Plan 2018](#) describes Response Phases **0** to **3** and is written like an Emergency Operations Plan Annex for emergency responders to follow.

The NH DHHS and the Capital Area Public Health Network should be notified of all public health emergencies, no matter the type of threat.

### Tick-borne Transmission Diseases

Tick-borne diseases are increasing in New Hampshire, and now include Lyme Disease, Anaplasmosis, Babesiosis, Powassan Virus, and more. These are all carried by the black legged tick in New Hampshire. The State has currently stopped producing annual maps and updates of tick-borne disease locations, but they have other resources available such as the [2015 State of NH Tickborne Diseases Prevention Plan](#). Check back here at the NH Department of Health and Human Services for future updates: <https://www.dhhs.nh.gov/dphs/cdcs/lyme/index.htm>. No increase in Lyme Disease in Pembroke residents has been noted.

### Air and Water Quality Decline

The [NH DES Drinking Water and Groundwater Bureau](#) administers the federal Safe Drinking Water Act and NH statutes to protect public water systems, drinking water sources and groundwater supplies to help maintain safe **water quality** for drinking. NHDES calculates Total Maximum Daily Load (TMDL) reports of pollutants for the state's water every two years.

**Water quality** hazards such as radon, arsenic, uranium Per- and polyfluoroalkyl substances (PFAS) industrial chemicals, cyanobacteria, coliform bacteria, lead and copper in public water systems, are constantly being tested for and when found, monitored. Once these enter the groundwater (aquifers) system, they are extremely difficult to mitigate. Various publications describe the NHDES efforts understand how damage to infrastructure from natural hazards such as **Inland Flooding** and spring **snow melt** runoff can occur to create more resilient water systems.

**Air quality** is a particular danger to the young, elderly people, and those with Chronic Obstructive Pulmonary Diseases (COPD), asthma and other breathing diseases. Ground level ozone and particle pollution are monitored, reported and forecasted for New Hampshire counties. The [Map of Current Air Quality](#) changes daily and is coded to [US EPA's Air Quality Index](#). Air Quality Action Days are announced when the air quality becomes Moderate, Unhealthy or Hazardous. Transportation such as I-89 and I-93, large local industries such as Merrimack Station and Wheelabrator contribute to Central NH Region air pollution, but New Hampshire is impacted by industries and wildfires across the United States and Canada. Greenhouse gases from industrial pollution and manufacturing contributes to poor **air quality**.

The NH DHHS maintains [NH Health WISDOM](#), a database of public health data for air quality, childhood lead, cancer, asthma, tickborne disease, radon, and more. Many public health threats in New Hampshire have indices, monitoring, and data recording. The NH Department of Health and Human Services (NH DHHS) <https://www.dhhs.nh.gov/> is a good resource to determine what diseases are most prominent.

### **Biological Infestation**

**Depending on the type of biological invasive species, a different State department monitors and reports their appearance within New Hampshire.**

#### **Invasive Insect Pests**

The [NH Department of Agriculture, Markets and Foods Division of Plant Industry's](#) mission is to promote and protect plant health by curtailing the spread of dangerous insects, diseases and weeds moved in commerce. A biological pest, the [Emerald Ash Borer](#), has consumed most of the Central NH Region's ash trees. Only a minority have not been infected. Active logging operations are asked to identify them. The problem has been increasing over the years in Merrimack County and surrounding areas.

#### **Invasive Land Plants**

Invasive plants like need to be managed or removed. The [NH Department of Agriculture, Markets and Foods Division of Plant Industry](#) (NHDAMF) also regulates invasive upland plants: It is illegal in New Hampshire to collect, transport, sell, distribute, propagate or transplant any living or viable portion of any listed prohibited invasive plant species including all of their cultivars, varieties, and specified hybrids.



### **Invasive Aquatic Plants and Insects**

The NHDES hosts an [invasive aquatic species program](#) and maintains a [statewide map of the invasive aquatic plant infestations](#) along with an accompanying [list of infested waterbodies](#). and invertebrate pest species and [NH Fish and Game](#) regulating invasive aquatic invertebrates. For public waters throughout the region, the NHDES Volunteer Rivers AP and NH Lakes Association can check help monitor [invasive water species](#).

### **Public Beach Monitoring**

The NH Department of Environmental Services [Public Beach Inspection Program](#) regularly tests public beaches, both freshwater and saltwater, for the presence of bacterias, like cyanobacteria and e. coli, and dangerous species like jellyfish. Cyanobacteria advisories are issued when there are blooming conditions and cyanobacteria cell concentrations exceed 70,000 cells/ml in recreational waters. Freshwater beach standards for e. coli is 1 sample > 158 counts/100 ml.

Pembroke does not have to worry about **milfoil** infestation because it does not have public ponds of 10 acres or greater. Rivers can carry invasive species like **zebra mussels**. The public beach at White Sands on the Merrimack River could be subject to such biological hazards. The [NHDES OneStop](#) data resource center can be accessed to provide reports on potential water hazards.

### **Opioid Endemic**

New Hampshire has seen a rise in the number of heroin and opioid deaths over the last few years. Even Pembroke has been subject to additional calls for service for overdose. Along with the use of these substances is a commensurate amount of buying and/or making of illegal drugs. The State has made national headlines in 2014, 2015 and 2016 for its problems with overdoses and its public recognition of the problem. A particular concern to Pembroke officials and Tri-Town Ambulance workers is the illegal drug usage and overdosing that is occurring in the community. By 2021, misuse of opioids had declined tremendously in comparison with previous years.

### Magnitude of Public Health

The [2018 State Multi-Hazard Mitigation Plan](#) includes **Infectious Diseases** as a natural hazard. From this resource, the definition and extent of the potential magnitude of public health threats are identified as follows. These disease levels are described at the [US Center for Disease Control](#) (CDC) and included measures New Hampshire has been practicing for COVID-19, including masking, social distancing, staying at home, and quarantine.

The magnitude and severity of infectious diseases are described by its speed of onset (how quickly people become sick or cases are reported) and how widespread the infection is. Some infectious diseases are inherently more dangerous and deadly than others, but the best way to describe the extent of diseases relates to the disease occurrence:

§ <b>Sporadic</b>	Disease that occurs infrequently and irregularly.
§ <b>Endemic</b>	(Baseline) Constant presence and/or usual prevalence of a disease or infection agent in a population within a geographic area.
§ <b>Hyperendemic</b>	The persistent, high levels of disease occurrence in the area.
§ <b>Cluster</b>	The aggregation of cases grouped in place and time that are suspected to be greater than the number expected, even though the expected number may not be known.
§ <b>Epidemic</b>	An increase, usually sudden, in the number of cases of a disease above what is normally expected in the population of the area.
§ <b>Outbreak</b>	The same as epidemic, but over a much smaller geographical area.
§ <b>Pandemic</b>	An epidemic that has spread over several countries or continents, usually affecting many people.



## SOLAR STORMS HAZARDS

Solar storms and space weather is a new addition to the **Hazard Mitigation Plan** and can refer to solar flares, coronal mass ejections, high-speed solar wind, or geomagnetic storms. Solar activity can occur for as short a duration as a few minutes to several hours and create resulting effects on the Earth for weeks. When a geomagnetic storm occurs, high speed solar winds penetrate the Earth's magnetosphere and can decrease the Earth's magnetic field for several hours.

There are several types of **SOLAR STORMS** hazards examined in the **Hazard Identification and Risk Assessment**:

Main Hazard Category	Specific Hazards Included
<b>SOLAR STORMS</b>	<b>SOLAR STORMS AND SPACE WEATHER</b> Solar Winds, Geomagnetic Storms (Aurora Borealis), Solar Radiation or Radio Blackout

A significant danger from solar storms is the potential communications and electronics disruption. Satellites, vehicles, radios, airplanes, cell phones, computers, power lines and the internet have the capability for temporary cessation because of solar winds. Solar radiation can become a personal radiation hazard the closer one is to the stratosphere, especially on planes. Satellites, navigation, and electricity are sensitive to geomagnetic storms, which can cause electrical current surges in power lines, interference in the broadcast of radio, television, and telephone signals, and problems with defense communications.

The overall ratings of **Solar Storms** in Pembroke from the **HIRA** are:

Natural, Technological, Human Hazard Categories	Probability of Occurrence in 10 Years (1-4)	Human Injury Impact (1-4)	Essential Services or Infrastructure Impact (1-4)	Property Damage or Economic Impact (1-4)	OVERALL RISK (1-16)
<b>SOLAR STORMS AND SPACE WEATHER</b> Solar Winds, Geomagnetic Storms (Aurora Borealis), Solar Radiation or Radio Blackout	1 <b>LOW</b>	1 LOW	1 LOW	1 LOW	<b>1.0</b> <b>LOW</b>

### Magnitude of Solar Storms

Many in residents in the Central NH region enjoy the aurora borealis viewed from Mount Kearsarge, visible to Pembroke in the north, although when this phenomenon occurs a geomagnetic storm is reaching New Hampshire. Emergency response personnel could monitor these storms from the Mount Kearsarge Fire Tower in Warner or from Pat's Peak in Henniker, or possibly the Oak Hill Fire Tower in Loudon. NOAA's Space Weather Prediction Service <https://www.swpc.noaa.gov/> provides 3-day outlooks on solar storms. Magnitude scales for **Radio Blackout (R)**, **Geomagnetic Storms (G)** and **Solar Radiation Storms (S)** are provided in **Table 19**.

**Table 19**  
**Solar Storms Magnitude Scales**

Magnitude Scale	Description	Effect of Space Storm	Average Frequency (1 cycle = 11 years)
<b>GEOMAGNETIC STORM (G)</b>			
<b>G1 Geomagnetic</b>	<b>Minor</b>	<ul style="list-style-type: none"> <li>✦ Power systems: Weak power grid fluctuations can occur.</li> <li>✦ Spacecraft operations: Minor impact on satellite operations possible.</li> <li>✦ Other systems: Migratory animals are affected at this and higher levels; aurora is commonly visible at high latitudes (northern Michigan and Maine).</li> </ul>	1700 per cycle (900 days per cycle)
<b>G2 Geomagnetic</b>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>✦ Power systems: High-latitude power systems may experience voltage alarms, long-duration storms may cause transformer damage.</li> <li>✦ Spacecraft operations: Corrective actions to orientation may be required by ground control; possible changes in drag affect orbit predictions.</li> <li>✦ Other systems: HF radio propagation can fade at higher latitudes, and aurora has been seen as low as New York and Idaho (typically 55° geomagnetic lat.).</li> </ul>	600 per cycle (360 days per cycle)
<b>G3 Geomagnetic</b>	<b>Strong</b>	<ul style="list-style-type: none"> <li>✦ Power systems: Voltage corrections may be required, false alarms triggered on some protection devices.</li> <li>✦ Spacecraft operations: Surface charging may occur on satellite components, drag may increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems.</li> <li>✦ Other systems: Intermittent satellite navigation and low-frequency radio navigation problems may occur, HF radio may be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geomagnetic lat.).</li> </ul>	200 per cycle (130 days per cycle)
<b>G4 Geomagnetic</b>	<b>Severe</b>	<ul style="list-style-type: none"> <li>✦ Power systems: Possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid.</li> <li>✦ Spacecraft operations: May experience surface charging and tracking problems, corrections may be needed for orientation problems.</li> <li>✦ Other systems: Induced pipeline currents affect preventive measures, HF radio propagation sporadic, satellite navigation degraded for hours, low-frequency radio navigation disrupted, and aurora has been seen as low as Alabama and northern California (typically 45° geomagnetic lat.).</li> </ul>	100 per cycle (60 days per cycle)
<b>G5 Geomagnetic</b>	<b>Extreme</b>	<ul style="list-style-type: none"> <li>✦ Power systems: Widespread voltage control problems and protective system problems can occur, some grid systems may experience complete collapse or blackouts. Transformers may experience damage.</li> <li>✦ Spacecraft operations: May experience extensive surface charging, problems with orientation, uplink/downlink and tracking satellites.</li> <li>✦ Other systems: Pipeline currents can reach hundreds of amps, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours, and aurora has been seen as low as Florida and southern Texas (typically 40° geomagnetic lat.).</li> </ul>	4 per cycle (4 days per cycle)
<b>SOLAR RADIATION (S)</b>			
<b>S1 Solar Radiation</b>	<b>Minor</b>	<ul style="list-style-type: none"> <li>✦ Biological: None.</li> <li>✦ Satellite operations: None.</li> <li>✦ Other systems: Minor impacts on HF radio in the polar regions.</li> </ul>	50 per cycle
<b>S2 Solar Radiation</b>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>✦ Biological: Passengers and crew in high-flying aircraft at high latitudes may be exposed to elevated radiation risk.</li> <li>✦ Satellite operations: Infrequent single-event upsets possible.</li> <li>✦ Other systems: Small effects on HF propagation through the polar regions and navigation at polar cap locations possibly affected.</li> </ul>	25 per cycle
<b>S3</b>	<b>Strong</b>	<ul style="list-style-type: none"> <li>✦ Biological: Radiation hazard avoidance recommended for astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.</li> </ul>	10 per cycle

**4 HAZARD RISK ASSESSMENT**

Magnitude Scale	Description	Effect of Space Storm	Average Frequency (1 cycle = 11 years)
<b>Solar Radiation</b>		<ul style="list-style-type: none"> <li>✦ Satellite operations: Single-event upsets, noise in imaging systems, and slight reduction of efficiency in solar panel are likely.</li> <li>✦ Other systems: Degraded HF radio propagation through the polar regions and navigation position errors likely.</li> </ul>	
<b>S4 Solar Radiation</b>	<b>Severe</b>	<ul style="list-style-type: none"> <li>✦ Biological: Unavoidable radiation hazard to astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.</li> <li>✦ Satellite operations: May experience memory device problems and noise on imaging systems; star-tracker problems may cause orientation problems, and solar panel efficiency can be degraded.</li> <li>✦ Other systems: Blackout of HF radio communications through the polar regions and increased navigation errors over several days are likely.</li> </ul>	3 per cycle
<b>S5 Solar Radiation</b>	<b>Extreme</b>	<ul style="list-style-type: none"> <li>✦ Biological: Unavoidable high radiation hazard to astronauts on EVA (extra-vehicular activity); passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.</li> <li>✦ Satellite operations: Satellites may be rendered useless, memory impacts can cause loss of control, may cause serious noise in image data, star-trackers may be unable to locate sources; permanent damage to solar panels possible.</li> <li>✦ Other systems: Complete blackout of HF (high frequency) communications possible through the polar regions, and position errors make navigation operations extremely difficult.</li> </ul>	Fewer than 1 per cycle
<b>RADIO BLACKOUT (R)</b>			
<b>R1 Radio Blackouts</b>	<b>Minor</b>	<ul style="list-style-type: none"> <li>✦ HF Radio: Complete HF (high frequency) radio blackout on the entire sunlit side of the Earth lasting for a number of hours. This results in no HF radio contact with mariners and en route aviators in this sector.</li> <li>✦ Navigation: Low-frequency navigation signals used by maritime and general aviation systems experience outages on the sunlit side of the Earth for many hours, causing loss in positioning. Increased satellite navigation errors in positioning for several hours on the sunlit side of Earth, which may spread into the night side.</li> </ul>	2000 per cycle (950 days per cycle)
<b>R2 Radio Blackouts</b>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>✦ HF Radio: HF radio communication blackout on most of the sunlit side of Earth for one to two hours. HF radio contact lost during this time.</li> <li>✦ Navigation: Outages of low-frequency navigation signals cause increased error in positioning for one to two hours. Minor disruptions of satellite navigation possible on the sunlit side of Earth.</li> </ul>	350 per cycle (300 days per cycle)
<b>R3 Radio Blackouts</b>	<b>Strong</b>	<ul style="list-style-type: none"> <li>✦ HF Radio: Wide area blackout of HF radio communication, loss of radio contact for about an hour on sunlit side of Earth.</li> <li>✦ Navigation: Low-frequency navigation signals degraded for about an hour.</li> </ul>	175 per cycle (140 days per cycle)
<b>R4 Radio Blackouts</b>	<b>Severe</b>	<ul style="list-style-type: none"> <li>✦ HF Radio: HF radio communication blackout on most of the sunlit side of Earth for one to two hours. HF radio contact lost during this time.</li> <li>✦ Navigation: Outages of low-frequency navigation signals cause increased error in positioning for one to two hours. Minor disruptions of satellite navigation possible on the sunlit side of Earth.</li> </ul>	8 per cycle (8 days per cycle)
<b>R5 Radio Blackouts</b>	<b>Extreme</b>	<ul style="list-style-type: none"> <li>✦ HF Radio: Complete HF (high frequency) radio blackout on the entire sunlit side of the Earth lasting for a number of hours. This results in no HF radio contact with mariners and en route aviators in this sector.</li> <li>✦ Navigation: Low-frequency navigation signals used by maritime and general aviation systems experience outages on the sunlit side of the Earth for many hours, causing loss in positioning. Increased satellite navigation errors in positioning for several hours on the sunlit side of Earth, which may spread into the night side.</li> </ul>	Less than 1 per cycle

Source: <https://www.swpc.noaa.gov/noaa-scales-explanation>

## WIND HAZARDS

Severe wind is likely to occur throughout all seasons. Significantly high winds occur especially during hurricanes, tornadoes, downbursts, winter storms, and thunderstorms any time of the year. Falling objects and downed power lines are dangerous risks associated with high winds. Property damage and downed trees are common during high wind occurrences. All utilities, including power lines, are at risk and their damage or destruction would create a hazard to the Town. A communications interruption or failure resulting from damage to telecommunications towers could affect the capabilities of emergency personnel to respond to the hazard event. Often with wind events, precipitation accompanies, increasing the danger of the hazard.

There are several types of **WIND** hazards examined in the **Hazard Identification and Risk Assessment**:

Main Hazard Category	Specific Hazards Included	
<b>WIND</b>	<b>HIGH WIND EVENTS</b> Wind, Thunderstorms, Hail, Downbursts, Tornadoes or Debris	<b>TROPICAL AND POST-TROPICAL CYCLONES</b> Hurricanes, Tropical Storms or Tree Debris

### High Wind Events

High wind events can take the form of severe winds, rainstorms, thunderstorms, tornadoes, and downbursts.

The overall ratings of **High Wind Events** in Pembroke from the **HIRA** are:

Natural, Technological, Human Hazard Categories	Probability of Occurrence in 10 Years (1-4)	Human Injury Impact (1-4)	Essential Services or Infrastructure Impact (1-4)	Property Damage or Economic Impact (1-4)	OVERALL RISK (1-16)
<b>HIGH WIND EVENTS</b> Wind, Thunderstorms, Hail, Downbursts, Tornadoes or Debris	<b>4</b> <b>HIGH</b>	<b>1</b> <b>LOW</b>	<b>2</b> <b>MEDIUM</b>	<b>2</b> <b>MEDIUM</b>	<b>6.7</b> <b>MEDIUM</b>

### Severe Wind, Rainstorms and Thunderstorms

More commonly experienced are **severe windstorms**, **rainstorms** and **thunderstorms**. The severe windstorms occur during all months of the year while the thunderstorms tend to erupt during periods of humidity. On occasion, precipitation in the form of rain or hail is experienced during these storms. Rainstorms bring can flooding and high winds. **Thunderstorms** can also bring lightning and hail hazards in addition to severe winds and flooding.

There are several **types of thunderstorms**: **ordinary cell** – short lived and not severe, brief rain and lightning; **multi-cell cluster** – several cells working as one, garden-variety storms lasting up to an hour with hail, strong winds, brief tornadoes, and/or flooding; **multi-cell line (squall line)** – group of thunderstorms extending laterally for hundreds of miles long but only 10-20 miles wide; **supercell- single cell** -

thunderstorm lasting for hours, characterized by updrafts over 100 mph with giant hail and tornados, high precipitation and flash flooding.

#### **Magnitude of Severe Wind and Thunderstorms**

The majority of the severe wind events Pembroke experiences are not hurricanes but are severe windstorms or thunderstorms. Thunderstorms are common in New Hampshire, particularly during the hot weather months. The National Weather Service (NWS) has recently revised its storm warning criteria to better convey the severity and potential impacts from thunderstorm, winds, and hail. The new Impact-Based Warning format uses bullet points issued by the NWS for Severe Thunderstorm Warnings (SVR), Severe Weather Statements (SVS), and Tornado Warnings (TOR) to organize and consolidate public warnings to identify the Hazard, Source, and Impact & Location of hazards in these alerts. A summary of the thunderstorm damage threats is provided in **Table 20**.

**Table 20**  
**Damage Threats for Severe Thunderstorm Warnings**


<b>Thunderstorm Damage Threat</b>	<b>Wind &gt;</b>	<b>Hail Diameter &gt;</b>	<b>Wireless Emergency Alert (WEA)</b>	<b>Impact</b>
<b>Base (Normal Severe Thunderstorm)</b>	> 58 mph (60 mph will appear in the warning)	>1" Inch (US Quarter)	<b>No</b>	Damage expected to be at base level.
<b>Considerable</b>	> 70 mph	>1.75" (Golf-ball)	<b>No</b>	People and animals outdoors will be injured. Hail damage to vehicles is expected. Expect considerable tree damage. Wind damage is also likely to mobile homes, roofs, and outbuildings, and powerlines.
<b>Destructive</b>	> 80 mph	>2.75" (Baseball)	<b>Yes</b>	People and animals outdoors will be severely injured. People should move to an interior room on the lowest floor of a building. Expect shattered windows, extensive damage to roofs, siding, and vehicles. Expect downed trees and powerlines.

Source: National Weather Service [New Damage Threat Categories for Severe Storm Warnings](#), 2021

The NWS Storm Prediction Center issues [Day 1, 2 and 3 severe weather outlook](#) forecasts with risk categories up to 3 days out. They consist of 6 categories: 0- Thunderstorm, 1-Marginal, 2-Slight, 3- Enhanced, 4-Moderate and 5-High and are color-coded from an easy green to an escalated pink. A Level 1 Marginal risk consist of isolated and short-lived severe thunderstorms that have limited intensity; usually these storms will have winds between 40-60 mph, hail up to 1" and is a low tornado risk. A Level 2 Slight risk involves scattered severe storms that are also short-lived with isolated intensity; that consist of 1-2 tornadoes possible, strong winds and wind damage. A Level 3 Enhanced risk deals with numerous and persistent severe storms with a few intense ones; that produce a few tornadoes and several reports of wind damage. A Level 4 Moderate risk thunderstorm will have widespread and long-lived severe storms that are long-lived and intense; that include strong tornadoes, widespread wind damage and large hail. A Level 5 High risk thunderstorm is widespread, long-lived and are very intense storms involved in a tornado outbreak or significant wind damage such as straight-line winds (derechoes). **Figure 14** displays these categories:

**Figure 14**  
Severe Thunderstorm Risk

## Understanding Severe Thunderstorm Risk Categories

THUNDERSTORMS (no label)	1 - MARGINAL (MRGL)	2 - SLIGHT (SLGT)	3 - ENHANCED (ENH)	4 - MODERATE (MDT)	5 - HIGH (HIGH)
No severe* thunderstorms expected	Isolated severe thunderstorms possible	Scattered severe storms possible	Numerous severe storms possible	Widespread severe storms likely	Widespread severe storms expected
Lightning/flooding threats exist with <u>all</u> thunderstorms	Limited in duration and/or coverage and/or intensity	Short-lived and/or not widespread, isolated intense storms possible	More persistent and/or widespread, a few intense	Long-lived, widespread and intense	Long-lived, very widespread and particularly intense
					

\* NWS defines a severe thunderstorm as measured wind gusts to at least 58 mph, and/or hail to at least one inch in diameter, and/or a tornado. All thunderstorm categories imply lightning and the potential for flooding. Categories are also tied to the probability of a severe weather event within 25 miles of your location.



National Weather Service

[www.spc.noaa.gov](http://www.spc.noaa.gov)



Source: <https://www.spc.noaa.gov/> 2021



### **Tornadoes**

Significantly high winds that occur especially during hurricanes, winter storms, and thunderstorms, but can also exist independent of other storms. Falling objects and downed power lines are dangerous risks associated with high winds. In addition, property damage and downed trees are common during high wind occurrences.

A tornado is a violent windstorm characterized by a twisting, funnel shaped cloud. They 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 **200** 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.

### **Magnitude of Tornadoes**

A tornado occurring in Pembroke would cause considerable damage. Roofs could be torn off frame houses; dams could be damaged; large trees snapped or uprooted; and light object missiles would be generated by an **EF-2** Tornado. Tornado magnitude is measured by the [Enhanced Fujita \(EF\) Scale](#), a 2007 update from the original F-scale (Fujita Scale) and is provided in **Table 21**.

**Table 21**

**Enhanced Fujita (EF) Scale**

EF Rating	3-Second Gust mph
EF0	65-85 mph
EF1	86-110 mph
EF2	111-135 mph
EF3	136-165 mph
EF4	166-200 mph
EF5	over 200 mph

Source: National Oceanic and Atmospheric Administration (NOAA) Storm Prediction Center

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

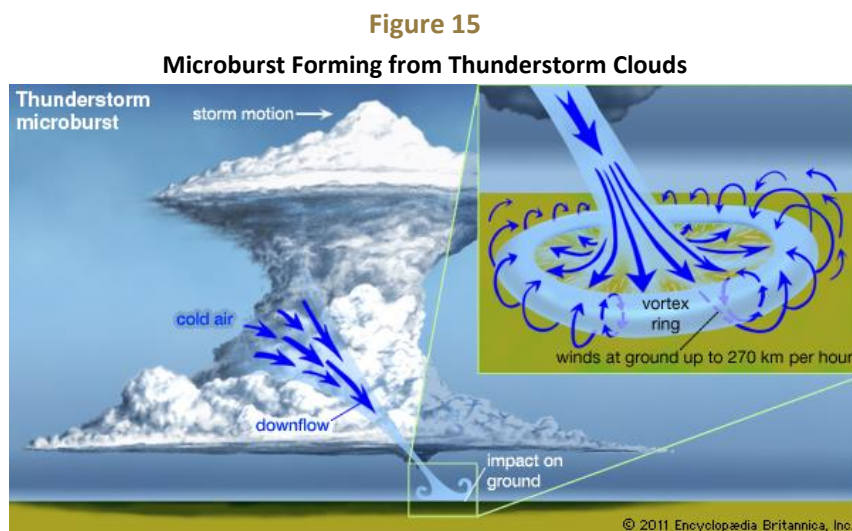


The center and northern sections of the Town are forested and its Class V and Class VI gravel roads run the risk of isolation through **debris impacted infrastructure** (trees down on roads and powerlines) after a **tornado**, resulting in **power failure** with little emergency access until the way is cleared. Wooded and forested sections of Town are vulnerable to tree fall. One-egress roads and remote neighborhoods are especially at risk to the impacts of high wind events, including tornadoes.

### Downbursts

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 are capable of producing winds of up to **175** mph and are life threatening. Downbursts are quite common during Central NH's hot weather months. The "dry" microbursts or macrobursts are strong downdrafts known to occur in Central New Hampshire almost annually, but the "wet" microbursts accompanied by rain are uncommon in the Northeast.

Downbursts of both sizes can produce strong wind shear, large changes in wind speed and direction over a short distance. Trees are regularly snapped off in a singular direction by a macroburst or microburst. Downbursts typically originate from thunderstorm clouds, with air moving in a downward motion until it hits the ground level and then spreads outward in all directions. In fact, the wind pattern of a downburst is the opposite of a tornado's wind pattern, shown in **Figure 15**.



*Source: Internet (Encyclopedia Britannica)*

Another wind with thunderstorm squall lines is a **derecho**. Derechos are straight-line winds associated with a downburst. They blow out in front of the squall line and are the strongest winds created by the downburst. This happens because the movement of the storms is already in that direction. Derechos can be as large as **200** miles wide with gusts of at least **58** mph. They can last up to **12** hours or more and are associated with very strong straight-line winds. Derechos can knock over trees and power lines and cause rain and lightning to come from all directions.

### Magnitude of Downbursts

**Downburst** magnitude is rated on the same **Enhanced Fujita (EF)** scale as tornadoes. In addition, downbursts fall into two categories:

- microburst, which covers an area less than **2.5** miles in diameter and
- macroburst, which covers an area equal to or greater than **2.5** miles in diameter.

### Debris Impacted Infrastructure

The immediate result of severe wind events becomes another hazard, **debris impacted infrastructure**. The infrastructure could include roads, culverts, powerlines, utility lines, water towers, bridges or dams. Infrastructure could also be the natural infrastructure, such as rivers, ponds, lakes and brooks.

Typically, trees and woody material and debris are blown down from **severe wind events** causing **debris impacted infrastructure**. Watercourses, including the rivers, brooks, intermittent streams, and ditches alongside roads, and stationary waterbodies such as lakes, ponds, wetlands, swamps, bogs, and wet meadows receive trees, leafy material and other debris and can then **flood** their banks, **overflow culverts**, or cause **road washouts** during certain conditions. Trees and limbs falling on power lines, substations, or communications towers cause **power failure** and **live wire danger**. Trees and limbs falling onto roadways can **road blockages** and **transportation crashes**. Debris from wind could include roofs, siding, shingles, and more from buildings which can cause potential human injury as well as **road blockages**, **power failure** and **live wire danger**.

These features inventoried in **APPENDIX A Critical and Community Vulnerability Assessment** are those which should be watched carefully before and after storms and should be checked and maintained regularly to reduce the risk of significant **debris impacted infrastructure** events. **Erosion** along the rivers can cause scouring to infrastructure such as bridge abutments, and woody debris can flow downstream to become hazards to the landowners who have shoreland frontage.

Most dams and bridges could experience **debris impacted infrastructure**. Debris generated during storms and winds could continue for many years. This woody material debris is a concern during and after storm events. For emergency removal, the Town could contact the NH Department of Environmental Services and remove the trees right away, obtaining a “retroactive permit” during emergency situations.

Bridges vulnerable to debris dislodged during storm events may be eligible for NH Bridge Aid funding to help rehabilitate these bridges. All outlying roads are susceptible to tree fall and downed powerlines from **severe wind events**.

### Magnitude of Debris Impacted Infrastructure

There is no standardized scientific scale for debris impacted infrastructure. However, the [US Federal Highway Administration](#) rates the potential for river/brook debris delivery to the infrastructure site and

for river/brook accumulation across an infrastructure span. These can be utilized for hydrologic debris impacted infrastructure measurements.

### Tropical and Post-Tropical Cyclones

Hurricane season begins on June 1 and continues through the end of November. August and September are the most active hurricane months. It is not uncommon for New England to be impacted by a hurricane more than once in a season. River and flooding due to heavy rains is a risk to Pembroke during hurricanes. Numerous hurricane events in recent history have occurred in the State, region, and the local area surrounding Pembroke that may have also had an impact on the Town.

The overall ratings of **Tropical and Post Tropical Cyclones** in Pembroke from the **HIRA** are:

Natural, Technological, Human Hazard Categories	Probability of Occurrence in 10 Years (1-4)	Human Injury Impact (1-4)	Essential Services or Infrastructure Impact (1-4)	Property Damage or Economic Impact (1-4)	OVERALL RISK (1-16)
<b>TROPICAL AND POST-TROPICAL CYCLONES</b> Hurricanes, Tropical Storms or Tree Debris	<b>2</b> <b>MEDIUM</b>	<b>2</b> MEDIUM	<b>2</b> MEDIUM	<b>3</b> HIGH	<b>4.7</b> <b>LOW</b>

A hurricane is a tropical cyclone in which winds reach speeds of **74** miles per hour or more and blow in a large spiral around a relatively calm center. Flooding is often caused from the coastal storm surge of the ocean and torrential rains, both of which accompany the storm. The floods and high winds can result in loss of life and property. Hurricanes, high wind and rain events, and thunderstorms can damage Pembroke just like any other community in Central New Hampshire. Forested lands and trees along the transportation infrastructure can be blown down across roads; the above-ground powerlines along the sides of the road can be snapped either by trees or high winds and fall onto the roads or nearby objects; and runoff flooding and stream/brook and river flooding can occur because of hurricanes and severe storms.

### **Magnitude of Hurricanes and Tropical Storms**

The [Saffir-Simpson Hurricane Wind Scale](#) measures the magnitude of wind event on a **1** through **5** rating basis. The definitions of Category **1** through **5**'s sustained wind miles per hour and their respective threats to people, different types of homes, shopping centers, trees, power lines, water, and more are displayed in **Table 22**.

Table 22

Saffir-Simpson Hurricane Wind Scale

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
<b>1</b>	<b>74-95 mph</b>	<b>Very dangerous winds will produce some damage:</b> Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
<b>2</b>	<b>96-110 mph</b>	<b>Extremely dangerous winds will cause extensive damage:</b> Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
<b>3</b> <i>major</i>	<b>111-129 mph</b>	<b>Devastating damage will occur:</b> Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
<b>4</b> <i>major</i>	<b>130-156 mph</b>	<b>Catastrophic damage will occur:</b> Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
<b>5</b> <i>major</i>	<b>157 mph or higher</b>	<b>Catastrophic damage will occur:</b> A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: National Oceanic and Atmospheric Administration (NOAA)

## WINTER HAZARDS

Ice and snow events typically occur during the winter months and can cause loss of life, property damage, and tree damage. Severe winter storms, including Nor'easters, typically occur during January and February. However, winter storms can occur from late September through late May. Numerous severe winter events in recent history have occurred in the State, region, and the local area surrounding Pembroke that may have also had an impact on the Town. Unlike the relatively infrequent hurricane, New Hampshire generally experiences at least several Nor'easters each year with varying degrees of severity. They form along the East coast as warm air from the Atlantic Ocean collides with cold arctic winds to the north and west. A hurricane, the nor'easter's warm-weather counterpart, differs in that it has a narrow range of strong winds around a warm, low-pressure core—nor'easter winds are more dispersed around a cold, low-pressure center.

There are several types of **WINTER** hazards examined in the **Hazard Identification and Risk Assessment**:

Main Hazard Category	Specific Hazards Included
<b>WINTER</b>	SEVERE WINTER WEATHER Snow, Ice, Blizzard or Nor'Easter

Although avalanche appears in the *State of New Hampshire Multi-Hazard Mitigation Plan 2018*, this winter hazard is not believed relevant to Pembroke's geography and development.

The overall ratings of **Severe Winter Weather** in Pembroke from the **HIRA** are:

Natural, Technological, Human Hazard Categories	Probability of Occurrence in 10 Years (1-4)	Human Injury Impact (1-4)	Essential Services or Infrastructure Impact (1-4)	Property Damage or Economic Impact (1-4)	OVERALL RISK (1-16)
<b>SEVERE WINTER WEATHER</b> Snow, Ice, Blizzard or Nor'Easter	<b>4</b> <b>HIGH</b>	2 MEDIUM	2 MEDIUM	2 MEDIUM	<b>8.0</b> <b>HIGH</b>

## Severe Winter Storms

A winter storm can range from moderate snow to blizzard conditions. Blizzard conditions are considered blinding, wind-driven snow over **35** mph that lasts several days. A severe winter storm deposits four or more inches of snow during a **12**-hour period or six inches of snow during a **24**-hour period.

An ice storm involves rain, which freezes upon impact. Ice coating at least **¼"** in thickness is heavy enough to damage trees, overhead wires, and similar objects. Ice storms also often produce widespread power outages.

A Nor'easter is a large weather system traveling from South to North, passing along or near the seacoast. As the storm approaches New England and its intensity becomes increasingly apparent, the resulting counterclockwise cyclonic winds impact the coast and inland areas from a Northeasterly direction. In the winter months, oftentimes blizzard conditions accompany these events. The added impact of the masses

of snow and/or ice upon infrastructure often affects transportation and the delivery of goods and services for extended periods.

Extreme cold temperatures are associated with continental Arctic air masses. The actual temperatures reached depend specifically on the nature of the cold air mass and where it originated. In general, those from the Arctic regions are the coldest. Though cold temperatures are dangerous, they become more so in conjunction with strong winds. The combination produces a wind-chill factor – heat loss measured in Watts per meter squared ( $Wm^{-2}$ ). A wind-chill factor of **1400**  $Wm^{-2}$  is equivalent to a temperature of **-40** degrees F. At **2700**  $Wm^{-2}$ , exposed flesh freezes within a half-minute.

Heavy snow can immobilize a region, strand commuters, stop the flow of supplies, and disrupt emergency responders. Accumulations of snow can knock down trees and power lines and cause some roofs to collapse. Homes and farms may be isolated for days and unprotected livestock may be lost while businesses either close or are open with reduced hours. The cost of snow removal, repairing damages, and the loss of business can have severe economic impacts on New Hampshire communities.

Winter precipitation includes the following types of weather described and is summarized in **Figure 16**:










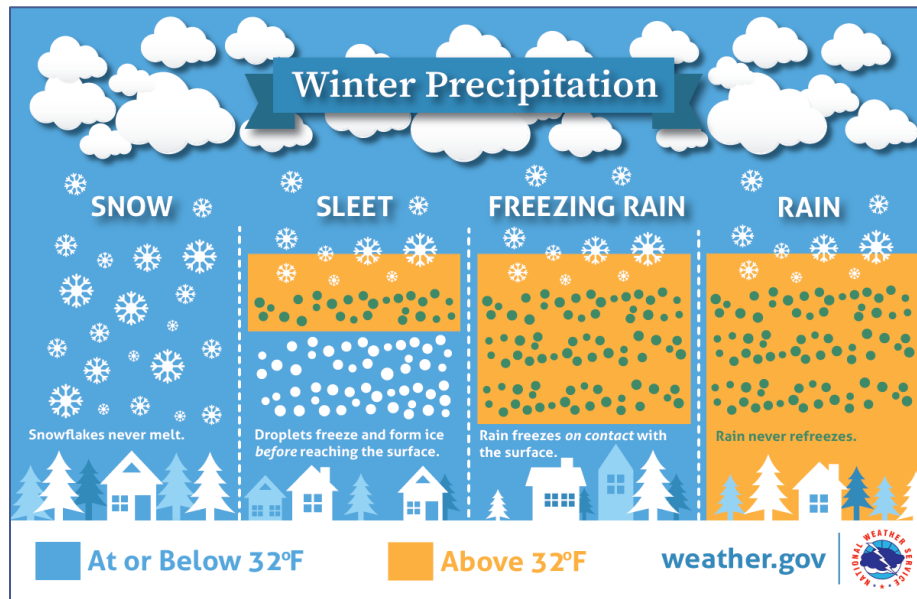
-  **Blizzard:** Winds of 35 mph or more with snow and blowing snow reducing visibility to less than ¼ mile for 3 hours or more.
-  **Blowing Snow:** Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground picked up by the wind.
-  **Snow Squalls:** Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant.
-  **Snow Showers:** Snow falling at varying intensities for brief periods of time. Some accumulation is possible.
-  **Snow Flurries:** Light snow falling for short durations with little or no accumulation.
-  **Freezing Rain:** Occurs when the layer of freezing air is so thin, raindrops do not have enough time to freeze before reaching the ground.
-  **Sleet:** Frozen raindrops occurs when the layer of cold, freezing air along the surface is thicker than the warmer air above. This causes the raindrops to freeze before reaching the ground.
-  **Ice Storm:** Results in the accumulation of at least .25" of ice on exposed surfaces. Creates hazardous driving and walking conditions, and tree branches and powerlines can easily snap under the weight of the ice.
-  **Lake Effect Storm:** Cold, dry air mass moves over the Great Lakes regions, picking up moisture from the Great Lakes. This air, now full of water, dumps the water as snow in areas to the south and east of the Lakes.

Figure 16  
Types of Winter Precipitation



Source: [https://www.weather.gov/bou/winter\\_wx\\_preparedness\\_week](https://www.weather.gov/bou/winter_wx_preparedness_week)

#### Recent Severe Winter Weather in New Hampshire

In March **2018**, New Hampshire was hit by **4** cyclonic Nor'easters in a row over a **2-** week period because of the changing climate, in a recurring snow-and-melt cycle. These storms have the potential to inflict more damage than many hurricanes because the high storm surge and high winds can last from **12** hours to **3** days, while the duration of hurricanes ranges from **6 to 12** hours.

- March 2-3, 2018 – Seacoast flooding, Concord wind gusts 36 mph, about 1"
- March 7-8, 2018 – Concord 11"
- March 12-14, 2018 – Concord 11", Epsom 23"
- March 22, 2018 – Concord 3"

All winter storms make walking and driving extremely dangerous. The elderly and very young are at high risk during winter storms and may be affected by hypothermia and isolation. During winter storms, there is an increased risk of **fire** because people experience **power failure** and use candles, portable gas stoves, generators, and flammable sources of heat and light.



### Magnitude of Severe Winter Weather

Severe winter weather magnitude can be measured using several different scales and indices including the Winter Storm Severity Index (WSSI), the NCDC Regional Snowfall Index (RSI) for the Northeast and forecasted weather advisories.

Figure 17 displays the [NOAA Weather Prediction Center's Winter Storm Severity Index \(WSSI\)](#), a 1-5 color-coded indices from 0- No Impacts to 5- Extreme Impacts, which is used on the winter maps to predict storms 1-3 days out. Users are advised the WSSI does not depict official warnings.

Figure 17

#### Potential Winter Storm Impacts

##### Winter Storm Severity Index (WSSI)

Potential Winter Storm Impacts	
	<b>No Impacts</b> Impacts not expected.
	<b>Limited Impacts</b> Rarely a direct threat to life and property. Typically results in little inconveniences.
	<b>Minor Impacts</b> Rarely a direct threat to life and property. Typically results in an inconvenience to daily life.
	<b>Moderate Impacts</b> Often threatening to life and property, some damage unavoidable. Typically results in disruptions to daily life.
	<b>Major Impacts</b> Extensive property damage likely, life saving actions needed. Will likely result in major disruptions to daily life.
	<b>Extreme Impacts</b> Extensive and widespread severe property damage, life saving actions will be needed. Results in extreme disruptions to daily life.

The [Regional Snowfall Index \(RSI\) for the Northeast](#) is used to categorize significant snowstorms. The RSI ranks snowstorm effects on a scale from **1** to **5**, similar to the Enhanced Fujita Scale for tornadoes or the Saffir-Simpson Hurricane Wind Scale for hurricanes. The RSI differs from these other indices because it includes population, a social component. The RSI is based on the spatial extent of the storm, the amount of snowfall, and the juxtaposition of these elements with population. The Regional Snowfall Index (RSI) displayed in **Table 23** is a measurement of the magnitude of a snowstorm in the Northeast, which includes New Hampshire.

Table 23

#### Regional Snowfall Index (RSI) for the Northeast

Storm Category	RSI Value	Snow Description
1	1–3	Notable
2	3–6	Significant
3	6–10	Major
4	10–18	Crippling
5	18.0+	Extreme

Source: [www.ncdc.noaa.gov/snow-and-ice/rsi/](http://www.ncdc.noaa.gov/snow-and-ice/rsi/)

(adapted by CNHRPC)

Several types of public alert warnings are issued to people have a chance to prepare and respond accordingly to the winter weather threat. Winter warnings are the most serious alert and represent different types of storms forecasted as displayed in **Table 24**.

❄ <b>Winter Watch</b> <b>BE PREPARED</b>	Issued in the 24 to 72 hour forecast timeframe when the risk of a hazardous winter weather event has increased (50 to 80% certainty). It is intended to provide enough lead time so people can prepare.
❄ <b>Winter Advisory</b> <b>BE AWARE</b>	Advisories are issued when a hazardous winter weather event is occurring, is imminent, or has a very high probability of occurrence (generally greater than 80%). An advisory is for less serious conditions that cause significant inconvenience and, if caution is not exercised, could lead to situations that may threaten life and/or property.
❄ <b>Winter Warning</b> <b>TAKE ACTION</b>	Warnings are issued when a hazardous winter weather event is occurring, is imminent, or has a very high probability of occurrence (generally greater than 80%). A warning is used for conditions posing a threat to life or property within the next 12-36 hours.

**Table 24**

**Winter Weather Warning Events**

Warning Type	Criteria	Description for Next 12-36 Hours
<b>Blizzard Warning</b>	<b>Gusts &gt;= 35 mph, visibility &lt;1/4 mile</b>	Blizzard event is imminent or expected in the next 12 to 36 hours. Sustained wind or frequent gusts greater than or equal to 35 mph will accompany falling and/or blowing snow to frequently reduce visibility to less than 1/4 mile for three or more hours.
<b>Ice Storm Warning</b>	<b>½" ice over 50% of area</b>	An ice storm event is expected to meet or exceed local ice storm warning criteria in the next 12 to 36 hours. Criteria for ice is 1/2 inch or more over at least 50 percent of the zone or encompassing most of the population.
<b>Winter Storm Warning</b>	<b>7" snow in 12 hrs, or 9+ snow in 24 hrs over 50% of area</b>	A winter storm event (heavy sleet, heavy snow, ice storm, heavy snow and blowing snow or a combination of events) is expected to meet or exceed local winter storm warning criteria in the next 12 to 36 hours. Criteria for snow is 7 inches or more in 12 hours or less; or 9 inches or more in 24 hours covering at least 50 percent of the zone or encompassing most of the population. Use "mid-point" of snowfall range to trigger warning (i.e 5 to 8 inches of snow = warning). Criteria for ice is identical to Ice Storm Warning.
<b>Lake Effect Snow Warning</b>	<b>7" snow in 12 hours, limited area</b>	A lake effect snow event is expected to meet or exceed local lake effect snow warning criteria in the next 12 to 36 hours. Widespread or localized lake induced snow squalls or heavy snow showers which produce snowfall accumulation to 7 or more inches in 12 hours or less. Lake effect snow usually develops in narrow bands and impacts a limited area within a county or forecast zone. Use "mid-point" of snowfall range to trigger warning (i.e 5 to 8 inches of snow = warning).
<b>Wind Chill Warning</b>	<b>Low temps to -25°F</b>	Wind chill temperatures are expected to meet or exceed local wind chill warning criteria in the next 12 to 36 hours. Wind chill temperatures may reach or exceed -25°F.

Source: [Weather.gov](https://www.weather.gov), 2021

## TECHNOLOGICAL HAZARDS

Many technological hazards could be construed as secondary hazards, as they often occur as the result of a primary (natural) hazard. For example, **power failure** or **transportation accidents** (technological) can result from severe winter weather (natural). Scientific measures of magnitude are generally not available for individual technological hazards, but they are provided for **debris impacted infrastructure** and **dam failure** which are closely related to **flooding** and for **hazardous materials spills** and **radiological incident**.

One of the technological hazards has been rated along with the natural hazards within the **Hazard Identification and Risk Assessment**. There are several specific hazards of the **TECHNOLOGICAL** hazard category examined in the **HIRA**:

Main Hazard Category	Specific Hazards Included			
TECHNOLOGICAL	AGING INFRASTRUCTURE Bridges, Culverts, Roads, Pipes or Underground Lines	DAM FAILURE Water Overtop, Breach, Beaver, etc.	FIRE Vehicle, Structure, Arson or Conflagration	HAZARDOUS MATERIALS Haz Mat Spills, Brownfields or Trucking
	LONG TERM UTILITY OUTAGE Power, Water, Sewer, Gas, Internet, Communications or Live Wire Danger			

### Magnitude of Technological Events

The magnitudes of technological hazards are not addressed in this Plan. Technological events could have rating systems within their sphere of influence, but these are outside the scope of this **Hazard Mitigation Plan**. More information is provided for reference as needed for some of these technological hazards.

### Aging Infrastructure

Infrastructure of a community includes its roads, sidewalks, bridges, culverts, water lines, sewer lines. Those components such as electric lines, telecommunications towers and dams are not considered in this section because they are not usually municipal-owned. The State of New Hampshire maintains responsibility for NH 106, NH 28, and US 3 in Pembroke. The Town is responsible for **50 miles** of local Class V gravel and paved roadways, sidewalks, as well as the bridges and culverts. Communities in New Hampshire are faced with the dilemma of poor conditioned infrastructure with not enough funding to pay for rehabilitation, even with grants from the NH Department of Transportation (NHDOT) for roads and bridges and revolving loans from the NH Department of Environmental Services for water infrastructure.

Aging infrastructure creates hazards to people, through **transportation crashes**, **public health water quality crisis**, weakened bridges during **flooding** events, undersized culverts unable to accommodate storm water, and more.

### Bridges, Culverts, Roads

Debris impacted infrastructure regularly occurs along the Central NH Region's rivers and streams and also along roadways. Rivers or brooks flowing under bridges or through culverts could get clogged or damaged by woody material or leaves in the watercourse. Culvert maintenance is particularly important before and during heavy rainfall and floods. Tree limbs falling onto power lines and onto roadways, disrupting both electricity and the roadway, occur during wind or winter storms.

Some of the gravel Town roads in Pembroke are constructed using ditching instead of storm drains. The Town is required to develop and maintain MS4 stormwater regulations, which it has done. Some of the Town maintained roads are gravel, enabling easier maintenance and washout repair. Bridges and dams are described in the **APPENDIX A Critical and Community Vulnerability Assessment**.

### Fire (Arson, Vehicle, Structure)

Fires which are not natural hazards are often associated with vehicles, structures or hazardous materials spills, or sometimes an explosion. These are considered **Technological Hazards**. Arson, the deliberate setting of a fire as an act of sabotage or mischief is a **Human Hazard** but is contained in this section for convenience. No magnitude scales were defined for these types of non-natural fires.

### Hazardous Materials

Hazardous materials and hazardous wastes contain properties that make them potentially dangerous or harmful to humans. They can be liquids, solids, contained gases or sludge. Hazardous wastes can be the by-product of manufacturing, as well as discarded commercial products. Most households contain cleaning agents that become hazardous waste when disposed of improperly. Chemicals have numerous benefits but can also cause hazards during their production, storage, transportation, use or disposal.

Hazardous materials can have adverse health related effects and may even cause death in certain cases. In addition, hazardous materials may damage homes, businesses and other property, as well as natural ecosystems. Chemical accidents in plants or chemical spills during transportation may often release hazardous chemicals.

The risk from hazardous materials spills or releases into groundwater is present if consumers and homeowners make irresponsible decisions regarding the disposal of household chemicals. These household chemicals can contaminate drinking water in wells and cause damage to various ecosystems. Most people contaminate without being aware that they are doing so. Further education may be needed to reduce hazardous waste contamination. The necessity for continuing the program of holding biennial municipal Household Hazard Waste (HHW) collection days is crucial to helping to maintain a healthy environmental for Pembroke's residents.

### Long Term Utility Outage

Utilities systems exist everywhere and are subject to damage from construction work, accidents and extreme weather. Many utilities are protected by back-up generators to prevent failure, whatever the cause may be. Nuclear power plants produce roughly **20%** of the nation's power, they exist in nearly all states and 3 million Americans live within **10** miles of a nuclear power plant. The greatest risk to life resulting from a nuclear power plant failure is radiation contamination resulting from radiation release into the environment. People in the immediate vicinity are at greatest risk of radiation contamination. Another common source of energy, coal, can be potentially hazardous because coal power plants emit chemicals such as mercury and sulfur dioxide.

Any service-providing businesses in Town (gas station, bank, fast food, convenience, etc.) would rely on electricity provided by powerlines, and in many cases, enterprise comes to a standstill during disaster events. Aging, vulnerable populations are at greatest risk in rural Pembroke from the effects of **power/utility failure** and **communications failure**. A few individuals in Town require oxygen and power failure and the likely accompanying communications systems failure would comprise the most vulnerable populations. The Fire and Rescue Department and Police Department conduct welfare checks for many residents known to be in need.

As a rule of thumb, all residents should be able to shelter in place in their homes for up to **3** days or **72** hours, gathering needed supplies and water ahead of time. **Power failure** can cause inconvenience, loss of economy, extra Town expenditures and staffing, and could restrict emergency response because the typical power failure is a secondary hazard caused by natural weather event. This problem is applicable to the **High Wind Events** and **Winter Weather** hazard events described earlier as well as **Debris Impacted Infrastructure** and **Transportation Crash** hazard events in the following sections.

### **Electricity**

New Hampshire contains nuclear, coal and natural gas power plants. There is only one (1) coal power plant in New Hampshire, the Merrimack Station in Bow, currently owned by Granite Shore Power, formerly owned by Eversource and Public Service of New Hampshire. As of **2018**, the Merrimack Station is partially decommissioned, only operating when there is a need for additional kilowatt hours in the area. The Station requires **24** hours to become operational, then ceases firing when there is no additional electrical demand. The Merrimack Station is the largest coal-fired electrical generating station and when it was operating around the clock, supplied power to **190,000** households. Coal fuel generated only **7%** of the State's electricity in **2016**. Much of the State's electricity (**56% in 2016**) is provided by the Seabrook nuclear power reactor.

In the harsh environment that New Hampshire residents are subjected to, power and utility failures on an isolated level are commonplace. During nearly every heavy snowstorm, ice storm, or other severe weather event, customers can easily lose power and/or other utilities. Pembroke is served by Eversource and Unitil.

### **Communications Systems Failure**

Communications systems, like utilities, are found everywhere and are subject to damage by construction work, severe weather and traffic accidents. Because communications systems depend on electricity, any power outage may cause an interruption in a communications system. In addition, many communications systems have buried cables which are particularly vulnerable to being cut. Communications systems interruptions can negatively impact a region, town, neighborhood or household in the case of a natural disaster, catastrophe or other emergency. Power lines often share cables and poles with communications systems. When power fails, cable, telephone and radio services frequently fail as well.

Telecommunications towers often carry local, regional, county, state and sometimes federal antennas that relay emergency communications. In addition, personal cellular communications are often co-located at the same tower. When a major communications tower is out of service, its impacts are widespread. In some Central NH Regional municipalities, the existing towers do not provide coverage to the entire community and create dead zones. This is particularly dangerous to people without landlines or when emergency services are necessary. Regional and state communications are often co-located on the tower upon which Town's emergency communications are based (Plausawa Hill). The Town is a member of the Capital Area Mutual Aid Fire Compact which is a centralized communications hub for emergency fire and medical communications. The CAMAFC has redundancy sharing with the Lakes Region Fire Mutual Aid Compact.

## HUMAN HAZARDS

Events of human nature include terrorism (ecological, cyber and chemical), sabotage/vandalism, hostage situations, and civil unrest. These are often “behind the scenes” hazards that local Police Departments handle on a regular basis. These events are all caused by direct human action. Mass casualty incidents, caused by any number of hazards, would also be addressed as a human hazard. Cyber events, while a technological hazard, are considered another type of artificial, human-developed hazard.

There are several types of **HUMAN** hazards examined in the **Hazard Identification and Risk Assessment**:

Main Hazard Category	Specific Hazards Included			
<b>HUMAN</b>	<b>TRANSPORTATION CRASH</b> Vehicle, Airplane, Helicopter, Rail, Interstate, Pedestrian or Bicycle	<b>MASS CASUALTY INCIDENT</b> As a result of any hazard event	<b>TERRORISM/VIOLENCE</b> Active Shooter, Hostage, Public Harm, Civil Disturbance/Unrest, Politically Motivated Attacks, Incendiary Devices, Sabotage or Vandalism	<b>CYBER EVENT</b> Municipal Computer Systems Attack, Cloud Data Breach, Identity Theft, Phishing, Ransomware or Virus

Human Hazards are examined by descriptions of the types of hazards and in the **Potential Future Hazards**. Scientific measures of magnitude are not available for individual human hazards.

### Transportation Crashes

Automobile crashes could occur on any roadway in the Central NH region. A major accident would have the greatest impact for travelers on Interstates 93, 393 or 89; on US Route 202, US Route 4/202 or US Route 3; on NH Route 3A, NH Route 9, NH Route 13, NH Route 28, NH Route 31 NH Route 49, NH Route 77, NH 103, NH Route 106, NH Route 107, NH 114, NH Route 127, NH Route 129 and NH Route 132 or on their bypasses, interchanges, Exits and on/off ramps. These are high speed corridors with high traffic volumes. Many local roads allow for residential and commuter vehicles at low speeds. A vehicle-pedestrian or vehicle-bicycle crash has a greater casualty rate on the local and state roads as different road users use the same limited space.

In the region, the railroad lines along the Merrimack River create the potential for a (railcar) transportation accident. Trains could potentially derail, causing injuries or fatalities and hazardous materials spills. In the Central NH Region, the Concord-Lincoln Line runs **73** miles between Concord and Lincoln. The New Hampshire Maine Line runs between Concord, Nashua and Lowell, MA. Several communities through which these lines travel have expressed the concern about hazardous material spills due to transportation crashes or sabotage. Concord Municipal Airport is a small airport in the Central NH region used by private small planes, but Manchester-Boston Regional Airport (MHT) can be accessed via



NH 28 or US 3 in about 30 minutes. Air traffic can also be hazardous to the region's citizens. Small local sites such as JBI Helicopter and other helipads in Pembroke increase the chances for a possible aviation crash, especially in the higher elevations around Mount Kearsarge and Pat's Peak. With the technological prominence of personal drones that can be flown within site of the user, possibilities for drone crashes with people or vehicles increase.

### **Mass Casualty Incident**

**Mass casualty** is the situation for which local, regional, state and national personnel train for treating large numbers of people who are injured from any natural, human or technological disaster. The Central NH Region has many partners for mass casualty training and preparation. [Capital Area Public Health Network](#) (CAPHN) works to promote, protect, and improve the health and well-being of communities within the Capital Area of New Hampshire through the proactive, coordinated, and comprehensive delivery of essential public health services. These include substance misuse prevention, suicide prevention, public health emergency preparedness, vaccinations, and more. The staff works with area emergency management directors. Across New Hampshire, there are **13** regional public health networks.

Concord Hospital is a **295**-licensed beds (plus **238** staffed beds) facility and the only trauma center in the Central NH Region. New London Hospital (**25** critical access beds, **58** long term care beds) and Franklin Regional Hospital (**25** critical access beds) are smaller hospitals in Merrimack County. In Laconia, the Lakes Region General Hospital (**137** beds) has a trauma center. The Dartmouth-Hitchcock Medical Center (**396** beds) in Lebanon has a trauma center and is New Hampshire's only and teaching hospital. The closest hospital to Pembroke is the private [Monadnock Community Hospital in Peterborough](#). Mass casualty preparedness is a situation regularly trained for by hospital employees.

The [New Hampshire Hospital Association](#) provides leadership through advocacy, education and information in support of its member hospitals and health care delivery systems. The NHHA has an encourages its members to develop hospital emergency plans and staffs an Emergency Preparedness Coordinator position to plan for such events. **Mass casualties** of the magnitude that can be expected with a disaster related to terrorism or other incidents demand an expanded role for hospitals. They must be supported by their communities as they attempt to protect the facility, its patients and personnel while attending to the victims of a disaster. The NHHA has a mutual aid network designed to work together during times of crisis.

### **Terrorism/Violence**

The use of force or violence against people to create fear, cause physical harm and/or intimidation or for reasons of ransom. Terrorists often make threats to create fear and change public opinion. Cyber terrorism consists of hackers who threaten the economy by attacking the intricate computer infrastructure, affecting business and communication. Biological and chemical terrorism refers to those infectious microbes or toxins used to produce illness or death in people or animals. Large groups or close

quarters of people can make bioterrorism more effective. Terrorists may contaminate food or water, thus threatening an unprotected civilian population. Eco-terrorism refers to the destruction of property by persons who are generally opposed to the destruction of the environment or to make a visible argument against forms of technology that may be destructive to the environment.

### **Sabotage/Vandalism**

**Sabotage** is a deliberate action aimed at someone or some institution to weaken that person's or institution's integrity and reputation through subversion, destruction, obstruction, or disruption. Sabotage may occur in war, a workplace, in the natural environment, as a crime, in politics or as a direct attack against an individual. Vandalism is the willful defacement or destruction of property.

### **Hostage Situation**

A **hostage situation** is an incident where innocent civilian(s) are held by someone or some group of persons demanding something from third party not related to the individual(s) being held hostage to ensure the fulfillment of certain terms. Often, a hostage situation results from a domestic dispute.

### **Civil Disturbance/Public Unrest**

This hazard refers to types of disturbances that are caused by a group of people, often in protest against major socio-political problems including sit-ins or protests against wars and any general and public expression of outrage against a political establishment or policy. Many instances of **civil disturbance** and public unrest are quelled by a use of force from police. Participants may be victims of personal injury in severe cases. The most probable locations of larger civil disturbance and/or protest in New Hampshire are at the State House in Concord and at the universities and colleges. They have also occurred at political locations, such as feminist health centers or political party headquarters.

### **Bioterrorism**

**Biological hazards** can also be caused by bioterrorism, the deliberate release of viruses, bacteria, or other germs (agents) used to cause illness or death in people, animals, or plants. The [US Center for Disease Control \(US CDC\)](#) has categorized the bioterrorism agents into priority Categories **A**, **B** or **C**, indicating how easily they can be spread and the severity of illness or death they cause. The bioterrorism Categories measure the risk of transmission of infectious organisms, germs, or pathogens but does not include chemicals.

### **Cyber Event**

While **cyber events** could be considered technological hazards, they are deliberately initiated by a person or group of people, thus falling into the human hazard category. Cyberattacks are malicious attempts to access or damage a computer system. These events are socially- or politically- motivated attacks carried out primarily through the Internet. Cyberattacks target the general public or national and corporate organizations and are carried out through the spread of malicious programs (viruses), unauthorized web

access, fake websites, and other means of stealing personal or institutional information from targets of attacks, causing far-reaching damage. **Cyberattacks** are oriented toward organizations, services, and individuals to obtain private, technical, and institutional information, and other intellectual assets for the purpose of vandalism or monetary gain.

As computer crimes, they can cause serious consequences to those against which this threat is used. The cyber events range from more harmless such as website hacking, to personally harmful such as identity theft to more dangerous, such as those that cripple critical infrastructure. Cyber events cause harm to people or property and can generate fear. Much of the infrastructure upon which the State of NH relies is automated and could be subject to cyberattacks. These could include the government, military, communications systems, utilities, fuel, electrical systems, nuclear power plants, transportation systems, financial systems, emergency medical services and more.

On a municipal level, computer systems data storage, transmission of emergency communications, daily operations and monitoring or financial information, could be disrupted or be redirected to the perpetrators. Information Technology (IT) **cybersecurity** is paramount, as is employee training, to reduce the incidence of malware, phishing, SQL injection, man-in-the-middle attack, zero-day exploit, and other techniques to gain access to systems. With our society's increasing reliance on electronic devices and computers, Pembroke's local government and residents should be prepared to address **cyber events** in the various and growing forms they take.

## Potential Future Hazards

After the inventory of hazard types and past hazards in Town, a list of hazards which currently exist or need to be monitored in Pembroke has been completed along with potential future hazards that could occur in the same or other areas. This unique listing of **Potential Future Hazards** was compiled so the Town can be aware of areas that might need to be watched for recurring hazardous problems or that may experience some of these hazards for the first time. The listing was developed by knowledge of the Hazard Mitigation Committee and past experiences of hazards. Past locations of hazard events, where they exist for each hazard, are listed under the individual hazard narratives in the previous section. The existing and susceptible hazard locations are taken from the **Hazard Identification and Risk Assessment (HIRA)**. With this existing and potential future knowledge listed side by side, it becomes easier for a community to plan mitigation measures for the most prominent hazard events in Town.

Potential future hazards in **Table 25** indicate locations in the community where a hazard event could occur and how that hazard could impact the Town. The **Overall Risk** score between **1-16** for the **14** rated hazards from the **HIRA** is provided to understand the scale of risk to Pembroke from all natural hazards. Also from the **HIRA** is whether or not each hazard event occurred within the last **5** years in Pembroke, indicated by either **\*Events(s) Within Last 5 Years\***, **\*ANNUAL Occurrences Within Last 5 Years\***, or **\*NO Event(s) Within Last 5 Years\*** beneath each *Hazard Category*. The magnitude or extent scale where available from previous **4 HAZARD RISK ASSESSMENT** descriptions enable possible effect measurement of the noted Pembroke locations.

**Table 25**  
**Potential Future Hazards**

Hazard Risk Assessment Hazards	Overall Risk	Potential Future Hazards – Locations and Impacts	Magnitude/ Extent Measurement Scales
<b>DAM FAILURE</b> <b>Water Overtop, Breach, Beaver, etc.</b> <i>*Event(s) Within Last 5 Years*</i>	<b>3.3</b> <b>LOW</b>	<ul style="list-style-type: none"> <li>• There are few constructed dams in Pembroke with potential for future flooding damage if breached or failed. The <b>High Hazard (H)</b> Pembroke <b>and Significant (S) Hazard</b> and the <b>Low (L) Hazard</b> dam may be unlikely to flood or breach but still have the potential during a strong flooding event. Several <b>Non-Menace</b> dams are located on are found along a tributary of the Suncook River, Soucook River, Merrimack River. No significant dam breach issues have occurred in the community or upstream.</li> <li>• A potential future breach of the Main Street at Suncook River dam or upstream dams shared by Concord (Soucook River) or Allenstown (Suncook Ricer) places Pembroke in a vulnerable situation to monitor.</li> <li>• Beaver dams carry a high probability of flooding and potential for breakage. Beaver dams are located throughout the Town and depending on size and location, could cause significant damage to roads if the natural dams breach. The Public Works Department regularly breaks up smaller, temporary dams and relocates the beavers.</li> </ul>	<ul style="list-style-type: none"> <li>◆ NHDES Dam Classifications</li> </ul>
<b>DROUGHT</b> <i>*Event(s) Within Last 5 Years*</i>	<b>8.0</b> <b>HIGH</b>	<ul style="list-style-type: none"> <li>• During future <b>drought</b> events, agricultural farms, orchards, nurseries tree farms run the risk of high damage from droughts which also brings economic consequences. Some farms are homestead farms which provide food and income for owners. Crop and livestock loss are consequences of <b>droughts</b> in these locations. In Pembroke, agricultural operations include multiple farms, orchards, nurseries, livestock, (including), and others. When hayfields die off, livestock animals in Town cannot easily be locally fed. See <b>APPENDIX A</b> for the list.</li> <li>• While drought has been a continuing problem and is expected to periodically occur in the future, the lower section of Pembroke is served by a municipal water supply (Pembroke Water Works) for which mandatory restrictions can be enacted. The entire community has private, individual wells. In future drought conditions, private homeowner wells will continue to go dry especially at the higher elevations. When this occurs, the owners typically have a new well dug. Town fire ponds and dry hydrants are found throughout the community, but over time they may dry up from drought. The Fire Department uses an alternate source of water such from the Rivers instead of drawing from the water hydrants.</li> <li>• Customers of the Pembroke Water Works might need to follow voluntary or required water restrictions to conserve the supply. The Town has a Watershed Protection Overlay District to help reduce the impact of different threats to the Town's drinking water wells.</li> </ul>	<ul style="list-style-type: none"> <li>◆ US Drought (D-scale) Monitor Intensity Scale</li> </ul>
<b>EARTHQUAKE</b> <i>*NO Event(s) Within Last 5 Years*</i>	<b>2.0</b> <b>LOW</b>	<ul style="list-style-type: none"> <li>• Since Pembroke is located within an active but mild seismic region, residents are expected to feel the larger future <b>earthquakes</b>, but any damages should be minor.</li> <li>• Locations to watch include historic buildings and essential Town facilities. Although the buildings may receive little damage from</li> </ul>	<ul style="list-style-type: none"> <li>◆ Richter Magnitude Scale</li> <li>◆ Modified Mercalli Intensity Scale</li> </ul>

**4 HAZARD RISK ASSESSMENT**

Hazard Risk Assessment Hazards	Overall Risk	Potential Future Hazards – Locations and Impacts	Magnitude/ Extent Measurement Scales
		<p><b>earthquakes</b>, they should be carefully monitored because the buildings are structurally larger, typically contain numerous people, may contain vulnerable populations, and are critical to the Town's operations and culture.</p> <ul style="list-style-type: none"> <li>• Damage to utility poles and wires, roadways and infrastructure could be significant. Aboveground poles, underground electric lines, underground gas, water and sewer lines could be susceptible.</li> </ul>	
<p><b>EXTREME TEMPERATURES</b>  <b>Excessive Heat, Heat Wave, or Cold, Wind Chill</b>  <i>*Heat Event(s) Within Last 5 Years*</i>  <i>*NO Cold Event(s) Within Last 5 Years*</i></p>	<p><b>2.0 LOW</b></p>	<ul style="list-style-type: none"> <li>• <b>Excessive heat and extreme cold</b> will continue being problematic for Pembroke residents. There are many group facilities, multi-family housing, manufactured housing parks, and the Schools containing seniors, children, vulnerable and/or marginalized populations. The Fire Department and Police Department should continue to check on at-risk residents when possible.</li> <li>• Should the temperature remain high (or low), the Library could be opened as a temporary cooling (or warming) centers. The Town Hall first floor could be opened for temporary warming and cooling purposes without formal School District, Red Cross, and/or Capital Area Public Health Network assistance.</li> </ul>	<ul style="list-style-type: none"> <li>◆ NWS Heat Index</li> <li>◆ NWS Excessive Heat Warnings</li> <li>◆ NWS Windchill Index</li> <li>◆ NWS Freeze Warnings</li> </ul>
<p><b>HIGH WIND EVENTS</b>  <b>Wind, Thunderstorms, Hail, Downbursts, Tornadoes, Debris</b>  <i>*Event(s) Within Last 5 Years*</i></p>	<p><b>6.7 MEDIUM</b></p>	<ul style="list-style-type: none"> <li>• All of Pembroke will experience future severe wind, rainstorms, and thunderstorms often with lightning, particularly common in the summer months. In addition, tornadoes and downbursts are anticipated in the future based on past areal events. Flooding, debris, and property damage will accompany these events. Electrical power (Eversource) is disrupted during most wind-related events. The main telecommunications tower and antennas on Plausawa Hill, water and sewer pumping stations, Eversource and Unitil electric lines and substations, and transmission lines could be damaged by <b>High Wind</b> events.</li> <li>• The whole Town could be impacted by a tornado or downburst. Winds alongside the Merrimack River, in Suncook Village, or along US 3, NH 106 or NH 28 could be strong, as tornadoes travel through flat areas and valleys. These cover much of the geography of the Town, where people and vulnerable facilities would be at risk.</li> <li>• Future high wind events will likely endanger roadways and utility lines from falling trees and limbs. NH 106, NH 28, and North Pembroke Road are critical local routes that lead to hundreds of residences. Other Class V town roads may be suitable for temporary commuter detour traveling but most of them are gravel and hilly and are in danger of tree fall during high wind events. Others lead to unmaintained Class VI roads. These steep slopes and hillsides leading to homes.</li> <li>• The majority of the Town north of US 3 is wooded and forested. The defined historic Town Center is in Suncook Village with essential Town services and historic facilities on US 3/Pembroke Street. Sections would be difficult to access with trees and power lines down on the residential roads. Should a downburst or tornado run through the recreational areas and current use lands, recreationalists would likely need assistance if a severe weather event was unexpected.</li> </ul>	<ul style="list-style-type: none"> <li>◆ Enhanced Fujita (EF) Tornado Scale</li> <li>◆ NWS Thunderstorm Risk Categories</li> <li>◆ NWS Damage Threats for Severe Thunderstorm Warnings</li> </ul>

**4 HAZARD RISK ASSESSMENT**

Hazard Risk Assessment Hazards	Overall Risk	Potential Future Hazards – Locations and Impacts	Magnitude/ Extent Measurement Scales
		<ul style="list-style-type: none"> <li>Older historic or wooden buildings include public and private buildings (historic homes), Town Hall, Pembroke Congregational Church, Town Library, cemeteries throughout Town may be more vulnerable to wind damage because of their age and type of construction.</li> </ul>	
<b>INLAND FLOODING</b> <b>Rains, Snow Melt or Flash Floods</b> <i>*Event(s) Within Last 5 Years*</i>	<b>5.3</b> <b>MEDI</b> <b>UM</b>	<ul style="list-style-type: none"> <li>Future flooding is expected in Pembroke, whether from storm events or snowpack melt. The Soucook River and Suncook River, Brooks, unnamed streams, and culverts have the potential to flood their banks. The MHP units are old and do not meet current codes. The NH 106 Soucook River area of manufactured homes may be impacted and could include landside.</li> <li>Some of the Town's roads have steep slopes and tend to washout during storm events. The community has unnamed brooks that flow under roads that would become impassible during heavy rainfall and resultant flooding conditions. Regularly washout locations are identified and are anticipated to do so in the future from spring snow melts or heavy rainfall at least until repaired.</li> <li>Rain events are concurrent with beaver dam events and culvert washouts, a compounded problem. The Town has done a lot of culvert work since 2017 - many culvert upgrades from corrugated alum to corrugated PVC- all replaced, reset at angle, riprap, elevation raise, most same size but some upsized. Still, some locations may continue to flood during heavy inland flooding events.</li> <li>Although bridge flooding has not yet occurred, some of the bridges have come close to flooding, with water flowing just underneath the decking. The North Pembroke Road Concord/Pembroke bridge will be rehabilitated. Newer bridges are elevated from the banks, so flooding would have to be significant to overtop. See also the <b>Special Flood Hazard Areas</b> (floodplains), <b>Waterbodies</b>, and <b>Road Washouts</b> sections for details. The SFHAs and road washout areas are anticipated to flood in the future during extreme events.</li> </ul>	<ul style="list-style-type: none"> <li>Special Flood Hazard Areas (SFHAs) on 2010 Digital Flood Rate Insurance Maps (Zones A, AE, X)</li> <li>Flood Action Stages (River Gages)</li> </ul>
<b>LANDSLIDE</b> <b>Soil, Rockslide or Excavation Areas</b> <i>*NO Event(s) Within Last 5 Years*</i>	<b>2.7</b> <b>LOW</b>	<ul style="list-style-type: none"> <li>Generally, vegetation and best operational practices of excavation sites in Pembroke are good at preventing landslides or rockslides. Sites include the commercial excavation operations, some of which has been reclaimed. Potential future landslides are not expected to occur at the excavation sites in Town, although slides are possible under the right conditions.</li> <li>The Town has numerous hills over 800' in elevation or on slopes greater than 15%, most of them with roadways leading to homes.</li> <li>Roads with steep ditching or embankments will remain vulnerable to landslide in the future. Road washouts and flash-flooding of gravel or paved roads could cause landslides. Gravel roads with ditching in Pembroke could be subject to landslide conditions (see <b>Inland Flooding</b>). Blasted State or US Routes can have landslide (small rocks land on the roadway occasionally). Landslide is an uncommon hazard but one that could cause property damage, otherwise the Town is not particularly susceptible.</li> </ul>	<ul style="list-style-type: none"> <li>No known widely-used scale measuring the magnitude of landslides</li> </ul>



**4 HAZARD RISK ASSESSMENT**

Hazard Risk Assessment Hazards	Overall Risk	Potential Future Hazards – Locations and Impacts	Magnitude/ Extent Measurement Scales
<b>LIGHTNING</b> <i>*Event(s) Within Last 5 Years*</i>	<b>3.0 LOW</b>	<ul style="list-style-type: none"> <li>• Future lightning strikes may cause the damage at the Town Hall, Congregational Church, Clock Tower, and other important Town and School facilities. The large tax exempt facilities and buildings without lightning rods may also be susceptible in cleared areas or on the high hills. Conflagration could start at these denser facilities as a result of lightning strike and be most dangerous.</li> <li>• Other structures and homes located in the populated areas would be most vulnerable to the power surges and outages caused by these strikes, especially those high density populations in proximity to wooded and forested areas. The potential for resulting wildfire and conflagration is high in these densely populated areas.</li> <li>• Town essential facilities buildings, construction/lumber businesses, and the haz mat or fuel businesses (businesses with potentially hazardous materials onsite such as fuel, gasoline, natural gas, propane) and used fluids (various automotive repair shops) could each be vulnerable to lightning and fire. The Town Public Works Garage, Transfer Station, and aircraft operations could be vulnerable to lightning strike.</li> <li>• The higher elevations north of US 3/Pembroke St may be susceptible to lightning.</li> <li>• Outdoor utilities and antennas are highly vulnerable to future lightning strike, such as the telecommunications tower, electric lines, and telephone switching stations, repeaters, and other communications equipment.</li> <li>• Forested areas and open recreation fields can be dangerous to people and property. Trees are constantly struck. These include the public Town lands and State Forests, conservation areas, and points of higher elevation which can be dangerous to people and property if struck by lightning. Outdoor recreational (golf club) and gathering places could be vulnerable to <b>lightning</b>. Some locations cannot be easily accessed by emergency vehicles, whether to fight the fire or remove people from harm's way.</li> </ul>	♦ Lightning Activity Level (LAL)
<b>PUBLIC HEALTH Infectious Diseases, Air &amp; Water Quality, Biological, Addiction, Arboviral, or Tick-borne</b> <i>*Event(s) Within Last 5 Years*</i>	<b>10.0 HIGH</b>	<ul style="list-style-type: none"> <li>• Public health issues may occur in the community in the future during warm or cold months. For indoor contamination, the highest risk facilities for pick-up or transfer of viruses and bacteria can include the: Three Rivers School, Pembroke Academy, private schools, Churches, Town Hall. There are no health services or dedicated senior housing facilities. Food-borne illness can be transferred at eateries, but there are no public food places in Pembroke. All winter long, people of Pembroke in close quarters get sick from different viruses.</li> <li>• Outdoor susceptibility to arboviral and tickborne diseases is expected to grow. Pembroke is a highly rural community with many waterbodies, wetlands, and other swampy areas for these arthropods to thrive. The wet areas, vernal pools and the many public trails on conservation lands can also enable transmission. Several horse farms are in the area and can contribute to infection.</li> </ul>	♦ CDC Infectious Disease Levels Scale

**4 HAZARD RISK ASSESSMENT**

<b>Hazard Risk Assessment Hazards</b>	<b>Overall Risk</b>	<b>Potential Future Hazards – Locations and Impacts</b>	<b>Magnitude/ Extent Measurement Scales</b>
		<ul style="list-style-type: none"> <li>• Air quality warnings from Canadian fires and drifting smog do little to prevent particulate inhalation by Pembroke’s more vulnerable populations and outdoor enthusiasts.</li> <li>• Banks of the Merrimack River at White Sands and any other watercourse or waterbody used as beaches may expose people to cyanobacteria. The public canoe launches/ beaches can be shut down in the future due to high cyanobacteria levels, and this situation is one to watch during the warm season in July-August. The Town has a Watershed Protection zoning ordinance surrounding the Pembroke Water Works wells watershed to preserve water quality and public health.</li> <li>• Much of NH 106 and its businesses are situated atop the Soucook River aquifer. Potential environmental damage to water quality by trucking, fuel spills, and long term exposure is a concern. Thousands of Pembroke and area residents others obtain water from this aquifer.</li> <li>• The Town's local Point of Dispensing (POD) is located at the Concord’s NH Technical Community College. Pembroke is a member of the Capital Area Public Health Network, which will assist the Town in times of public health crisis.</li> </ul>	
<b>RIVER HAZARDS</b> <b>Ice Jams, Scouring, Erosion, Channel Movement or Debris</b> <i>*Event(s) Within Last 5 Years*</i>	<b>6.0</b> <b>MEDIUM</b>	<ul style="list-style-type: none"> <li>• Future ice jams in the Soucook River and Suncook River could be expected. Roads within the Rivers’ floodplain areas could in the future be subject to ice jam damage. River ice jams, may have future potential to occur on Batchelder Road, Buck Street, Glass Street, Front Street, and Soucook Lane, and Memorial Field, and Soucook River at North Pembroke Road (Silva). A jam on the Suncook River could severely impact the double-decker bridge between Allenstown and Pembroke on Route 3. Floodplains could become inundated and evacuations might be necessary.</li> <li>• The Suncook River forms the 7-mile eastern border of Pembroke. Flooding, erosion, and channel movement has the potential to occur on Batchelder Road, Buck Street, Glass Street, Front Street, and at Memorial Field. Property damage and personal injuries could occur. Irish Pond better, known as Suncook Pond, in back of Post Office is quickly filling with sediment. Locations particularly vulnerable to this hazard include the Suncook River at Mills Falls and the Suncook River at Maple Grove Campground. The Town has been able to acquire most of the private properties of Batchelder Road to eliminate the flood risk to life and property.</li> <li>• An ice jam at the double decker bridge at Upper Turnpike Street over the Suncook River would be most serious. This River has had ice jams in the past.</li> <li>• The Soucook River forms the western border of Pembroke. Flooding, erosion, and channel movement may the potential to occur on Soucook Lane, 823 North Pembroke Road (Silva), Batchelder Road, Buck Street, Soucook Lane, and Memorial Field. Flooding of the Soucook could overtake the sewer pumping station at Route 3, causing a possible raw sewage release.</li> <li>• Riverine floodplain flooding or channel movement of the Suncook River is a likely future hazard. Woody debris was inventoried in 2015.</li> </ul>	<b>◆ EPA Bank Erosion Risk Index</b>

**4 HAZARD RISK ASSESSMENT**

Hazard Risk Assessment Hazards	Overall Risk	Potential Future Hazards – Locations and Impacts	Magnitude/ Extent Measurement Scales
		Any upstream channel movement would have detrimental effects downstream. <ul style="list-style-type: none"> <li>• Erosion/washout of certain Town roads along the Suncook River and Soucook River is anticipated to continue due to flooding and heavy rains. See prior North Pembroke bridge flood damage (Soucook) and Memorial Field erosion (Merrimack).</li> <li>• Floating debris down the Rivers can accumulate at bridges and dams during future flooding events, including at the Main Street Dam (partial removal in spring 2021 to enable most debris to flow downstream).</li> </ul>	
<b>SEVERE WINTER WEATHER</b> Snow, Ice, Blizzard or Nor'Easter <i>*Event(s) Within Last 5 Years*</i>	<b>8.0 HIGH</b>	<ul style="list-style-type: none"> <li>• It is extremely likely that Pembroke will be impacted by severe winter weather in the future. Damage and serious conditions can result in all areas of the community. Areas above 800 feet (See <a href="#">Map 1</a>), the remote, forested and difficult to access areas and ___ are among the most vulnerable areas to ice and snow conditions.</li> <li>• As <b>severe winter conditions</b> are expected to continue in the future and to increase in severity, concerns remain regarding safety on roads, especially in narrow, straight areas and at intersections. Many local roads have a sharp incline/decline and cars have trouble traveling the roads during winter conditions, especially when icy. See the <b>Table of One Egress/Cul-de-Sac Roads in Town</b>. Public Works Department keeps up with the snowfall on the Town roads, but ice storms require more time and resources to keep the roads safe. During the winter months, the crew sees regular severe warming and snowmelt which then freezes to ice. With the changing climate, this situation is anticipated to grow in the future.</li> <li>• Particular areas of concern during <b>winter weather</b> include the more highly traveled roads –Us 3, Nh 106, NH 28, and North Pembroke Road detour. Power outages and isolation may occur from heavy <b>snow loads</b> and <b>downed trees</b> on roads.</li> <li>• The Town facilities buildings, Town Hall, Library, Safety Center, Public Works Garage, Transfer Station, and Pembroke Water Works, Allenstown Wastewater must be able to function during <b>severe winter events</b>. Personnel driving to and from these facilities must travel on the main roads.</li> <li>• During future storms, some historic buildings or Town facilities with large or flat roofs, barns or sheds, and older manufactured homes may be vulnerable to <b>heavy snow loads</b> or other events that could cause the roof to collapse. Flat roofs can be a problem with snow-loading.</li> <li>• The Plausawa Hill, Buck Street, and Center Road telecommunications towers and antennas, Eversource &amp; Unil electric lines, and Comcast switching stations as well as Department building antennas could be highly impacted from future <b>snow, ice, and blizzards</b>.</li> </ul>	<ul style="list-style-type: none"> <li>◆ Potential Winter Storm Severity Index (WSSI)</li> <li>◆ NCDC Regional Snowfall Index (RSI) for Northeast</li> <li>◆ NWS Winter Weather Warning Events</li> </ul>
<b>SOLAR STORMS AND SPACE WEATHER</b> Solar Winds, Geomagnetic	<b>1.0 LOW</b>	<ul style="list-style-type: none"> <li>• The aurora borealis has been photographed on nearby Mount Kearsarge in Warner 20 miles to the north due to geomagnetic storms. These types of events are likely to recur. At this time, the Town is aware of potential impacts to its communications and electrical systems to its</li> </ul>	<ul style="list-style-type: none"> <li>◆ NOAA Geomagnetic Storms Scale</li> <li>◆ NOAA Solar Radiation Storms Scale</li> </ul>

**4 HAZARD RISK ASSESSMENT**

Hazard Risk Assessment Hazards	Overall Risk	Potential Future Hazards – Locations and Impacts	Magnitude/ Extent Measurement Scales
<b>Storms (Aurora Borealis), Solar Radiation or Radio Blackout</b> <b>*NO Event(s) Within Last 5 Years**</b>		<p>Town and School facilities but has rated the hazard unlikely to cause damages.</p> <ul style="list-style-type: none"> <li>The telecommunications array on the privately owned Wolfe tower, Eversource high tension power lines or telephone/fiber switching stations could be impacted in the future by a geomagnetic event as could Town Department radios, base station, cellular phones, and VOIP that use emergency communications.</li> <li>Pembroke is a member of Capital Area Mutual Aid Fire Compact dispatch which in 2020 combined with Lakes Region Mutual Aid dispatch. The Police Department uses the Merrimack County Sheriff's Office dispatch. Other Town staff (Highway, Town Office, and residents) rely on non-locally owned cell towers with national service provider antennas. Repeaters on the tower require backup generator maintenance and operation, which is out of local control.</li> </ul>	<p>◆ NOAA Radio Blackouts Scale</p>
<b>TROPICAL AND POST-TROPICAL CYCLONES</b> <b>Hurricanes, Tropical Storms or Tree Debris</b> <b>*NO Event(s) Within Last 5 Years*</b>	<b>7.0</b> <b>MEDI</b> <b>UM</b>	<ul style="list-style-type: none"> <li>The last tropical and post tropical storm to impact Pembroke was Hurricane Sandy in 2012. There will be future tropical cyclones to impact Pembroke. Although the vulnerable areas are spread all over Town instead of more site- specific, the facilities and locations at greatest risk are shared with <b>High Wind Events</b> and <b>Inland Flooding</b> above.</li> </ul>	<p>◆ Saffir-Simpson Hurricane Wind Scale</p>
<b>WILDFIRE</b> <b>Brushfire, Outdoor Fires or Accidental</b> <b>*Event(s) Within Last 5 Years*</b>	<b>6.7</b> <b>MEDI</b> <b>UM</b>	<ul style="list-style-type: none"> <li>Although few substantial <b>wildfires</b> have impacted Pembroke since the last Plan, the potential exists for large fires in remote or difficult to access locations in the future. Drier foliage, slash on the ground, one-egress roadways, in the conservation lands and in private woodlots could mean both future severe fires and difficulty accessing these fires should the need arise. As a member of the Concord Area Fire Mutual Aid Compact, the Town regularly provides other communities with mutual aid for wildfires and would receive aid in turn.</li> <li>The public conservation lands and trail systems are heavily used and may be the primary concern for future <b>wildfires</b>.</li> <li>◆ Numerous neighborhoods with about 1,500 people are surrounded by woods and have only one egress/access route. The Town is dotted with these cul-de-sac and one-egress residential roads (Class V, Class VI and private) in the Wildland Urban Interface which have limited emergency access. Northern Pembroke and the unmaintained Range Roads are particularly vulnerable to <b>wildfire</b>.</li> <li>Pembroke is heavily wooded, with difficult, remote areas and many slopes. 2020 land use indicates the forest areas are declining, but additional lands are residential with wooded unbuilt area. Any residential area within Town could be particularly prone to <b>wildfire</b> since all are situated in rural and wooded locations. Most new subdivisions which are approved occur on sloped wooded areas, but most are required to have an adequate cistern or flowing water supply for firefighting. A lot of slash remains on the ground. An <b>aircraft crash</b> in</li> </ul>	<p>◆ NWCG Wildfire Classification ◆ National Fire Danger Rating System</p>

**4 HAZARD RISK ASSESSMENT**

Hazard Risk Assessment Hazards	Overall Risk	Potential Future Hazards – Locations and Impacts	Magnitude/ Extent Measurement Scales
		<p>the flightpaths of JBI Helicopter, Concord Municipal Airport, NH Army National Guard, or Manchester-Regional Airport could result in a <b>wildfire</b>.</p> <ul style="list-style-type: none"> <li>Some of the lots on private roads or Class VI unmaintained roads could be particularly vulnerable to <b>wildfire</b> as they might not be readily accessible for fire apparatus, either not maintained or not constructed to town road standards. The Fire Department is lightly staffed (volunteer) until needed and relies on mutual aid assistance.</li> <li>See also <b>Lightning</b>.</li> </ul>	
<b>TECHNOLOGICAL AND HUMAN HAZARDS</b>			
<b>AGING INFRASTRUCTURE</b> Bridges, Culverts, Roads, Pipes or Underground Lines <i>*Event(s) Within Last 5 Years*</i>	not scored	<p>Most of the Town's infrastructure is aging and only able to be replaced on a priority basis. Therefore, any future natural hazard could render the culverts, ditching, and drainage systems vulnerable. US 3 Double Decker Bridge over Suncook River, other state bridges, and shared bridges are aging. The Town bridges also are aging and could be subject to future floods, ice, transportation crashes or debris impacted infrastructure. See <b>APPENDIX A</b> for the list.</p> <ul style="list-style-type: none"> <li>There are municipal water lines, wastewater lines, stormwater lines, and natural gas lines. Future hazard events such as earthquakes, floods, hard freezing and continued aging infrastructure will make any existing problems worse.</li> <li>See list of <b>Road Washouts</b> for a list of culverts susceptible to future floods, ice jams, debris, and other hazards as well as the <b>Action Plan</b> to address them.</li> <li>The Town's 50 miles of roads often difficult to maintain, upgrade and rehabilitate because of lack of funding. Only the priority roads are upgraded. The Town Public Works Dept Budget will only stretch to the immediate priorities, while <b>flooding events</b> and <b>severe winter weather</b> are anticipated to increase and impact multiple roads during each event.</li> <li>Asset management and inventories are available for most Town infrastructure, including RSMS for roads.</li> </ul>	N/A
<b>FIRE</b> Vehicle, Structure, Arson or Conflagration <i>*Event(s) Within Last 5 Years*</i>	not scored	<p>The previously noted higher density areas could be subject to potential <b>conflagration</b> which would have devastating effects on the entire community. Drought conditions increase dryness and flammability.</p> <ul style="list-style-type: none"> <li>Serious <b>vehicular fires</b> resulting from crashes could occur, especially on US 3, NH 106, or NH 28 where speeds are faster and more delivery vehicles travel. Some delivery vehicles carry fuel (gasoline, diesel, propane, natural gas, flammable haz mat) to local businesses.</li> <li>The multiple construction, excavation, lumber, automotive and fuel businesses in Town could be subject to potential explosions or <b>fires</b> (see <b>APPENDIX A</b> for the list). Significant risks include the Cooperative Way businesses and from aircraft flightpaths over Pembroke.</li> </ul>	N/A

**4 HAZARD RISK ASSESSMENT**

<b>Hazard Risk Assessment Hazards</b>	<b>Overall Risk</b>	<b>Potential Future Hazards – Locations and Impacts</b>	<b>Magnitude/ Extent Measurement Scales</b>
		<ul style="list-style-type: none"> <li>• Vacant structures, vacant housing units, housing run by absentee landlords, unmaintained housing, or similar commercial structures run a greater risk of arson than occupied or well-kept premises.</li> <li>• Conservation areas and public trails may carry the significant risks and damages of any future <b>arson</b> or <b>accidental fire</b>.</li> </ul>	
<b>HAZARDOUS MATERIALS</b> <b>Haz Mat Spills, Brownfields or Trucking</b> <i>*Event(s) Within Last 5 Years*</i>	not scored	<ul style="list-style-type: none"> <li>• Transportation of hazardous materials on Us 3, NH 106, or NH 28 could be an everyday occurrence through Pembroke. In the future, delivery trucks could rollover to spill their contents (fuel, liquids, propane, solids, etc) onto these significant roadways. High traffic volumes would contribute to secondary crashes and long detours.</li> <li>• Should a future haz mat spill occur in Pembroke, not only could the contents of the spill reach the adjacent Merrimack River, Soucook River, or Suncook River, and Suncook Village or US 3 populations would need to be immediately evacuated or the decision to shelter in place would need to be made and conveyed to occupants.</li> <li>• Several occupational facilities in Town handle, store, or use hazardous materials. Any of these facilities could have a spill at their site or during transport which could result in a spill. Key sites include any fuel stations, auto repair shops, excavation sites, construction businesses, and Cooperative Way businesses. See <b>APPENDIX A</b> for the full list.</li> <li>• Existing and future potential brownfields sites such as old mills along the Rivers, vacant or former industrial properties, salvage yards and illegal junkyards may exist and pose future danger to new property owners or river users in the area. The Town should be aware of and inventory these locations.</li> </ul>	N/A
<b>LONG TERM UTILITY OUTAGE</b> <b>Power, Water, Sewer, Gas, Internet, Communications or Live Wire Danger</b> <i>*Event(s) Within Last 5 Years*</i>	not scored	<ul style="list-style-type: none"> <li>• Aboveground electric lines in Pembroke make the Town particularly vulnerable to outage during future disaster events. High tension transmission lines run through the Town. Utilities (Eversource, Unital, Comcast, internet, cable) may be restored to the most critical areas first, the Town facilities, before the more remote locations in Pembroke have utilities restored.</li> <li>• The most Town facilities have backup generator when electricity fails, but long term solutions are necessary when outages over 3 days occur.</li> <li>• There are several miles of underground water, gas, and sewer lines in Pembroke from which a strategic break could isolate all those connections at the far end of the line.</li> <li>• Long-term future electricity outages may impact the rural residents and the schools most heavily. Many Pembroke residences own generators for their homes or have solar panels and are prepared for several days of no utilities to their homes during future storms.</li> <li>• The telecommunications towers located on Plausawa Hill, Buck Street, and Center Road contains cellular antennas, CAFMAC, County, State, and federal repeaters may be disrupted during future storm events. Local antennas are located on Town Department buildings and are</li> </ul>	N/A



**4 HAZARD RISK ASSESSMENT**

Hazard Risk Assessment Hazards	Overall Risk	Potential Future Hazards – Locations and Impacts	Magnitude/ Extent Measurement Scales
		especially vulnerable. Essential communications may be paused until redundant capabilities are reestablished in the region.	
<b>TRANSPORTATION CRASH</b> <b>Vehicle, Airplane, Helicopter, Rail, Interstate, Pedestrian or Bicycle</b> <b>*ANNUAL Occurrences Within Last 5 Years*</b>	not scored	<ul style="list-style-type: none"> <li>• With Us 3, NH 106 and NH 28 running through Pembroke, the Town's Fire Dept and Police Department are often the first to respond to the vehicle crashes experienced on these main State and local roadways. These routes are used heavily by commuters as they travel through Pembroke to their destinations. Crashes may increase over time, especially when conditions become icy from winter snow melt for the fast highways and greater numbers of vehicles use the roads.</li> <li>• The Town maintained roads, Class VI unmaintained roads and private roads can have elevation changes that will continue to make travel difficult in the future in snowy, icy, flooded, or debris blockage conditions. See <b>Winter Hazards</b> for the list. Any time of year, dangerous intersections become more difficult to navigate with heavy winds, rain, treefall, or flooding hazards and could cause crashes.</li> <li>• Suncook Village is one area where vehicle/pedestrian or bicycle crashes could occur in the future. Other location include US 3 sidewalks, and sidewalks and crosswalks near the schools and Memorial Field. With high speeds in most of the areas, bikes and pedestrian have the potential for serious crashes with vehicles.</li> <li>• The Town also has alternative future <b>crash</b> potentials, such as airplanes, helicopters, and drones. The Town hosts JBI Helicopter, and is in the flightpath of Concord Municipal Airport, NH Army National Guard air traffic. The Manchester-Boston Regional Airport is nearby and supports large-engine plane traffic which have the potential of crashing in nearby communities. With the increased usage of private drones for personal or commercial use, the future potential for their crashing in populated areas or causing vehicular crashes is anticipated to rise.</li> </ul>	N/A
<b>MASS CASUALTY INCIDENT</b> <b>As a result of any hazard event</b> <b>*NO Event(s) Within Last 5 Years*</b>	not scored	<ul style="list-style-type: none"> <li>• Large groups of people are regularly located at the Town Hall, the Schools, Safety Center, NH National guard Edward Cross Training Facility which may be where a future mass casualty event (incidents exceeding d the Tri-Town Ambulance capacity) could occur because of any other type of hazard event.</li> <li>• Pembroke is a vibrant community with active groups and social calendars. Events such as political candidate visits, Pembroke School District sporting events, School Board meetings, Town Meeting, Old Home Day, Veteran's Parades, Church events, and other community gatherings could set the location for future mass casualty incidents.</li> <li>• Concord Hospital is 15 minutes from Pembroke and is the closest hospital with a trauma center. There are few private practice doctors and dentists in Town to assist with mass casualty incidents.</li> <li>• During times of mass casualty, it is likely the communications network will be overloaded. Residents may not be able to telephone and emergency responders could have difficulty reaching assistance. The Town Hall, Schools, Fire Department, Tri-Town Ambulance, and Police</li> </ul>	N/A



**4 HAZARD RISK ASSESSMENT**

Hazard Risk Assessment Hazards	Overall Risk	Potential Future Hazards – Locations and Impacts	Magnitude/ Extent Measurement Scales
		Department phone lines could be jammed with callers. During this time, the Town website should be updated regularly.	
<b>TERRORISM/ VIOLENCE</b> Active Shooter, Hostage, Public Harm, Civil Disturbance/ Unrest, Politically Motivated Attacks, Incendiary Devices, Sabotage or Vandalism <i>*Events(s) Within Last 5 Years*</i>	not scored	<ul style="list-style-type: none"> <li>It is possible the Town could be the target of an act of terrorism based on current national trends. Possible susceptible non-municipal targets could include strategic facilities like the NH National Guard Edward Cross Training Complex or the Schools.</li> <li>The municipal facilities in Pembroke, Town Hall, Library, Safety Center, Public Works Garage, Transfer Station, Water Works, or Wastewater Treatment have a risk of <b>terrorism or violence</b>. Vandalism of Town cemeteries may occur.</li> <li>Future hostage situations are isolated events and are nearly impossible to predict. The sites where this potential exists could include those listed above under Terrorism, the high density housing neighborhoods (see <b>Severe Winter Weather</b>) and everyday domestic situations. Isolated incidents of violence could occur in the remote forested areas and trails of those Forests, state lands, and conservation lands listed in the <b>Lightning</b> section.</li> <li>Large scale incidents of civil disturbance and public unrest are possible in Pembroke, but unlikely based upon the local facilities. However, the Town’s participation in the Central NH Special Operations Unit enables Pembroke’s mutual aid assistance where needed.</li> <li>Bomb threats at the schools are a possibility based on current attitudes and trends. The bridges, dams and cultural landmarks could be subject to terrorist threats or bombs that disrupt major travel routes.</li> <li>Any future sabotage of local utilities, Eversource &amp; Until lines, high tension power lines, Tenneco gas line, stormwater system, water and sewer lines, gas lines, pump stations, telecommunications towers, telephone and internet substations, or the local High, Significant and Low Hazard dams could cause an immense amount of damage in Pembroke.</li> </ul>	N/A
<b>CYBER EVENT</b> Municipal Computer Systems Attack, Website Overtake, Cloud Data Breach, Telephone Rerouting, Identity Theft, Phishing, Ransomware, Virus or Phone Scams <i>*ANNUAL Occurrences Within Last 5 Years*</i>	not scored	<ul style="list-style-type: none"> <li>The entire Town – residents, businesses, municipal, School District, and state facilities- could be subject to future cyber events. Cyberattacks could target their websites, computer systems, cloud data systems, archival records, or use email phishing or related techniques to install ransomware, etc. The Town Hall, Library, Departments, Schools, Water Works, Wastewater Treatment, any technology businesses would be high-value targets for their software and their archival systems.</li> <li>Email scams, phone scams, door-to-door canvassing, and identity theft are likely to continue in the future, causing regular problems for residents and businesses. These scams are more likely to impact the Town’s senior residents. Significant future damage could be done to municipal and School systems, in addition to tech businesses and other facilities located in Town. Private businesses targeted could create a negative economic impact on the community.</li> </ul>	N/A

*Source: Pembroke Hazard Mitigation Committee*

Although there are many potential hazards in Pembroke's future, the community is knowledgeable about where some of the worst occurrences might result with this descriptive **Potential Future Hazards** inventory. A comprehensive, specific community facility inventory that indicates each site's **Primary Hazard Vulnerabilities** is found next in **5 COMMUNITY VULNERABILITY ASSESSMENT**.

## INLAND FLOODING

Flooding is a more easily locatable hazard as waterbodies can be used to approximate the range of future potential flooding areas. The Special Flood Hazard Areas, waterbodies, and road washout locations are listed in detail below for Pembroke.

### Special Flood Hazard Areas (SFHA)

There are active **10** Digital Flood Insurance Rate Maps (DFIRMs) in Pembroke from the **April 2010** updated set, plus **4** more DFIRMs which do not have flood zones or watercourses. Base Flood Elevations (BFEs) are abundant along the **Merrimack River**, **Suncook River**, and **Soucook River** on the DFIRMs.

#### **Soucook River**

The DFIRMs identifying floodplains along the **Soucook River**, sharing the boundary with the City of Concord, from north to south are NH (D33013C) **#0551**, **#0552**, **#0553**, **#0534**, **#542** and **#0561** which is also shared with the **Merrimack River**. These **6** DFIRMs include regular Base Flood Elevations BFEs along the Soucook River's entire length of Pembroke's western boundary. From north to south, the BFEs begin at their highest with **314'** at the Loudon boundary down and declines significantly in each DFIRMs' lowest BFEs of **300'** and **233'**, **242'**, **220'**, and **203'** as the **Soucook River** converges with the **Merrimack River**, a total decline of **109'**.

#### **Merrimack River**

The DFIRMs identifying floodplains along the **Merrimack River**, sharing the boundary with the Town of Bow, from north to south are NH (D33013C) **#0561**, **#0563**, and **#0564** which is also shared with the **Suncook River**. These **3** DFIRMs include BFEs along the **Merrimack River's** southern boundary with Pembroke. From north to south, the BFEs begin at their highest with **215'** at the **Soucook River** down and declines significantly in each DFIRMs' lowest BFEs of **203'**, **200'** and **198'**, a total decline of **17'** when the **Suncook River** converges with the **Merrimack River**.

#### **Suncook River**

The DFIRMs identifying floodplains along the **Suncook River**, sharing the boundary with the Town of Allenstown, from north to south are NH (D33013C) **#0567**, **#0566**, **#0568**, and **#0564** which is also shared with the **Merrimack River**. These **4** DFIRMs include BFEs along the **Suncook River's** eastern boundary with Pembroke. From north to south, the BFEs begin at their highest with **306'** at the **Suncook River** at the

northern Epsom boundary and declines slightly in each DFIRMs' lowest BFEs of **295'**, **294'**, **289'** and a steep **198'**, a total decline of **108'** when the **Suncook River** converges with the **Merrimack River**.

These DFIRMs all display the SHFA **Zone AE** (1% annual risk of flooding) with floodways, SHFA **Zone A** (1% annual risk of flooding) and **Zone X** (0.2% annual risk of flooding) locations. These are highlighted gray in **Table 26**. Four (4) additional DFIRM numbered-only panels cover the area of the Town of Pembroke, **#0554**, **#0558**, **#0559**, and **#0552**. As none of these have floodplains, they have not been mapped and no data is available. They also appear in **Table 26** to complete the SFHA portrait of the community.

**Table 26**

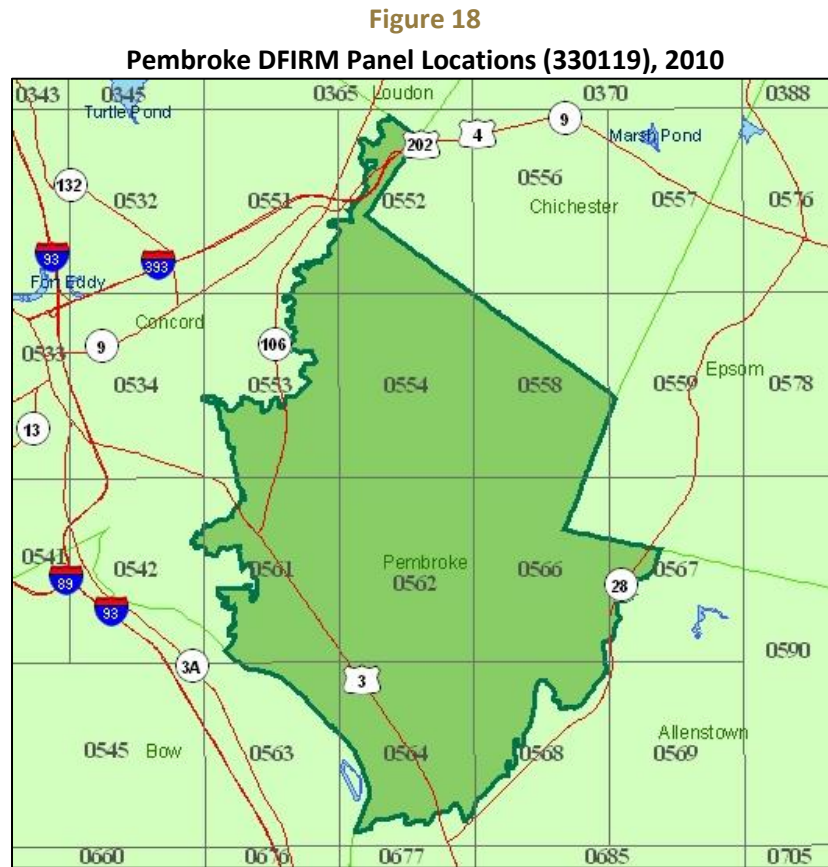
**Locations of Pembroke Special Flood Hazard Areas (SFHA) on 2010 DFIRMS**

<b>Panel NH (33011C)</b>	<b>Flood Zones in Pembroke (330119)</b>	<b>Base Flood Elevations (BFEs)</b>	<b>Water Body Areas in Floodplains</b>	<b>Community of Pembroke Geographic Location</b>
<b>#0552</b>	A, AE with floodway, X	Soucook River- 300, 302, 303, 304, 305, 206, 307, 308, 310, 311, 312, 313, 314	<b>Soucook River, unnamed brook</b>	Northernmost jagged area of Town, with the border of the Soucook River forming the boundary with Concord, flowing from the abutting northern Town of Loudon and crossing Interstate 393. Shares eastern boundary with Chichester.
<b>#0553</b>	A, AE with floodway, X	Soucook River- 233, 234, 235, 236, 237, 238, 239, 241, 244, 245, 246, 248, 249, 240, 253, 255, 257, 259, 260, 261, 262, 263	<b>Soucook River, unnamed brooks</b>	Western border of the Soucook River forming the boundary with Concord. Parallel to NH Route 106 (Concord).
<b>#0534</b>	A, AE with floodway, X	Soucook River- 242	<b>Soucook River</b>	Westernmost meander tip of the border of the Soucook River forming the boundary with Concord. Within the Concord Airport complex.
<b>#0542</b>	AE with floodway, X	Soucook River- 220, 224	<b>Soucook River</b>	Western meander of the Soucook River forming the boundary with Concord.
<b>#0561</b>	AE with floodway, X	Merrimack River- 203, 203. Soucook River- 203, 204, 205, 206, 207, 208, 210, 211, 212, 213, 215.	<b>Merrimack River, Soucook River, unnamed brooks</b>	Western border of the Soucook River forming the boundary with Concord, meeting the Merrimack River forming the southern boundary with Bow.
<b>#0563</b>	AE with floodway, X	Merrimack River- 200, 200, 201	<b>Merrimack River, Meetinghouse Brook</b>	Southwestern side across the Merrimack River from Bow.
<b>#0564</b>	AE with floodway, X	Merrimack River- 198, 199.	<b>Suncook River and</b>	Southern tip, bounded by Merrimack River to west and

<b>Panel NH (33011C)</b>	<b>Flood Zones in Pembroke (330119)</b>	<b>Base Flood Elevations (BFEs)</b>	<b>Water Body Areas in Floodplains</b>	<b>Community of Pembroke Geographic Location</b>
		Suncook River- 200, 201, 205, 213, 237, 239, 262, 269, 284, 286, 288	<b>Merrimack River</b>	Suncook River forms the southern boundary. Suncook Village is covered on this panel.
<b>#0568</b>	AE with floodway, X	Suncook River- 289, 291, 293, 294	<b>Suncook River, Hartford Brook and Pettingill Brook</b>	Southeastern border formed by the Suncook River.
<b>#0566</b>	AE with floodway, X	Suncook River- 294, 295, 299	<b>Suncook River and Pettingill Brook</b>	Eastern central section where Pembroke forms the border with Epsom at nearly a right angle. Small meander of Suncook River on southeastern section of panel.
<b>#0567</b>	A, AE with floodway, X	Suncook River- 295, 299, 302, 303, 304, 306	<b>Suncook River, Ames Brook</b>	Eastern border formed by the Suncook River shared with Allenstown, and eastern boundary forming the Epsom border
<b>#0554</b>	none	none	none	Northern central of the Town. Panel not mapped. Large area with no SFHAs delineated.
<b>#0558</b>	none	none	none	Northeastern boundary of the Town shared with Chichester to the north and Epsom to the east. Panel not mapped. Large area with no SFHAs delineated.
<b>#0559</b>	none	none	none	Eastern most point of Pembroke border, very small area of Town, shared boundaries with Epsom and Chichester. Panel not mapped. Tiny area with no SFHAs delineated.
<b>#0562</b>	none	none	none	Center middle of Town. Panel not mapped. Large area with no SFHAs delineated.

Sources: FEMA and [NH Geographically Referenced Analysis and Transfer System \(NH GRANIT\)](#) websites

**Figure 18** displays the relative location of each of the DFIRM panels in the community used in **Table 26**. This set of DFIRMs is excerpted from the *Merrimack County Flood Insurance Study (FIS) of 2010*. The graphic illustrates the numbering system of the DFIRMs and how they are not consecutive.



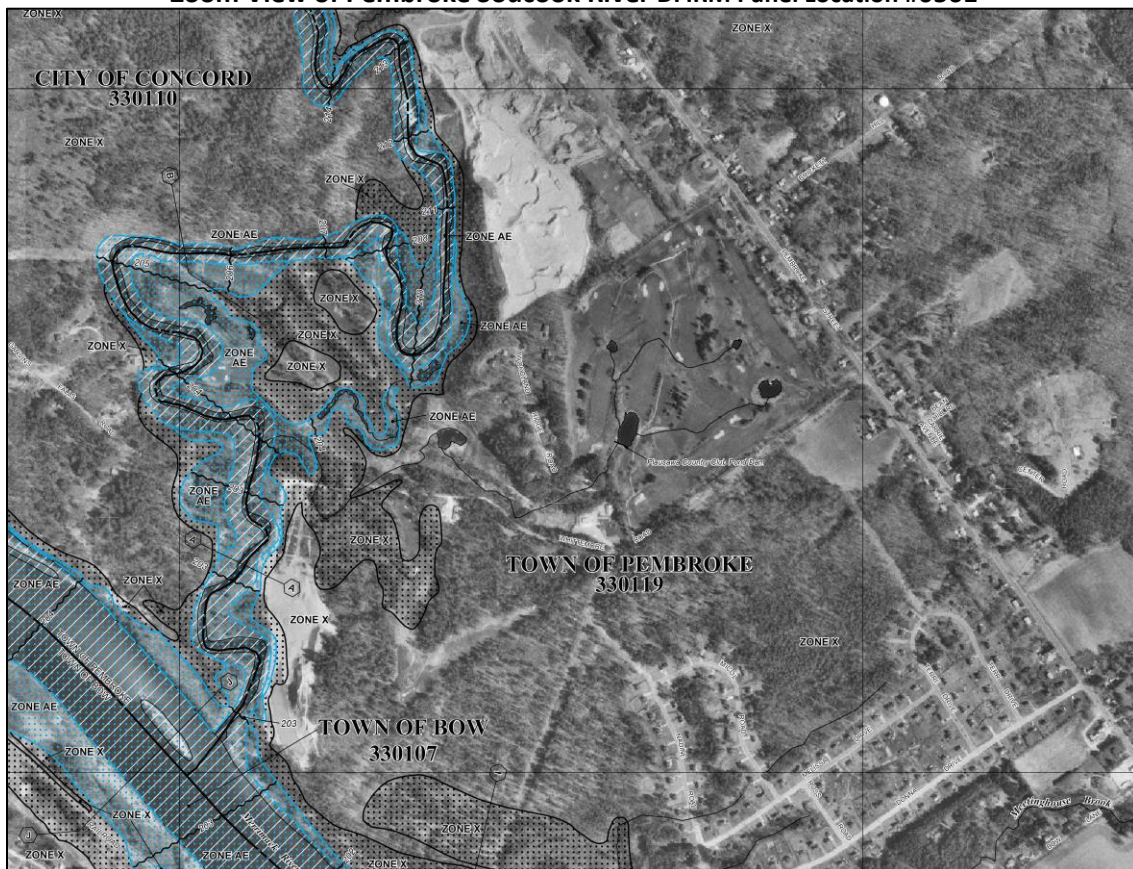
Source: Pembroke DFIRMS can be downloaded at <https://granit.unh.edu/dfirms>, last accessed 10-21



**Figure 19** displays an example of a DFIRM's zoomed-in view of the **Soucook River** crossing US 3/Pembroke Street to the west of NH 106/Sheep Davis Road with river meanders between Pembroke and Concord. The **Soucook River's** confluence with the **Merrimack River** is shown here. The river has multiple Flood Zone classifications based on location, depth, and elevation. Within this section, the **Soucook River** is designated as **Zone AE (1% annual chance with BFEs)**, **Zone AE with Floodway (1% annual chance, channelized)**, and **Zone X (0.2% annual chance)**.

**Figure 19**

**Zoom View of Pembroke Soucook River DFIRM Panel Location #0561**



Source: FEMA DFIRM 2010 Panel #33011C-330119-0561 for Pembroke, NH

Knowing the Base Flood Elevations (BFE) can help understand a river's possible inundation area. For instance, the **Soucook River** flows south and on Panel **#0561** the measured BFE just north of Keith Avenue in Pembroke is **232'**. Measured at NH 106 at **228'** BFE, the **Soucook River** flows south present-day Cooperative Way at **210'** BFE and follows hard meanders until its confluence with the Merrimack River at **203'** BFE. This examination can be used by the Town to learn where the most severe inundation flooding could occur within the community for any of the three rivers, knowing that new development may have occurred since this 2010 mapping.

### Waterbodies

Pembroke is unique in the Central NH Region because it three active rivers forming the Town's borders with Concord (Soucook River), Allenstown (Suncook River) and Bow (Merrimack River). These large watercourses and numerous individual brooks and ponds in Pembroke contribute to flooding these and other areas in Town. These rivers, brooks, ponds and wetlands in Pembroke will contribute to future potential flooding in these and other areas:

➡ **Watercourses:** Suncook River, Soucook River, Merrimack River, Meetinghouse Brook, Hartford Brook, Pettingill Brook, Ames Brook, French's Brook and several unnamed Brooks.

➡ **Waterbodies:** Wildlife Pond (dam). Pembroke does not have any significant ponds of note although some wetlands are present.

### Road Washouts

Some of the local Town Class V maintained roads in Pembroke are constructed using ditching; storm drains are found along the densely developed paved roads within the MS4 area. About **50 miles** of the Town maintained (Class V) roads are located throughout Pembroke. Regular road washouts currently include:

- |                       |                                 |
|-----------------------|---------------------------------|
| ➡➡ Nadine Road        | ➡➡ Littlefield Condominiums     |
| ➡➡ Ross Road          | ➡➡ Batchelder Road              |
| ➡➡ Micol Road         | ➡➡ Fourth Range Road            |
| ➡➡ Pembroke Hill Road | ➡➡ North Pembroke Road (FEMA \$ |
| ➡➡ Cross Country Road | obtained)                       |
| ➡➡ Buck Street        |                                 |

Many of the above culvert upgrades have been developed into Actions, with many culvert and drainage projects undertaken annually.

The meandering Soucook River and Suncook River, along with the wide and high-volume Merrimack River (most of the Town is of a much higher elevation to the Merrimack) make the Town particularly susceptible to flooding. The following areas have been identified by the Hazard Mitigation Committee as being immediately susceptible to the impacts to **flooding**:

- ➡ Batchelder Road (removal of NH 28 dam has helped, most homes were voluntarily acquired)
- ➡ Suncook Village
- ➡ Memorial Field Recreation Area



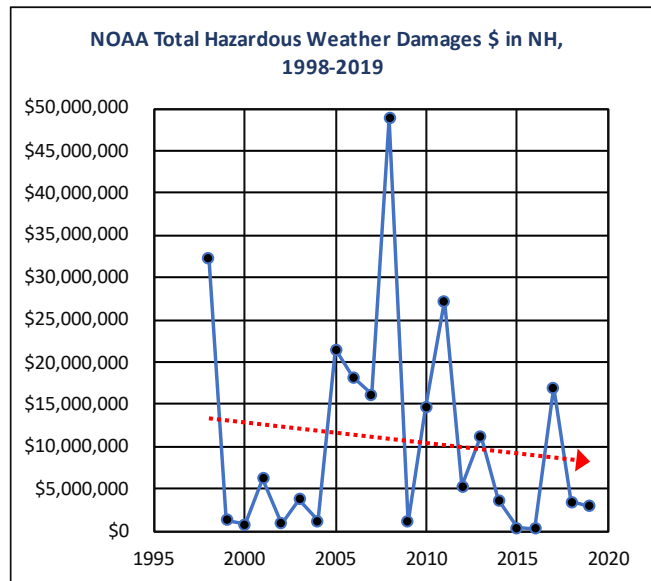
## Local Climate and Extreme Weather

In the State and the Central NH Region, like any other areas, exist our own “micro-climate” areas that can be analyzed for future susceptibility to disasters and hazard events. New Hampshire has obtained high costs of damage over time due to hazardous weather and declared disasters. A review of the state and area history can provide a perspective on what Pembroke can expect to see in terms of extreme weather in the future.

Table 27

Summary of Hazardous Weather Fatalities, Injuries, and Damage Costs in NH, 1998-2019

Year	Fatalities	Injuries	Total Damages \$ in Million
2019	0	0	\$2.98
2018	2	9	\$3.4
2017	0	0	\$17.0
2016	1	1	\$0.27
2015	2	34	\$0.37
2015	0	2	\$3.7
2013	0	30	\$11.3
2012	1	4	\$5.28
2011	1	2	\$27.3
2010	1	6	\$14.63
2009	1	0	\$1.13
2008	2	5	\$48.9
2007	0	3	\$16.15
2006	1	9	\$18.2
2005	4	9	\$21.5
2004	0	11	\$1.2
2003	2	29	\$3.8
2002	0	7	\$0.9
2001	0	2	\$6.2
2000	2	6	\$8.0
1999	3	17	\$1.3
1998	1	23	\$32.4



Source: National Oceanic and Atmospheric Administration, last accessed 03/21.

Adjusted for inflation [Consumer Price Index CPI]

<https://www.weather.gov/hazstat/>

Injuries to people and the costs of damages in New Hampshire have slightly decreased from hazardous weather over the last 20 years according to the trendline displayed in the associated chart for Table 27. Between 1998-2008, this slight decline in injuries and damages can be generally applied to the major disasters declared in the State. The highest damage costs

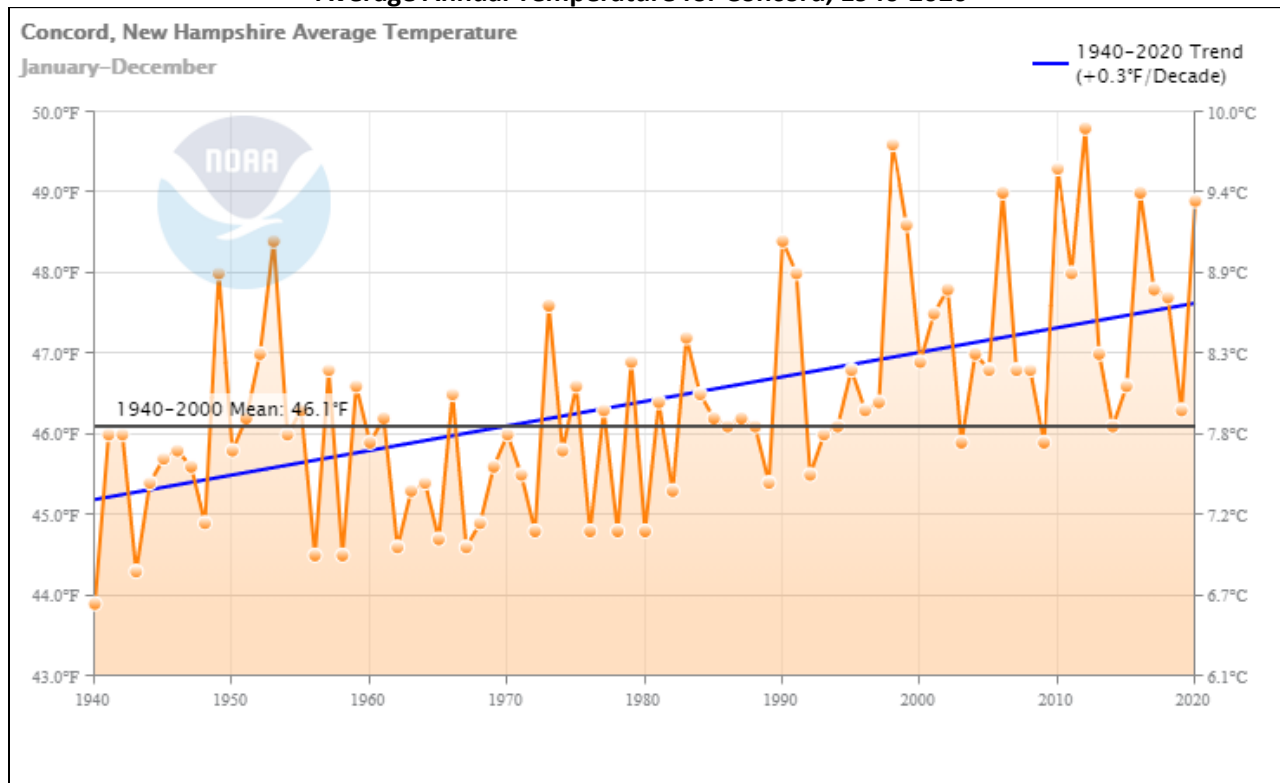
correlate to the 1998 (\$32m) and 2008 (\$49m) ice storms. The number of injuries and fatalities have a less distinct association, with the highest casualties shown in 2015 (36), 2013 (30) and 2003 (31). However, the single greatest number of fatalities during this time period occurred in 2005 (4), likely during the time of the Oct 2005 Columbus Day Floods that struck the southwestern section of the State very hard.

The Central NH Region's weather history is summarized to provide a view of the trends around the Concord area where some weather measurements have been taken at the Concord Airport since 1868. Pembroke is geographically close to the City of Concord (within 5 miles) and these measurements should have some reasonable basis in Pembroke, while small unique microsystems are found throughout the region particularly at higher elevations. As the closest large and longest active weather station, and for CNHRPC region continuity, the Concord measurements will be used for Pembroke.

Figure 20 displays Concord's average annual temperature (Jan-Dec) between 1940 (43.7°F) and 2020 (48.9°F) with a mean temperature over the 1940-2020 period of 46.1°F. The warmest years were 2012 with a 3.7°F departure from normal, 1998 at 3.5°F departure, 2010 at 3.2°F departure, followed by 2016 at 2.9°F departure from the normal mean 46.1°F. As with typical New Hampshire weather, the seasonal temperatures can vary year after year and without obtaining an average, changes are difficult to see. The coolest years were 1940 at 43.9°F, 1943 at 44.3°F, 1956 and 1958 at 44.5°F, followed by 1962 and 1967 tied at 44.6°F. The displayed trend line allows a definitive way of averaging all temperatures and illustrates an average +0.3°F temperature increase trend per decade and the increase of about 2.4°F total during this 80-year period in Concord.

Figure 20

Average Annual Temperature for Concord, 1940-2020



Source: National Oceanic and Atmospheric Administration, last accessed online 03-31-21

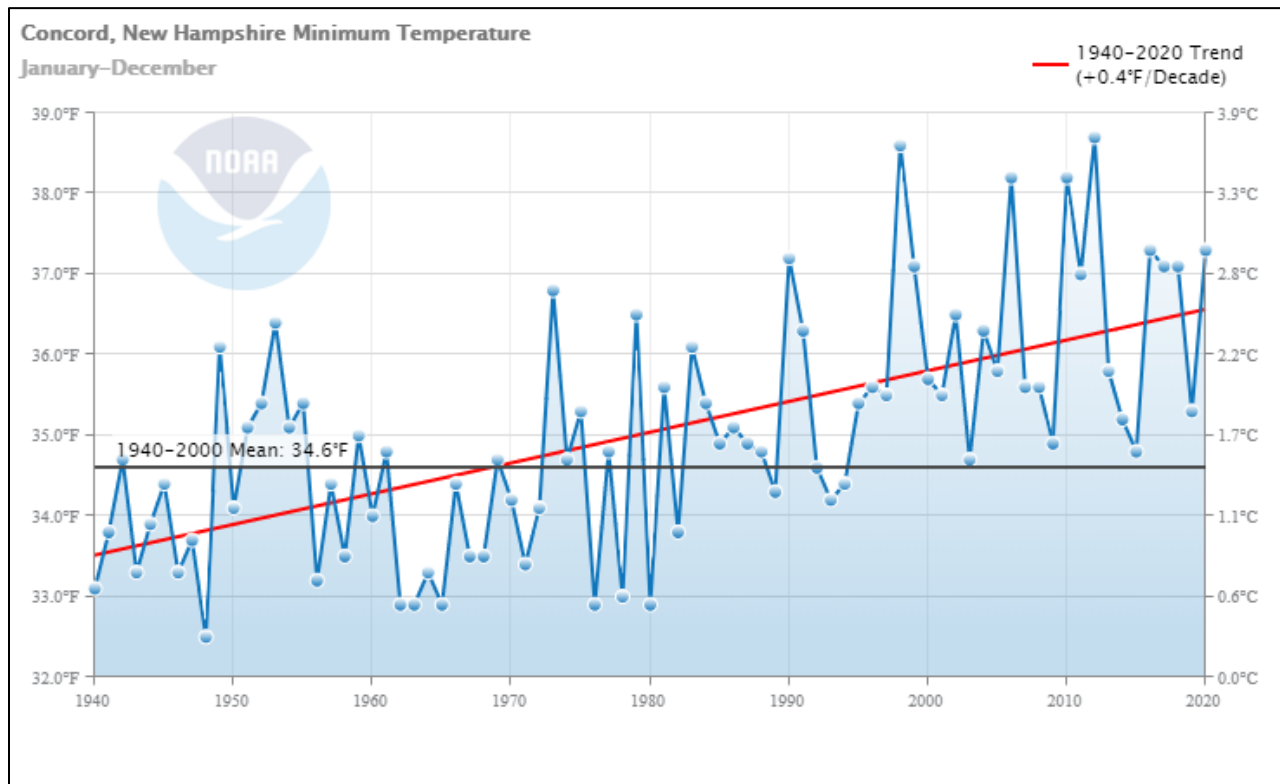
[https://www.ncdc.noaa.gov/cag/city/time-series/USW00014745/tavg/12/12/1940-2020?base\\_prd=true&begbaseyear=1901&endbaseyear=2000&trend=true&trend\\_base=10&begtrendyear=1895&endtrendyear=2021](https://www.ncdc.noaa.gov/cag/city/time-series/USW00014745/tavg/12/12/1940-2020?base_prd=true&begbaseyear=1901&endbaseyear=2000&trend=true&trend_base=10&begtrendyear=1895&endtrendyear=2021)

Another way to evaluate how the temperatures is to measure the minimum annual temperatures and maximum annual temperatures are changing. Both the coldest and the hottest temperatures are growing warmer in the Central NH region, which includes Pembroke.

**Figure 21** displays the *minimum* average temperatures for Concord, with a mean (average) of **34.6° F** for **1940-2020**. In **2020**, the *minimum* average temperature was **37.3° F**, as compared to the **1940** *minimum* average temperature of **33.1° F**. Within this 80-year period, the *lowest* minimum was **32.5° F** in **1948**, followed by **32.9° F** (1962, 1963, 1965, 1976, 1980), **33.07° F** (1978), followed by **33.1° F** (1940). The *highest* minimums were in **2012** (**38.7° F**), **1998** (**38.6° F**), tied in **2006** and **2010** (**38.2° F**), followed by **2016** and **2020** (**37.3° F**). In fact, the top **10** highest *minimums* have occurred since **1990** during the nearly **80**-year data span, indicating the coldest temperatures are growing warmer.

The trend line indicates a **+0.4° F** increase per decade between **1940-2020**, about a **+3.2° F** increase in minimum average temperatures.

**Figure 21**  
Minimum Average Temperatures for Concord, 1940-2020



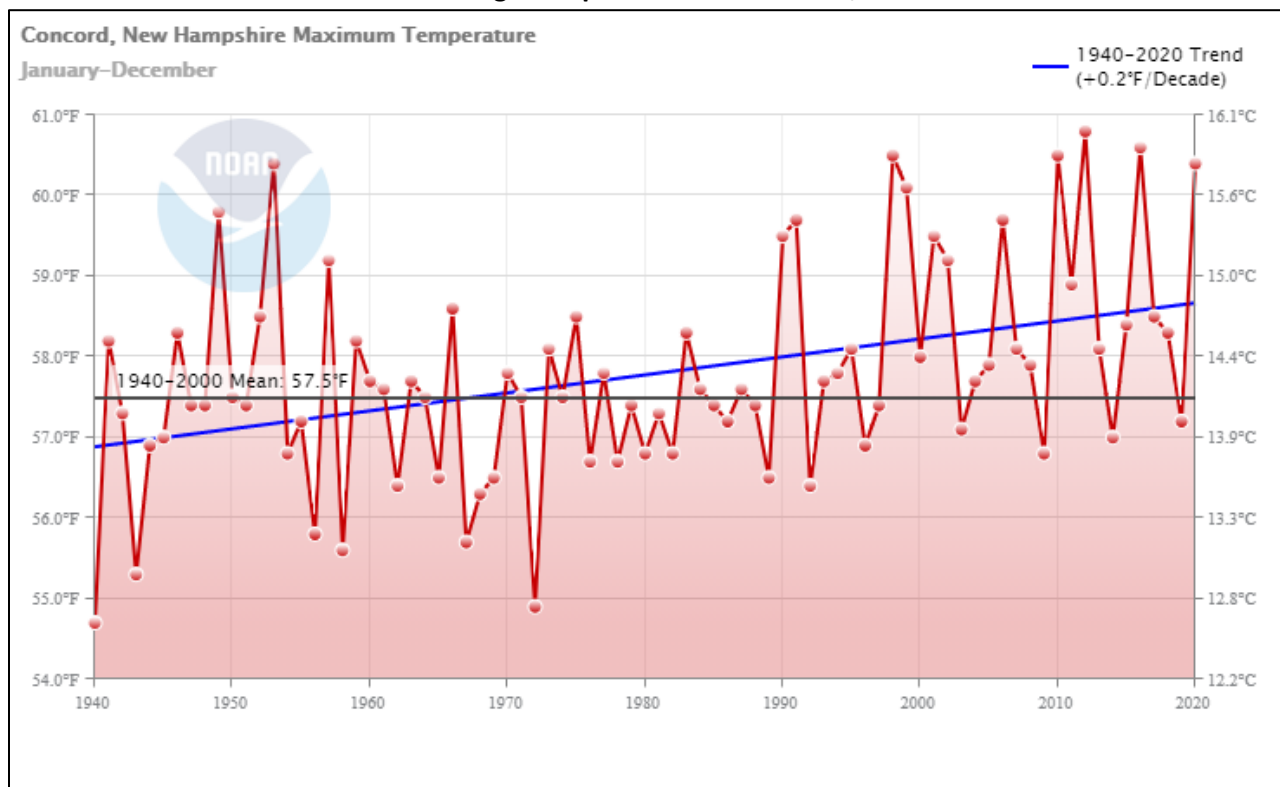
Source: National Oceanic and Atmospheric Administration, last accessed online 03-31-21

**Figure 22** displays the *maximum* average temperatures between **1940-2020**, with a mean (average) of **57.5° F** annually. In **1940**, highest *maximum* average temperature was **54.7° F** while in **2020** the highest *maximum* was **60.4° F**. The lowest *maximums* were **54.7° F** in **1940**, **54.9° F** in **1972**, **55.3° F** in **1943**, **55.6° F** in **1958**, **55.7° F** in **1967** followed by **55.8° F** in **1956**. The highest *maximums* in Concord were **60.8° F** in **2012**, **60.6° F** in **2016**, **60.5° F** in **1998** and **2010**, **60.4° F** in **1953** and **2020**, followed by **60.1° F** in **1999**. Eight (**8**) of the top **10** highest *maximums* have occurred since **1990** during the **80-year** data span. These numbers indicate the hottest temperatures in the Central NH Region are growing warmer.

The **+0.2° F** trendline per decade results in a **+1.6° F** increase in the maximum average temperatures.

**Figure 22**

**Maximum Average Temperatures for Concord, 1940-2020**

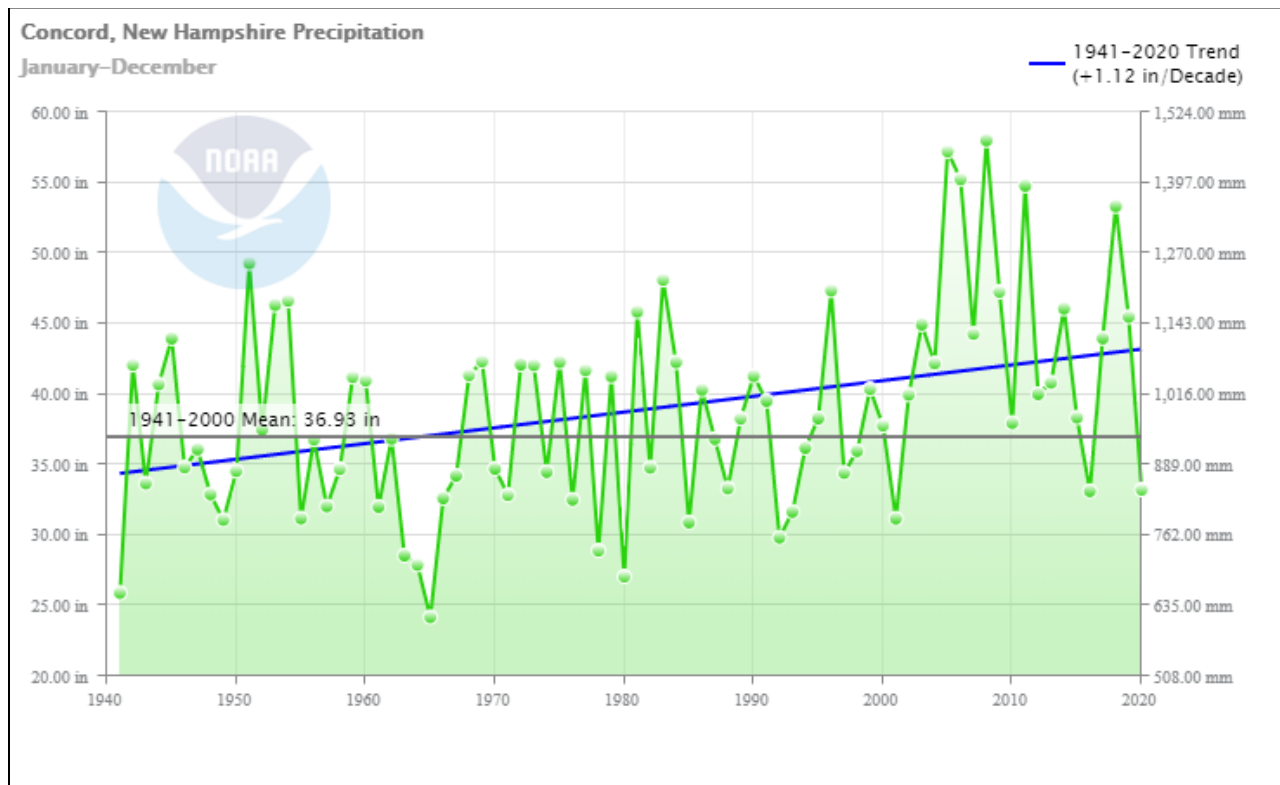


Source: National Oceanic and Atmospheric Administration, last accessed 03-31-21

For precipitation (rain) changes, **Figure 23** displays Concord's average annual Jan-Dec precipitation rates between **1941** and **2020**. Varying seasonal rainfall amounts continue over the decades. The mean annual precipitation during this period is **36.93"** annually. In **1941**, the amount of precipitation was **25.91"** while in **2020** the precipitation totaled **33.23"**. The wettest year in Concord was **2008** at **58.00"**, **2005** at **57.22"** and **2006** at **55.24"**, **2011** at **54.78"**, **2018** at **53.33"**, followed by **1951** at **49.29"**. The years with the least amount of rainfall were **1965** at **24.19"**, **1941** at **25.91"**, **1980** at **27.07"**, **1964** at **27.90"**, **1963** at **28.56"**, followed by **1978** at **28.91"**.

The trend line serves the same purpose to illustrate an increase of **1.12"** in precipitation per decade, or about a **+8.9"** increase in the annual average precipitation during this **80-year** period from **1941-2020** in Concord. Pembroke will have experienced similar conditions.

**Figure 23**  
**Average Annual Precipitation for Concord, 1941-2020**

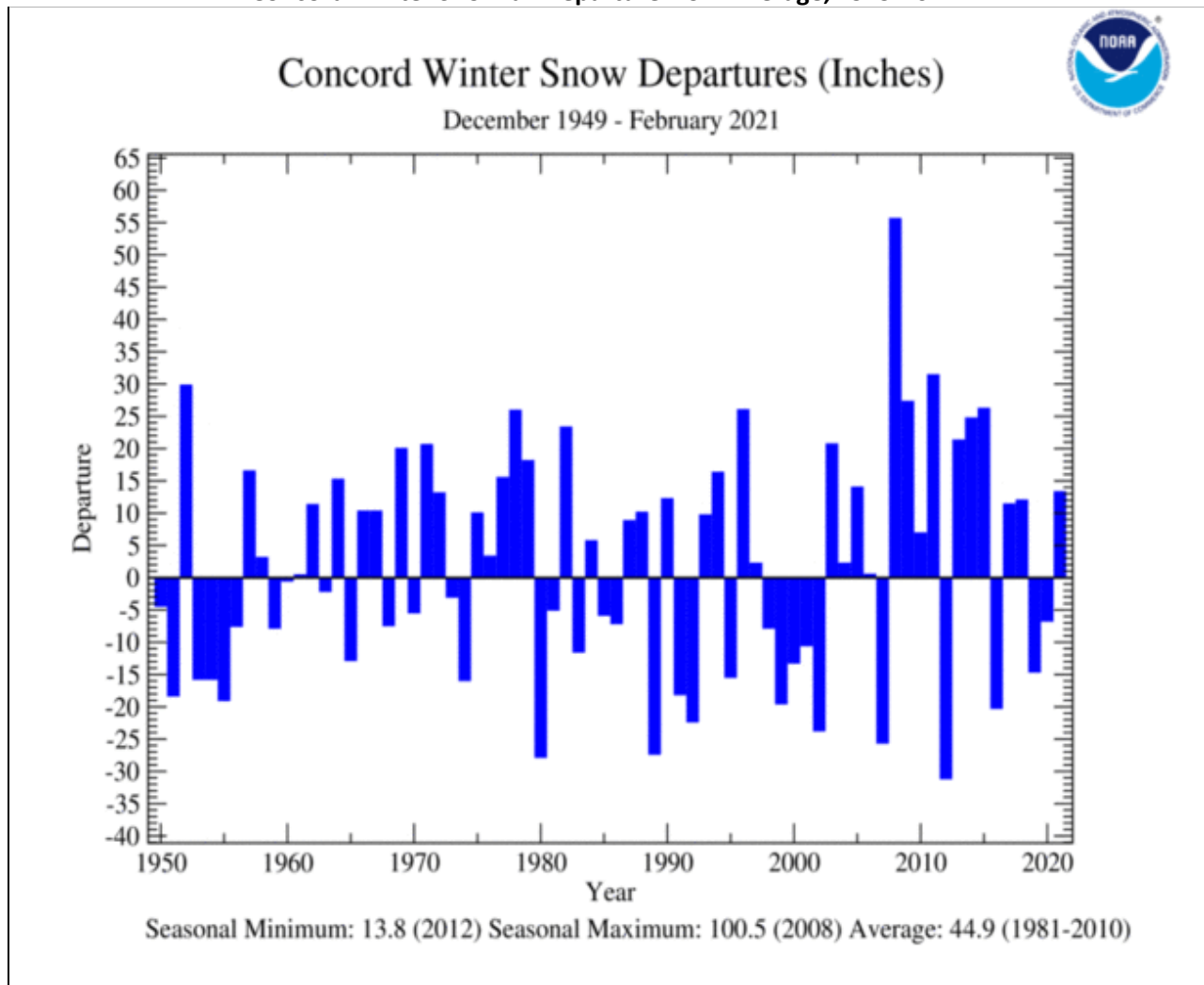


Source: National Oceanic and Atmospheric Administration, last accessed 03-31-21

Displayed in **Figure 24** is the departure from normal snowfall instead of actual inches per year, using a “30-year normal” period as the baseline, which for **1981-2010** is **44.9”** of snowfall annually in Concord.

The amount of recent annual snowfall has significant departures from normal. From **Jan-Dec 2020**, **58.2”** of snowfall occurred, which is **13.3”** higher than what normally falls (**44.9”**). Since **1949**, the year with the highest amount of snowfall was **2008** with **100.5”** and the lowest snowfall was **13.8”** in **2012**.

**Figure 24**  
**Concord Winter Snowfall Departure from Average, 1949-2021**



Source: National Oceanic and Atmospheric Administration, National Climate Report February 2021

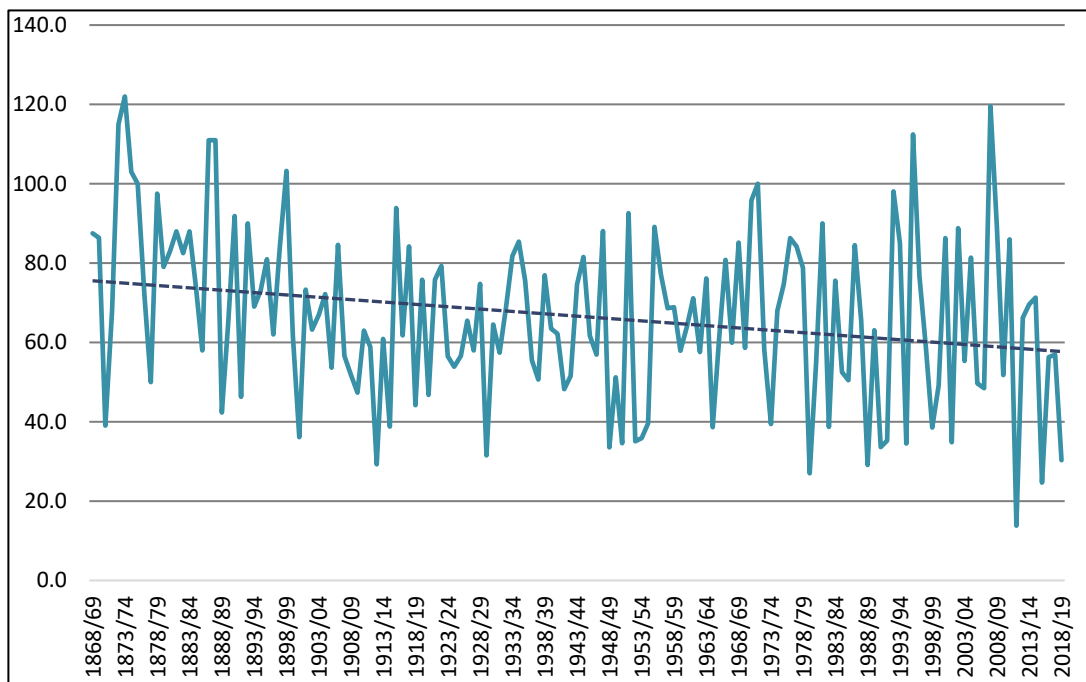
<https://www.ncdc.noaa.gov/sotc/national/202102/supplemental/page-5>

<https://www.ncdc.noaa.gov/monitoring-content/sotc/national/2021/feb/Concord.gif> last accessed 03-31-21



The National Oceanic and Atmospheric Administration (NOAA) seasonal snowfall totals were compiled by CNHRPC for Concord, where snowfall data gathering began in **1868**. **Figure 25** displays the snowfall every **5** years and includes a trendline that indicate annual seasonal snowfall has decreased by nearly **20"** since **1868**. The years with the highest snowfall accumulations were **1873/74 (122.0")**, **2007/08 (119.5")**, **1872/73 (115.0")** and **1995/96 (112.4")**. The years of lowest accumulations were **2011/12 (13.8")**, **2015/16 (24.7")**, **1979/80 (27.0")**, and **1988/89 (29.1")**.

**Figure 25**  
**Seasonal Snowfall Totals for Concord, 1868-2019**



Source: National Oceanic and Atmospheric Administration Data as compiled by CNHRPC, 03-19

Five (**5**) of the top **10** lowest snow accumulations occurred since **1990**. The **2018/19** season ended with **30.3"**, ranking **6th** out of **151** years of records. Pembroke is geographically close to Concord (**30** miles) and likely shares similar snowfall accumulation trends over time.

## IMPACTS OF CLIMATE CHANGES IN SOUTHERN NEW HAMPSHIRE

This climate data may certainly be relevant to the entire Central NH Region which includes the Town of Pembroke. The Central NH region climate summation is that the **temperature is getting warmer**, the **precipitation is increasing**, and the **snowfall is decreasing** according to the National Oceanic and Atmospheric Administration's data collection at the Concord airport. There are no indications to see these trend lines reverse in the future.

The Southern NH Climate Change Assessment, formally entitled *Climate Change in Southern New Hampshire: Past, Present, and Future, 2015* by Climate Change Solutions of New England under the University of New Hampshire, reviewed current climate conditions and projected future conditions of Southern New Hampshire under potential low and high emission scenarios. The Central NH Region and the Town of Pembroke are within southern

New Hampshire. The past and future Southern NH climate overview is illustrated in **Figure 26**.

As a result of anticipated extreme weather continuing and climate changes in Central NH and Pembroke, consideration should be given for potential impacts to the community. Several new issues are considered, including public health, natural environment disruption, declining forest health, fewer recreational opportunities, risks to the built environment, transportation system maintenance, aging stormwater infrastructure, decreasing water resources and changing food and agriculture, which may result from climate change. For more information on these topics, refer to the *Central NH Regional Plan 2015*.

**Figure 26**

### Southern NH Climate Assessment Projections

#### Past Data and Future Climate Overview

#### SOUTHERN NH CLIMATE ASSESSMENT Projections

##### TEMPERATURE

What have we seen since 1970?

- Average maximum temperatures have warmed by 2.0°F (spring, fall and summer) and 2.9°F (winter)
- Average minimum temperatures have warmed by 3.2°F (spring, fall and summer) and 6.1°F (winter)

What can we expect in the future?

- Summers will be hotter: 16-47 days above 90°F
- Winters will be warmer: 20-45 fewer days below 32°F

##### RAINFALL

What have we seen since 1970?

- Annual precipitation has increased by 8-22%
- Frequency and magnitude of extreme events

What can we expect in the future?

- Precipitation annual average will increase: 15-20%
- More frequent and severe flooding

##### SNOW

What have we seen since 1970?

- Fewer days with snow cover
- Lake ice-out dates occurring earlier

What can we expect in the future?

- Significant decrease of 20-50% in number of snow covered days

Source: UNH Climate Solutions of New England, 2015

**More Human Health Emergency Events**

- ☞ Illnesses such as heatstroke, fainting, and heat exhaustion.
- ☞ Excess heat especially dangerous for the aging population and residents without air conditioning.
- ☞ Increase in greenhouse gas emission, energy demand, and air conditioning use and cost.
- ☞ More favorable conditions for insects carrying viruses and diseases, such as West Nile Virus.
- ☞ Increases risk of waterborne illnesses caused by pollutants entering the town's water supply, commonly through stormwater runoff and sewage overflow.
- ☞ Infrastructure failure by adding additional stress, leading to potential injury or loss of life.
- ☞ More air pollution, leading to asthma and breathing disorders.
- ☞ Vulnerable populations require more assistance.

**Natural Environment Disruption**

- ☞ Too much water and/or lack of water can disrupt trees and plants natural growing cycle, potential leading the tree, plant, and surrounding area to die.
- ☞ Additional water and drought conditions affect wetland discharge, stream flow, and water quality, affecting the habitat's quality of life and species' health within the area.
- ☞ Debris will be a result of harsh flooding, including trash and downed trees, polluting waters, harming habitats, and damaging property and infrastructure.






**Declining Forest Health**

- ☞ Large weather events such as heat stress, drought, and periods of winter thaw followed by intense cold can lead to loss of trees.
- ☞ Become susceptible to invasive species and diseases, such as the Hemlock Wooly Adelgid.
- ☞ Loss of trees can have a direct impact on portions of the region's economic components, including declining tourism.




**Fewer Recreation Opportunities**

- ☞ Weather Impacts on Recreational Trails such as debris, flooding and erosion.
- ☞ Snowmobiling, ice fishing, snow shoeing, skiing and snowboarding provide numerous sources of winter recreation and winter tourism, enhancing the quality of life and economy, will be affected with shorter seasons.





**Risks to the Built Environment**

-  Critical infrastructure such as roads, bridges, culverts, stormwater drainage systems, water and wastewater treatment facilities, natural gas lines, electric lines and poles might be at risk of severe damage or failure if the anticipated extreme weather events occur.
-  Damaged infrastructure cannot provide services to homes and businesses, disrupting the economy and may endanger public health.
-  Culverts are at risk to extreme precipitation events, including rain, snow, and ice.
-  Residents who experience damage with flooding to their homes and personal belonging may lack proper flooding insurance, placing the resident in financial hardship.
-  Dams with High Hazard and Significant Hazard classifications are the most likely to cause the largest amount of damage or loss of life. Dam operators may quickly release water without notification to municipalities.



**Increasing Municipal Transportation Systems Maintenance Needs**

-  Volume of flooding is expected to increase, potentially closing roads and increasing the travel time for drivers and increasing the cost and energy use.
-  Flooding can also cause damage to pavement and embankments, increasing maintenance, repair, and replacement costs to municipalities.
-  Extreme precipitation will also increase erosion, decreasing certain infrastructure components design life span.

**Aging and Inadequate Stormwater Infrastructure**

-  Stormwater infrastructure such as catch basins, pipes, discharge points, and culverts that redirect stormwater runoff can be impacted by flooding and cannot perform their function.
-  Blocking of water can lead to flooding of the area and roadways, potentially leading to the closure of nearby roads.
-  Components of stormwater infrastructure are outdated, and increased flows are added stress to the system, more money to maintain and higher replacement costs.
-  Increased development with increased amounts of impervious surface adds the volume of stormwater runoff within more urban area.

**Decreasing Water Resources**

-  Water quality and quantity are both threatened by projected changing weather events, with threats of flooding, drought, erosion and stormwater runoff.
-  By preventing groundwater from replenishing, additional runoff and sediments can lead to intensify flows in rivers and streams with higher contamination levels of unwanted nutrients and pathogens.

- ☞ Additional water treatment may be necessary, potentially overloading treatment systems.
- ☞ Contamination can pollute sewage, threatening the performance of wastewater treatment facilities.
- ☞ Increased occurrences in flooding can also intensify flows, causing overloading of treatment system.
- ☞ When the ground is frozen, rapid snow melt from warm days or intense rain is not able to infiltrate the ground, leading to drought conditions.

#### **Changing Food and Agriculture Production**

- ☞ Merrimack County is the top county in the State for agriculture sales of higher temperatures will promote a longer growing season for most crops, benefiting a larger number of local crops.
- ☞ Negative impacts can potentially alter the region to a climate not suitable for growing valuable local crops such as apples and blueberries.
- ☞ Temperature are expected to slow weight gain and lower the volume of milk produced by dairy cows.
- ☞ Higher overnight temperatures are anticipated to prevent the dairy cows and cattle from recovering from heat stress.
- ☞ Warmer temperatures and increase in carbon dioxide in the air creates a more ideal environment for pests and weeds, potentially increasing the use of herbicides and pesticides on crop.

This is a sampling of how changing climate and severe weather impacts can affect communities in New Hampshire, in the Central NH Region and in Pembroke. Consideration should be given to applicable items during the development and update of the **Hazard Mitigation Plan**, as Actions are completed, and as new Actions are developed for the **Mitigation Action Plan**.

## Pembroke's Hazard Vulnerability Changes Since the 2017 Plan

The locations of where people and buildings are concentrated now or where new lands may be developed have been considered as compared to the changing locations of potential natural hazards in order to best mitigate potential property damage, personal injury or loss of life. These factors assist the community with determining whether Pembroke's vulnerability to natural hazard events has changed in any way since the **2017 Plan**. Facilities and their locations with vulnerabilities to specific natural hazards are listed in **APPENDIX A Critical and Community Facilities Vulnerability Assessment**.

There have been population and housing increases over the last **5** years from **2 COMMUNITY PROFILE**, but aging citizens and individuals with limited access and functional needs require more services and assistance. Traffic continues to increase within Town because of the US 3, NH 106 and NH 28 commuter routes through Pembroke. The need for volunteers increases annually as fewer younger people are joining Town Boards and Committees and finding new people volunteer to serve is difficult. Existing volunteers typically continue their services for many years. Membership in the Capital Area Fire Mutual Aid Compact (CAFMAC) Dispatch has enabled for faster emergency response for Fire Department and Ambulance needs. The Town has access to the Central NH Hazardous Materials Response Team and the Central NH Special Operation Unit for special incidents, which creates more training opportunities available. Membership in the Capital Area Public Health Network enables organized public health assistance while membership in the NH Public Works Mutual Aid program enables shared Public Works Department labor and vehicles from across the State during times of need.

### THE TOWN'S STATEMENTS OF VULNERABILITY CHANGE

2022

**Natural Disasters Vulnerability** The Town's overall vulnerability to natural disasters **is believed to have STAYED THE SAME over the last 5 years**. Factors considered include its steady population growth and aging population, the changing climate and weather impacts, and continuing disasters and hazard events, which are offset by less road flooding, less debris and faster damage repair, regular infrastructure improvements and upgrade, more development, and good preparation and mitigation to date, keeping up with improvements.

#### Changing Climate

The Town is experiencing increasing temperatures, more rain, less snow, and storms are bigger. The frequency of torrential downpours has increased which impacts the Suncook River Soucook River, and the Merrimack River, brooks, and waterways, often wash out or erode portions of gravel roads, ditches, and drainage systems. Yet floods have not recently reached the **100**-year storm event level. The rain that is unable to run off in the cold months or during the torrential downpours washes out some of the **50** miles of



Town maintained roads. Increased traffic accidents result from the weather and road conditions.

More rain is coming more quickly, and although the roads are mostly good now, washout issues remains the same. Tree debris remains the same because of Eversource and Unifit trimming activity. The Town upgraded culverts underneath roads and is enrolled in an MS4 stormwater regulation program yet has been experiencing drought conditions as opposed to flooding over the last five years.

As a mostly forested community, a significant future concern to Pembroke is the large die-off of trees (including ash trees) which hold the water supply, serve as carbon storage, maintain a healthy local hydrologic cycle (tree transpiration), and guard against erosion on the hills to the roads.

When the normal 4- season climate varies, Pembroke has little recreational economy to negatively impacted. Issues with White Sands could increase (algae blooms, aquatic invasive species) could occur with more traffic either to the beach or to Plausawa Country Club. The unpredictable weather **since the last Plan has** brought more rain and washouts, more significant or damaging weather events to aging infrastructure (road, bridges, water, sewer, sewer, and Town services). Infrastructure upkeep is expensive to maintain. The Town **will not quite be able** to adequately continue optimal services and infrastructure upgrades with future population and housing growth without increased funding, additional staffing, and new equipment.

### **Town Demographics and Housing Changes**

The Town is at greater risk from not only the natural hazards, but also from the changing population characteristics in Pembroke. The more affordable housing in manufactured housing parks, older multi-unit housing in Suncook Village or condominiums, and apartment buildings attracts people with fewer discretionary resources because of their lower pricing and nearby services. There is a low inventory of single family homes for sale in Town. The younger generation leaves the local school system for college and greater employment opportunities and does not often return to the Town after completing their college degrees. In-migration of young college-educated professionals (Millennial Generation) are moving back to Pembroke to live with their parents because of pandemic-related issues, encouraged by proximity to Concord and Manchester (30-minutes), and because of high housing costs. There are few jobs in Pembroke and the surrounding area available for highly educated young people.

There is a higher demand for Accessory Dwelling Units (ADU) on single family homes, with adult children (Generation X) sharing living space with their parents, usually with parents in the ADU. Additional housing developments containing smaller, multifamily units have been built to fulfill certain housing needs, such as for those over 55 in age.

These units are in high demand, are listed at market rate, and both the elderly/retired and young families compete for this housing.

The townspeople are aging and the need for services increases, although trends have been noted that people who have lived in Pembroke for decades may be moving out for assisted or independent living services, there is little availability to downsize to the single-level, ranch style homes that the aging population is looking for in Pembroke. Senior programs and classes are available at the Allenstown Senior Center. The Town offers emergency Fire, Ambulance, and Police services seven days per week and with on-call, 24 hours per day availability. Pembroke continues to have a strong volunteer ethic for Town Committees and Boards and organizations.

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### Economic Changes

Years when the economy is good, housing growth will occur as may new business development. In the Town are dozens of active commercial and industrial businesses mostly along NH 106 and Cooperative Way, along with an unknown number of home-based businesses. Home businesses are encouraged in the community. A diverse tax base enhances funding for long-term mitigation planning projects. Class VI gravel roads and conservation land trails are used for bicycling and walking. Bike races are often held during the warm weather weeks.

Pembroke residents can commute 15 minutes to work in Concord or can reach Manchester within 30 minutes. Today, the option to telecommute is growing stronger. There are many local employment opportunities available in Pembroke, although most workers commute using US 3 to jobs in Concord, Hooksett, or travel to I-93 and I-89 to access Lebanon, Manchester, Plymouth, and greater Boston metro area locations.

### Infrastructure Changes

With a growing older population, the Town of Pembroke may be challenged to raise taxes for mitigation projects. **The ability of the infrastructure to meet the Town's remains difficult.** For instance, limited funding is available to upgrade the Town's Class V roads (50 miles). The Town owns but is not responsible for the maintenance of nearly 13 miles of Class VI Town roads. Mitigation Actions were developed for many aspects of Town infrastructure, yet over the last 5 years, there was not enough funding or the staffing capability to see many of the infrastructure projects through to completion.

The Town Hall is modernized to fulfill Department operational needs. The Safety Center houses the Fire Department, Police Department, and Emergency Operations (EOC) Center. The Public Works Garage requires some facility upgrades. For all Departments, budgets are limited for infrastructure upgrades. The Town has multiple Capital Reserve

Funds (CRFs) and Expendable Trust Funds (ETFs) and the Town maintains an active CIP, but because funding comes from taxation, budgets are limited to approval from residents at annual Town Meetings, and the occasional state funding and state and federal grant opportunities.

The burden on the Town’s aging infrastructure is increasing with no end in sight. Pembroke has no Town red listed bridges, but the high upkeep and rehabilitation costs of Town roads, buildings, and the services provided by Departments are too high to be sustainable with any future housing and business development without adding staff. The Town could seek 75/25 federal funding for high priority bridges, including the HMGP and BRIC programs. Not enough funding through taxation is available to repair the existing infrastructure, and grant funds are competitive and require staff management and completion time, although sometimes the Town can be proactive, such as securing MS4 stormwater funding and RSMS transportation funding. Most of Pembroke’s paved road infrastructure, culverts, and bridges age **5** years with every **Plan** without upgrades.

### Overall Natural Hazards Vulnerability

Despite these risks, **Pembroke is also better protected from natural hazards now than in the past.** These protections arise from select infrastructure and service improvements to past vulnerable areas which were identified and mitigated where feasible by the Public Works Department, Emergency Management, Police Department, Fire Department, and Town Administration. The Town was assisted by the State of New Hampshire and memberships agreements with organizations and neighboring towns for aid. Balancing the changing climate and potential for hazard events, **Pembroke’s overall natural hazards vulnerability has STAYED THE SAME over the last 5 years.**



**Human and Technological Disasters Vulnerability** The Town’s overall vulnerability to human and technological incidents **is believed to have INCREASED over the last 5 years** with the potential for great technological escalation in the future. Although the Town **is better protected than in the past** through partnerships and best practices, updated SOPs, regular Information Technology (IT) improvements to combat human hazards, and tightened informational technology services and updates protecting data, the Town has an ongoing struggle to contain the many facets of human and technological hazards. Town must stay in a reactive position to these events instead of a proactive position due to costs, staffing, and its “wait and see” approach: as technology improves, Pembroke will wait to see how it operates before making the purchase or effort.

### Human Hazards Vulnerability

Human hazards are unpredictable to a large degree, but preparedness can enable faster, more appropriate emergency response. The School District conducts active threat drills (2x per year), fire drills (10x year), and bus evacuation drills periodically during normal operation years. The District likely reviews its Emergency Operations Plan and procedures annually. The Town emergency response (Emergency Management, Fire, Police, Tri-Town Ambulance) often participates in municipal drills and the School drills. All emergency response personnel regularly participates in the newest training related to human hazards, at least during non-pandemic years.

The Fire Department call volume and Police Department call volume have increased since **2017**. More human hazards have been experienced in the Town, but none that are especially alarming. At the Pembroke local and private Schools, the increased use of social media is believed to increase the volatile situations and bullying handled by emergency response personnel responding to an increase in mental health crisis calls by younger residents. Homelessness has increased, based on the calls to remove larger encampments from private property. The Police Department has issued **46** (voluntary) concealed carry handgun permits in **2021** to date, but there is an assumption of an increasing number of handguns purchased annually which are not registered. The handgun permit was eliminated in the State but can be issued by local police.

Stress levels in the community have increased as noticed by Departments and the School District. The COVID-19 pandemic has helped to polarize residents by decisions mandated for health and safety. Mental health and substance abuse issues need to be addressed. Higher stress can result in serious human hazard events such as active threat, kidnapping, hostage situations, civil disturbance, or public harm.

### Technological Hazards Vulnerability

The Town's core financial business software operates "in the cloud" with multiple redundant backups available as a safeguard. Most Department files are saved to a local server and backed up to the cloud. A contracted IT company is responsible for maintaining the Town's local server. The files, email, internet, website, in the cloud are maintained by software provider. The Town system is fairly safe from cyber-attack because their technology is automated under highly secure software and hardware.

While the Town and School cybersecurity has increased, like anti-phishing and malware installation, new technological hazards will continue to be developed and utilized and may be directed toward Pembroke, which is not anticipated to be able to keep pace with advanced, changing technological risk. Valid concerns include Town database and website hacking although Departments have redundant back-up systems to the cloud by using outside software providers. While use of technology increases efficiency, the increased reliance on cell phones, electronics, electricity and technology also makes Pembroke's population and Schools more vulnerable to the effects of cyberattacks.

Software also helps monitor the Suncook Wastewater Treatment Facility (in Allenstown) and Pembroke Water Works in Pembroke, both of which serve the Town. A breach in either of these facilities could result in a public health crisis or personal data loss.

### **Overall Human and Technological Hazards Vulnerability**

The Town itself is **better protected** from human hazards by partnerships among Town Departments, Pembroke School District, mutual aid agreements, and emergency response and membership with the Capital Area Mutual Aid Fire Compact (CAMACF). However, with the future technological factors considered, **the Town's vulnerability to these hazards has INCREASED** and is anticipated to continue increasing to **2027** and perhaps indefinitely.

### **FUTURE DEVELOPMENT IN PEMBROKE**

Many of the Town's roads and homes are located in remote locations, but many are located in Suncook Village and residential communities. Many homes were newly constructed since the **2017 Plan**. Pembroke is accessible via the primary US 3/NH 106 & NH 28 corridors and local roads such as North Pembroke Road, Buck Street, Academy Road and connector roads. Residents are aging and employed adults either work from home or commute along to Concord, Keene, Hooksett, Manchester, or Lebanon or points within or beyond. Since much of the easily developable land in Town has already been built or subdivided, future developments may occur on the (upgraded) Class VI Range Roads, lots built on backlands, near **wetlands** or **steep slopes**, or in-fill development around Suncook Village. **Floods, landslides, erosion, and fires** could occur in these potential residential areas. **Severe winter weather, storms** and **wind events** on these hilly locations will bring trees down on roadways, interrupt **power and communication** services and will **flood** ditches and **wash out** roads.

Several large businesses are located in Pembroke and many new subdivisions are anticipated. Infill development between existing built areas could guide residential and light commercial development as mixed-use in the community. About two dozen conservation easements protect some of Pembroke's land from development. **Large-scale commercial** and **mid- to large scale residential developments** are expected to occur in Pembroke in the future. Some multi-unit housing infill development may be seen on US 3/Pembroke Street and into Suncook Village.

The risk of **Suncook and Soucook River flooding** is always present. Most of Pembroke's development is on a higher elevation than the **Merrimack River** or is buffered by open lands. The most remote Class VI locations are not protected against severe impacts of **wildfire** and **lightning**, and all wildland urban interface housing could be vulnerable to **wildfire, severe winter weather, storms, and flooding of local roads**. There remains the potential for subdivisions in the future when the lots change hands to younger generations ("legacy parcels") if the largest parcels are not placed under conservation. Conservation land is highly preferable by the Town.

When developments come before the Planning Board, potential hazards including **flooding, fire, traffic accidents**, and **evacuation** are regularly considered. A Technical Review Committee and the developers try to solve the problems before a project is brought to the Planning Board to be approved. The existing roads and bridges experiencing **erosion** and **flooding** will need to be upgraded for additional usage. The Town will continue to grow and change, and attention should be focused on the hazards any new development could face during the consideration process. Techniques to mitigate identified hazards could be undertaken before the facilities are sited and constructed.

The main natural hazards for this community remain **wildfire, flood, severe wind events, severe winter weather, debris impacted infrastructure** (trees down on powerlines and trees/powerlines down on roads), **aging infrastructure** and **utility failures**. The Town will need to ensure Town services are not eclipsed by the needs of new development. Any future development in Town could be vulnerable to the various natural hazards identified previously. A few agricultural operations are present. New (or replacement) buildings and infrastructure and potential future development appear in **APPENDIX A Critical and Community Facility Vulnerability Assessment**.

## 5 COMMUNITY VULNERABILITY ASSESSMENT AND LOSS ESTIMATION

The Hazard Mitigation Committee developed and/or updated as needed each of the assets tables within this Chapter. Sites were added or removed, and contact information was revised. Modifications were made to the **Primary Hazard Vulnerability** column to reflect changes over the last five years. Revisions were made to the future development section, which now includes a clear table. The Plan's maps were also updated from the **Pembroke Hazard Mitigation Plan 2017**.

The identification of Critical and Community Facilities within Pembroke is integral to determining what facilities may be at risk from a natural disaster. Every Critical and Community Facility can be damaged by multiple hazards listed in **4 HAZARD RISK ASSESSMENT**. A tabular inventory of facilities in Pembroke is provided in **APPENDIX A Critical and Community Facilities Vulnerability Assessment**. The **911 Street Address** and **Phone** number of each facility is supplied, the assessed **Structure Replacement Value \$**, and the **Primary Hazard Vulnerabilities** to which the facility is most susceptible are listed. The hazards identified are primarily natural disasters but regularly include the technological (and secondary disasters) such as power failure and communications systems failure as well as human hazards such as vandalism/sabotage.

Most sites appear on **Map 3: Critical and Community Facilities** and **Map 4: Potential Hazards and Losses**.

Potential dollar losses for each of the facilities' **Structure Replacement Value \$** (not land) have been obtained through the Apr 2021 assessing software and the 2020 MS-1 Summary of Inventory Valuation to provide a starting point of the financial loss possible should these structures become damaged or require replacement. These community facility losses are estimated for the value of structure and does not include land (unless indicated), contents, or infrastructure.

**Problem Statements** were then generated for each type of facility when issues were identified by the Hazard Mitigation Committee during discussion of the facility characteristics and **Primary Hazard Vulnerabilities**. These **Problem Statements** are listed here.

Potential dollar losses to buildings in the Pembroke from flooding and other natural hazards are provided using the methods described in the chapter. The Town's participation in the National Flood Insurance Program (NFIP) offers a way for individuals to obtain insurance coverage for flooding. The Town's history with NFIP claims and repetitive losses are examined.

The Chapter provides an inventory of the **Community Facilities** and **Critical Facilities** and the most prevalent hazards to which they are vulnerable. Potential structure damage loss is also provided. The detailed information is available in **APPENDIX A Critical and Community Facilities Vulnerability**

<b>Assessment:</b>	<b>Facility Name</b>	<b>Street Address (911)</b>	<b>Phone</b>	<b>Structure Replacement Value* \$</b>	<b>Primary Hazard Vulnerabilities</b>
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## Critical Facilities

**Critical Facilities** are categorized as those Town or State buildings or services that are first-responders in a disaster or that are required to keep the community running during a disaster. The personnel in the Pembroke Town Department facilities, the Town Offices, Fire Department & Police Department (Safety Complex), Public Works, Transfer Station and Tri-Town Ambulance provide the services necessary for coordinating everyday activities and for emergency response. Other critical partners such as the Schools District provide essential services. Many staffed and unstaffed support facilities are located in Pembroke, such as Pembroke Library. Maintained roads, dams, and bridges are required for safe operation during both normal times and hazard events. Utilities or utility features such as cisterns, culverts, dry hydrants, telecommunications towers, phone and internet switching stations, gas lines, water & sewer lines, and electric transmission lines are included because of the essential communication and utility services provided, and their significant impact on Pembroke residents when they fail. Other **Critical Facilities** would include educational facilities, medical facilities, and emergency shelters.

Many critical facilities are located in Pembroke. The assessed structure/building only value is provided for each facility where available, otherwise estimates are provided to help ascertain the financial impact a disaster can have on the community. However, the assessed structure valuation does not reflect actual structure replacement (rebuilding) which would likely far exceed the valuations in many cases. To view the detailed **Critical Facilities** sites and tables, see **APPENDIX A**. Most of these facilities appear on [Map 3: Community and Critical Facilities](#).

**Essential Facilities** include: Pembroke Town Hall, Public Works and Transfer Station, (also a Haz Waste Facility), Safety Center/Police and Fire Departments, Town Salt Shed at Public Works, Tri-Town Ambulance Service in Safety Center. **Assessed structure (only) valuation for these essential facilities total \$7.1m.**

**Utilities** include: Pembroke Water Works Office and Barn, Water Storage Tank 1, Water Storage Tank 2, Pembroke 1 Water Works Well/1 Rt 106 Pump Station – Soucook River, Pembroke 2 Water Works Wells/1 Rt 3 Pump Station – Soucook River, Pembroke 2 Public Wells/1 Bear Brook Pump Station – Suncook River (Pembroke), Suncook Wastewater Treatment Plant (serves Pembroke), Sewage Pump Station #2, Sewage Pump Station #3, Sewage Pump Station #4, Sewer Department Storage Building, Sewage Pump Station #5, Public Works Storage Building, Global Partner Towers (2 Cell Towers), AT&T Cell Tower, T-Mobile Northeast Cell Tower (Poirier), Tennessee Gas Company TENNECO (underground), Liberty (formerly National Grid) Natural Gas (underground), Eversource (formerly PSNH) Electric, Comcast Cable, Eversource Substation, Unitil Electric, Pembroke Hydro Electric, Fairpoint Telephone. **Assessed structure (only) valuation for these utility structures (without Suncook WWTP) total \$38.8m.**

**Dams** include: **1 High Hazard (H) Dam:** 190.02 Pembroke Dam (Renewable Energy) on Suncook River at Main Street; **1 Significant Hazard (S) Dam:** 190.03 Webster Mill Dam (Renewable Energy) on Suncook

River; **1 Low Hazard (L) Dam-** 190.01 China Mill Dam (Renewable Energy) on Suncook River; Non-Menace (NM) Dams- 190.11 Plausawa Country Club Pond (Private) on natural swale, 190.12 Suncook Valley Club Wildlife Pond Dam (Private) on Pond west of Hartford Brook, 190.13 Pembroke Academy Wildlife Pond Dam (Private) on Hartford Brook, 190.14 Natti Farm Pond Dam (Private) on unnamed brook; 190.17 Robinson Farm Pond Dam (Private) on unnamed stream, 190.21 Soucook River Red Rock Detention Pond Dam (Private) on runoff, 190.22 Associated Grocers Farm Pond Dam (Private), 190.23 Dole Recreation Pond Dam (Private) on runoff; and Exempt Dams (from classification): 190.04 Sawmill Dam (Renewable Energy) on Suncook River, 190.07 State Game Farm Pond (Private) on unnamed brook, 190.09 Hilliard Farm Pond Dam (Private) unnamed brook, 190.15 Donaghey Wildlife Pond Dam (Private) on unnamed brook, 190.16 Drew Recreation Pond Dam (Private) on unnamed brook, 190.18 Rousseau Dam (Private) on unnamed stream, 190.19 Rugged Acres Detention Pond Dam (Town) on runoff between Smith Ave and Tina Drive, 190.20 Colonial Farms Detention Pond (Private) on runoff. **Estimated structure (only) repair values for these dams total \$9.5m.**

**Bridges include:** **3 TOWN BRIDGES:** 182/106 Buck Street (Town) over Suncook River, Batchelder Road Culverts at Batchelder Road, Cooperative Way Box Culvert at Cooperative Way. **3 SHARED or TOWN LINE BRIDGES:** ALLENSTOWN 068/55 US 3 Double Decker (State) over Suncook River & Buck Street at Pembroke Town line, ALLENSTOWN 107/098 NH 28 (State)\* at Suncook River at Allenstown Town line, CONCORD 160/188 NH Route 9 (State) at Soucook River / Pembroke Town line, CONCORD 161/184 I-393 US 4 Route 202 Westbound (State) at Soucook River / Pembroke Town line, CONCORD 162/184 I-393 US 4 Route 202 Eastbound (State) at Soucook River / Pembroke Town line, CONCORD 183/156 North Pembroke Road (Concord)\* at Soucook River / Pembroke Town line, CONCORD 198/146 NH 106 (State) at Soucook River / Pembroke Town line, Soucook River / Pembroke Town line, CONCORD 215/124 US 3 (State) at Soucook River / Pembroke Town line. \*scheduled for 2021 repair. **6 STATE BRIDGES:** 045/084 I-393 Westbound Ramp (State) at NH 9, 050/081 I-393, US 4, US 202 Westbound (State) at Horsecorner Road, 051/081 I-393, US 4, US 202 Eastbound (State) at Horsecorner Rd, 163/127 Old NH 28, Buck Street (State) at Pettingill Brook, 203/088 Main Street (State) at Suncook River at Allenstown Town line, Old Bear Brook Road Bridge (for snowmobiles, closed, no public vehicle access) at Allenstown Townline and NH 28 crosses Suncook River. **Estimated structure (only) rehabilitation values for these bridges total \$42.m.**

**Shelters, Schools, and Medical Facilities include:** SCHOOLS: Allenstown Elementary School (Pembroke Town Shelter), Green Valley School (Private), "PACE Academy [~66 students + ~11 staff], Pembroke Academy [~733 students + ~120 staff], "Pembroke Hill School [~320 students + ~85 staff], "Strong Foundations (Charter), Grades 1-8 (new addition forthcoming) [~340 students + ~65 staff], "Three Rivers School [~310 students + ~63 staff]. MEDICAL: Suncook Family Dentistry, Pembroke Wellness Center, Family Physicians of Pembroke, Pembroke Animal Hospital. **Assessed structure (only) valuation for these schools, medical facilities and shelters (Town Office only) total \$30.4m.**

## PROBLEM STATEMENTS AND EVALUATION

During discussion of these **Critical Facilities**, the Hazard Mitigation Committee identified specific issues or problems that could be further evaluated. **Problem Statements** were developed after ascertaining the **Primary Hazard Vulnerabilities** to the sites and known existing issues. These potential hazards were typically those from the **Hazard Risk Assessment**. The Committee also evaluated these statements to determine whether mitigation actions could be developed. See **APPENDIX A CRITICAL AND COMMUNITY FACILITIES VULNERABLE ASSESSMENT** for the referenced Tables:

### Essential Facilities Table

- ⊙ There is no municipal fuel available for Town emergency response vehicles in the event of power failure. (Now use Irving, Mobil, State sheds in Concord & Hooksett has a generator, Bow for Town fuel use). Natural Gas could be available at NG Energy in the event of a power outage.
- ⊙ During events, Fire Department has an unofficial agreement with Rymes (diesel) or another company to deliver fuel during an emergency.
- ⊙ Burke services generator on an annual basis. Lavallee may be the company that fills the tank during emergencies.
- ⊙ If the 10-year old Town Salt Shed is compromised by a water or wind event, the 15% salt and sand mixture will become unusable. Back up options include using state sheds in Allenstown; if Depts use it, will need to replace it. The fabric canopy is situated up high, but wind would be the only potential hazard.
- ⊙ Existing movement and settling of Public Works Facilities' structure and foundation. Constructed on an old dumping ground, unstable over time. Experiencing cracks, visible light, leaning. Item to repair in CIP (low priority), equipment may not be retrievable if wall(s) fall. Reviewed by contracted engineer (GZA who produces an annual report) regularly who makes recommendations. Appears yearly, but not favorably reviewed. The fix is costly- \$60,000 for injection foam system, but no guarantee it will stop settling (caulking worked for a time). Have a CRF for all town buildings, annual basis. Scored highest gets the repair. CRF contributions fluctuate between \$10,000 - \$100,000 Safety Center Roof & Library Roof.
- ⊙ Roof at the Safety Center needs replacement. New leaks every rainstorm. On the CIP list for 2021 or 2022 for replacement. When the flat roof leaks, damage to ceiling tiles, floors, structural damage could occur if continue. Where the building joins at flat area, the roof leaks. Screws are backing out of the Teflon roof, which is where leaks are forming. Underbody of the roof deteriorating, screws falling, more spots for leaks. Police has a sally port with leaking or flooding. Potential impact on electrical. People may not be safe because of bulging ceiling tiles.

- ⦿ Town Hall and Public Works Dept Garage, other facilities do not have lightning rods. The Safety Center antenna tower is grounded (25 feet high) which may attract the lightning. HVAC is on the roof (metal casings). Grounding designed for electrical in the building, not for lightning. Surge protectors are used in many buildings for electronics.
- ⦿ **INFO:** Public Works Dept has been using WEX cards for whichever pumps are available. Town would probably not install tanks in the ground again. Town drivers can get fuel anywhere at a government rate using WEX cards. Can get fuel at State pumps at Allenstown BBSP (got fuel here during last storms), Concord Hazen Drive, and Hooksett.

#### Utilities Table

- ⦿ There are generators for public/private radio traffic on 2 cell towers are not always filled with fuel, outside company does it. The Plausawa Hill tower (leased \$300/month from Global Tower) is a critical radio site for CAMAFC, Police & Fire & Highway, state communications and repeater if there is a disaster event. Allenstown tower on Bailey Ave (Hooksett access) Town does have emergency access if needed.
- ⦿ Fire Dept has a microwave redundancy system, switched over to another tower (Hopkinton). CAMAFC plan to switch to Laconia if lose dispatch.
- ⦿ Police Dept also has frequencies and options. Regional Towers used by Pembroke Police Dept: OAK HILL TOWER (Loudon), BAILEY AVE (Hooksett/Allenstown), FORT MOUNTAIN
- ⦿ EOC at Safety Center communications could self-dispatch if needed, a relay via vehicle could be used to communicate through all areas of Town.
- ⦿ Aging Tennessee (TENNECO) natural gas distribution pipeline is located in an environmentally sensitive area over aquifers, is under federal control. Reactionary measures for fixing leaks, Town has an emergency phone line to call. No known leak to date. Repaired an 8" 100' section of pipe around 2019 near Memorial Field/Public Works Dept building.
- ⦿ Tenneco NG is responsible for the costs. Central NH Haz Mat would be contacted for assistance.
- ⦿ The EOC tablets and apps use CAMEO software to determine radius of evacuation for gas leaks, also anhydrous ammonia.
- ⦿ Natural gas is not considered a contaminant of water, escapes into the atmosphere. Generators over the aquifer need to be propane that reason.
- ⦿ Cell phone coverage is spotty, even on Pembroke Street, Academy Road, Buck Street (both ends), Cross Country Road, Dearborn Road. Police Dept has to use radios in the car to communicate, cell phones wouldn't work if the radios were down. Officer safety issues have been resolved because radios now work in all sections of town.
- ⦿ Communications with Verizon enabled PA to obtain better service 5 years ago.

- ⦿ Pembroke Hydro Electric - large diameter pipe ~10' feet running under Mills Falls Road, like an underground culvert. Transports the water when running the turbines. (VJ) Debris and high waters could result in flooding. Depts have procedures in place to contact others or check on site.
- ⦿ **INFO:** Bow Lane Sewer Pump Station is old and needs to be upgraded else will be dump directly into the Merrimack River. - COMPLETED APRIL 2018

#### Dams Table

- ⦿ Around Webster Mill Dam finds erosion after each flood, closer to Mills Falls Condos.
- ⦿ Beaver are using the culverts to build or are clogging the culverts. Public Works Dept inserts screens to keep culverts clear, DAILY must inspect culverts and remove debris on screen. Church Road, Cross Country Road, Brickett Hill, Thompson Road, North Pembroke Road.
- ⦿ Public Works Dept contracts with a second party to relocate or remove the beavers. Have to do annually, just removed 3 dams.
- ⦿ **INFO:** Debris from the Suncook River was infiltrating abutments at the dam next to the Emerson Mills Apartments. The State removed a short section of this dam to help alleviate the debris barriers in 2020. Now in free-flow condition. Town has not had enough rain to assess whether the solution is viable.

#### Bridges Table

- ⦿ People will have difficulty accessing any of the bridges impacted by flooding, particularly Route 106 on the Soucook River (State bridge). North Pembroke Road bridge also. Have to detour longer way around.
- ⦿ Police Dept and Public Works Dept meet at site to determine where the detour should occur. Dependent on traffic, intersections, and hazards. Detours change.
- ⦿ Old Bear Brook Road Bridge when used by OHRVs could cause erosion of the deck and the road material. Snow use is fine for snowmobilers. Not an official road, that bridge is the shortcut to Bear Brook State Park. Must ride on across public roads and private roads to access.
- ⦿ Different Boards have held discussions about OHRVS, posted restrictions on Class VI Range Roads Dec 14- May 31 for all motorized vehicles, discussions on club usage, etc. Board of Selectmen have supported the plan. Brand new code update. Signs are being made. Public Works Dept will install them when received. It is online but not specifically shown.

- ⦿ INFO: As led by Concord, North Pembroke Road Bridge went out to bid, in process of awarding bid. Pembroke is funding 20%. Should be replaced in 2021. Business access and commuting access are predominant over residential access.
- ⦿ INFO: Main Street bridge is 3 years old (replaced around 2018)

Shelters, Schools and Medical Facilities Table

- ⦿ There is only 1 way in and out of Strong Foundations and PACE Academy (to be closing) onto NH 106. National Guard at top of Riverwood Drive controls the second gate for deliveries only. Evacuation issues. Difficult to hold conversation with the same person to obtain permission.
- ⦿ Fire Dept has an upcoming meeting with National Guard. Will talk about the evacuation issue. NG will be allowing the Fire Dept to use for training. Facility needs to remain nonpublic.
- ⦿ INFO: Pembroke shares sheltering with Allenstown Elementary School on Main Street. Town of Allenstown voted to build a new school complex. The new Allenstown School complex will include the Town of Pembroke Sheltering agreement (confirmed by the School District).

Many of these problem statements were developed into Actions discussed later in **7 PRIOR ACTION STATUS** and **8 MITIGATION ACTION PLAN**.

**CULVERT UPGRADES**

A table of culverts in need of upgrade could appear in multiple sections, such as the **Critical and Community Facility Vulnerability Assessment (APPENDIX A)** or with the **Aging Infrastructure** technological hazard. Instead, as critical facilities, they are included here once within this section and also appear within the **Mitigation Action Plan 2022**. Culverts (including box culverts, often considered “almost bridges”) are responsible for carrying large volumes of water safely under roadways, and with the prior severe flooding events it is necessary to keep Town infrastructure in good condition.

Like most communities, the Town of Pembroke has hundreds of culverts and is not known to have a mapped inventory. The Highway Department maintains multiple Town culverts daily (debris removal, clearing, repairs) and attempts to keep pace with culvert upgrades. Yet upgrading all culverts that require this action in the next 5 years would be unrealistic. A prioritization of the culverts in greatest need of upgrade is necessary.



**Table 28** displays Pembroke’s initial listing of culverts in need of most urgent upgrade and approximately when the upgrades should occur. The intent is to upgrade all of these failing culverts with either open box culverts or appropriately-sized PVC culverts, respectively. The estimated cost for these projects reaches well over **\$1.5m** for materials, permitting, study and design. Labor for the smaller projects is performed by Town staff and is usually considered an in-kind cost. For larger projects, contracted engineering, design and permitting may need to occur and would be included in the respective cost estimates. The optimal timeframe for these upgrades to protect the Town from **Inland Flooding, River Hazards** and **Aging Infrastructure** is between **2022-2027** which is within the span of this **2022 Plan**.

**Table 28**  
**Town-Owned Culverts in Need of Upgrade Through 2027**

Action #	Location of Culvert(s) to Upgrade	# of Culverts	Intersecting Water	Issue(s) with the Culvert(s)	Upgrade Diameter Inches	Estimated Upgrade Year	Total Approx \$ Cost for All
#12-2010	Nadine Road	1	flows into Merrimack River	deteriorating	N/A	2018	\$240,000
#22-2016	Ross Road	1	flows into Merrimack River	deteriorating	N/A	2016 paving project	\$30,000
#22-2016	Micol Road	1	flows into Merrimack River	deteriorating	N/A	2016	\$40,000
-----	255 Pembroke Hill Rd	1	storm drainage	deteriorating	N/A	2018	\$15,000
#39-2021	747 Cross Country Rd	1	brook with beaver pond	deteriorating	N/A	2023	\$30,000
-----	Buck Street at Evergreen Cemetery	1	Ames Brook	deteriorating	N/A	2019	\$25,000
#42-2021	766 Borough Rd	1	Brook with ponds on both sides	deteriorating	N/A	2022	\$22,000
#38-2021	Littlefield Condos	?	flows into Merrimack River	drainage system too small, failure	N/A	2020	\$100,000
#51-2021	Batchelder Road	1	flows into Suncook River	Undermined granite culvert under bridge	N/A	2027	\$400,000
#44-2021	Fourth Range Road	1	flows into Merrimack River eventually	deteriorating	N/A	2024	\$17,000
#39-2021	747 Cross Country Rd	1	Brook with pond	deteriorating	N/A	2023	\$25,000
#41-2021	339 Brickett Hill Rd	1	Stormwater culvert run off	deteriorating	N/A	2022	\$7,500
#43-2021	Drain from Exchange St. to Memorial Field		Merrimack River	deteriorating	24" to 36"	2023	\$250,000
#40-2021	216 Brickett Hill Rd	1	Run off stormwater culvert	deteriorating	N/A	2022	\$15,000



**5 COMMUNITY VULNERABILITY ASSESSMENT AND LOSS ESTIMATION**

Action #	Location of Culvert(s) to Upgrade	# of Culverts	Intersecting Water	Issue(s) with the Culvert(s)	Upgrade Diameter Inches	Estimated Upgrade Year	Total Approx \$ Cost for All
#45-2021	682 Thompson Rd	1	Suncook River	deteriorating	N/A	2024	\$10,000
#46-2021	North Pembroke Rd	2	Stormwater culverts run off	deteriorating	N/A	2025	\$30,000
#47-2021	Deerpath Lane	4	Run off	deteriorating	N/A	2025	\$60,000
#48-2021	Bridge St	1	Run off	deteriorating	N/A	2026	\$15,000
#49-2021	Cross Road	2	Run off	deteriorating	N/A	2026	\$30,000
#12-2010	Nadine Road	1	Merrimack River	deteriorating	N/A	2027	\$100,000
#50-2021	Donna Drive	1	Merrimack River	deteriorating	N/A	2027	\$20,000
<b>Totals</b>							<b>\$1,481,500+</b>

*Source: Pembroke 2021 Mitigation Action Plan, Public Works Department Sept 2021*

This table can help the Town develop a formalized culvert upgrade and maintenance planning document. Mapped drainage facilities permit data to be collected and is easily revised and updated. Instant access to culvert and drainage information can be of valuable assistance during **flooding** events, such as **run-off**, **overtop flooding conditions** and **road washouts**. On an annual basis, a culvert maintenance plan can help guide the Town's decisions of priority replacement, maintenance, and monitoring of culverts and drainage facilities. Budgeting is clearer and may be more successful at Town Meeting with such a plan.

Some of the culverts listed in **Table 28** have been developed into **Mitigation Action Plan** items in **8 MITIGATION ACTION PLAN**.

Like all communities, the Town owns and maintains hundreds of culverts. Most of the culverts are maintained (debris removal) on a regular basis and are upgraded when a specific need arises, such as a flood event which causes road erosion or washout. A comprehensive inventory of culverts and culvert conditions was conducted. The Town is currently working to transcribe these notebook-written locations into an editable Excel document, with the goal of developing a Culvert Maintenance Plan.

### **MOST VULNERABLE ROADS AND NEIGHBORHOODS**

The Town of Pembroke has about **82** total miles of roadway including **50** miles of Town maintained Class V (both paved and unpaved roads), **13** miles unmaintained Class VI roads, private roads and State highways. Many of these roads are remote, have significant elevation changes, or are dead-end roads or cul-de-sacs with only one way in and one way out. Pembroke residents reside in neighborhoods, such as Suncook Village, subdivisions, and within cul-de-sacs. When trees and powerlines fall onto roads or floods or wildfire hazards are occurring, evacuation of most of these neighborhoods would be difficult. The Town's road mileage, classification, and surface type are displayed in **Table 29**.

**Table 29**

**Town Road Length and Classification**

<b>Pembroke Roads Legislative Classification</b>	<b>Total Length in Miles</b>	<b>Percentage of Road Network</b>
<b>Class I (State Primary Highway)</b>	8.0	9.8%
<b>Class II (State Secondary Highway)</b>	5.0	6.1%
<b>Class III (State Recreational)</b>	0.0	0.0%
<b>Class IV (Urban Maintained)</b>	0.0	0.0%
<b>Class V (Town Maintained)</b>	50.0	61.1%
<b>Class VI (town Unmaintained)</b>	12.9	15.7%
<b>Private</b>	5.9	7.2%
<b>Totals</b>	<b>81.9</b>	<b>100.0%</b>

*Source: NHDOT Mileage by Town and Legislative Class, released 2021*

The Town of Pembroke is responsible for **50** miles of Town owned roads, some of which are paved and some of which are unpaved. Compared to other small-sized Central NH region communities, the Town of Pembroke hosts fewer than average roadway miles.

### **ONE-EGRESS ROADS AND CUL-DE-SACS**

The Town of Pembroke has about **12** miles of roadway, including Town maintained Class V, unmaintained Class VI and private roads, that are dead-end roads or cul-de-sacs with only one way in and one way out. Hundreds of people live in approximately **597** homes - about **1,500** people- along roads which have no secondary means of egress. Awareness of potential vulnerabilities may help with evacuation and other emergency planning as well as long term mitigation projects in these areas. Evacuation of many of these neighborhoods, most of which are forested, would be difficult. All identified one-egress roads are displayed in **Table 30**.

**Table 30**  
**One-Egress Roads (Dead End) and Cul-de-Sacs**

One-Egress (One Access/Exit) Road Name	Road Class (Class V, Class VI or Private)	Condition (Good, Fair or Poor)	Approx. Length in Feet	Approx. # of Homes on Rd	Neighborhood Name (If Applicable)
Alexander Drive	V - Cul-de-sac	Good	921	8	N/A
Ashley Drive	V - Cul-de-sac	Good	814	9	N/A
Bean Hill Road	V - Dead End	Fair	467	3	N/A
Belfry Court	V - Cul-de-sac	Fair	610	4	N/A
Berry Brook Lane	Private	Poor	363	8	N/A
Keystone Ln (Bridge St. Ext.)	V	Fair	444	7	N/A
Brittany Circle	V - Cul-de-sac	Good	603	15	N/A
Brush Road	V - Dead End	Good	647	6	N/A
Carrie Avenue	V - Dead End	Fair	468	5	N/A
Center Road	V - Dead End	Fair	392	10	N/A
Church Street Ext.	V - Dead End	Fair	N/A	N/A	N/A
Eley Lane	V - Cul-de-sac	Fair	1,957	25	N/A
Fairway Drive	V - Cul-de-sac	Good	579	8	N/A
Friendship Avenue	Private - Dead End	Poor	565	21	N/A
Girard Avenue	V	Good	358	8	N/A
Gooses Way	Private - Dead End	Fair	503	3	N/A
Grandview Road	V - Dead End	Good	258	11	N/A
Haleighs Court	V - Dead End	Good	718	4	N/A
Hardy Road	V - Dead End	Fair	328	3	N/A
Harold Avenue	V - Dead End	Poor	232	4	N/A
High Street	V - Dead End	Fair	165	3	N/A
Hillcrest Avenue	V - Dead End	Poor	634	9	N/A
Howard Street	V - Dead End	Good	360	6	N/A
Jacks Drive	V - Cul-de-sac	Good	664	9	N/A
Keith Avenue	Private - Dead End	Fair	N/A	3	N/A
Lindy Street	V - Dead End	Fair	596	9	N/A
Martin Hill Road	Private - Dead End	Poor	545	4	N/A
Mason Avenue	V - Cul-de-sac	Fair	639	20	N/A
Meadow Lark Lane	V - Dead End	Good	280	4	N/A
Middle Street	V - Dead End	Fair	392	5	N/A
Mill Falls	V - Dead End	Fair	143	12	N/A
Old Bear Brook Road	V - Dead End	Fair	722	5	N/A
Peaslee Drive	V - Cul-de-sac	Good	1,647	17	N/A
Pheasant Run	V - Dead End	Good	746	7	N/A
Plausawa Hill Road	V - Dead End	Poor	3,025	16	N/A
Poor Town Road	Private - Dead End	Poor	555	3	N/A
Rebecca Way	V - Cul-de-sac	Good	1,033	8	N/A
Rosedale Lane	V - Cul-de-sac	Good	1,561	7	N/A
Ryan Drive	V - Dead End	Fair	1,118	5	N/A
Sand Road	V - Dead End	Poor	965	5	N/A
Sherwood Meadows	V - Dead End	Fair	2,413	34	N/A
Simpson Avenue	V - Dead End	Fair	551	6	N/A

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## 5 COMMUNITY VULNERABILITY ASSESSMENT AND LOSS ESTIMATION

One-Egress (One Access/Exit) Road Name	Road Class (Class V, Class VI or Private)	Condition (Good, Fair or Poor)	Approx. Length in Feet	Approx. # of Homes on Rd	Neighborhood Name (If Applicable)
Sixth Range Road	V - Dead End	Good	1,853	N/A	N/A
Skyview Terrace	V - Dead End	Fair	150	5	N/A
Terrace Lane	Private - Dead End	Fair	300	1	N/A
Wellington Way	V - Cul-de-sac	Good	1,296	13	N/A
West View Terrace	V - Cul-de-sac	Poor	337	3	N/A
Wilkins Avenue	V - Dead End	Fair	551	3	N/A
Woodlawn Ridge Road	V - Cul-de-sac	Good	15,002	15	N/A
Soucook Lane	Private - Dead End	N/A	N/A	3	N/A
Chickering Court	Private	N/A	755	0	Chickering Meadows
Belknap Drive	Private	N/A	1,078	25	Chickering Meadows
Cardigan Drive	Private	N/A	492	12	Chickering Meadows
Profile Drive	Private	N/A	264	0	Chickering Meadows
Cascade Drive	Private	N/A	0	0	Chickering Meadows
Kearsarge Drive	Private	N/A	723	13	Chickering Meadows
Liberty Drive	Private	N/A	1,101	24	Chickering Meadows
White Sands Road	V - Dead End	Poor	522	6	N/A
Riverwood	V - Dead End	Good	1,154	11	Businesses, School
Savage Court	Private	N/A	592	17	Littlefield Condos
Winchester Court	Private	N/A	500	17	Littlefield Condos
Beretta Court	Private	N/A	291	11	Littlefield Condos
South Browning Court	Private	N/A	478	19	Littlefield Condos
North Browning Court	Private	N/A	306	15	Littlefield Condos
Remington Court	Private	N/A	482	12	Littlefield Condos
Hilltop Road	Private	N/A	200		N/A
Rockledge Terrace	Private	N/A	477		N/A
Mass Avenue	Private - Dead End	N/A	200	7	N/A
Belanger Drive	School - Dead End	N/A	2,015	1	Hill School
Silver Hills Drive	Private - Dead End	N/A	1,297	5	N/A
Tecumsah Drive	Private	N/A	167		N/A
Total Feet One-Egress Roads:			62,564.0	597	Vulnerable Homes
Total Miles One-Egress Roads:			11.8		

Source: Pembroke Highway Department Road Agent, Mar 2021

## Community Facilities

The **Community Facilities** inventoried in **APPENDIX A** are generally vulnerable to disasters and in need of careful consideration. Some facilities contain vulnerable populations, other community facilities are neighborhoods, roads with many homes or roads with only one access, places where people gather, the economic assets of the community, buildings or sites that contain the history of the town, or facilities which could release hazardous materials during hazard or disaster events. While **Critical Facilities** are strong with emergency preparedness and mitigation measures, **Community Facilities** are typically not as well attuned to these issues and would require more emergency services, and perhaps the first check, during a hazard event disaster.

**Vulnerable Populations** include: MANUFACTURED HOUSING NEIGHBORHOODS: Ashley Park Cooperative MHP [13 units], Sheetz (AHR Residential Realty) MHP [4 units], Silva's Park MHP [5 units], Silver Fox Estates MHP [21 units], Sun Briar Knoll MHP [5 units], Tanglewood MHP [22 units]. INDEPENDENT LIVING OR APARTMENTS: Cornerstone Realty Future Apartments at Former Pembroke Village School [~32 units proposed]\*, Meetinghouse Commons Independent Living Apartments 55+ [~45 units], Pembroke Farms Independent Living 62+ Apartments [~40 units], Pembroke Pines (Fowler) 55+ Rooming House [10 bed limit]. CHILD CARE FACILITIES: First Choice for Children [~40 children], Hurney's Nursery and Daycare [~32 children], It Takes a Village Child Care (Donnelly) [~12 children], Krazy Kids Indoor Play & Party Center [~50 children]. **Assessed structure (only) valuation for these vulnerable population facilities total \$9.7m.**

**Economic Assets** include those LARGE BUSINESSES and services that employ a large number of people or contribute to the local economy: A&B Lumber, American Yeast Industrial Building, Associated Grocers, D'Pergo Realty Investments, Heat and Control, Northeast Logistics, Pitco, Vacant For Sale Comm/Res/Ind - formerly TD Bank, Union Street Business Building. GOVERNMENTAL FACILITIES: NH National Regional Training Institute (Army) and Military Police, US Geological Survey (Timouth). AGRICULTURAL: Donaghey Christmas Tree Farm, Found Well Farm (greenhouse accessory to residential use) (Whytemare-Donovan), Gelinas Farm (horses), Green Gold Farm (Pritchard), Pleasant View Gardens (wholesale greenhouse) (New England Flower Farms LLC), Townsend's Training Farm (horses). See also **Hazardous Materials** facilities. **Assessed structure (only) valuation for these economic asset facilities total \$73.0m.**

**Hazardous Materials Facilities** include: Airgas USA, Continental Paving, Dandy Automotive, Eight 17 LLC (Refurbish Video Arcades), Energy Improvements Retail & Materials (Home Improvements, Insulation), JBI Helicopter (Transport), Lavallee Oil Company, MBI Trash Trucking and Haul (Mechanic Maintenance Shop)-D'Pergo Realty tenant, Michel's Corporation, Mike Gove Auto, NG Advantage Gas Distribution Center, Nortrax Equipment Co, Pellerin Motor Sports (Repair Auto Service Center and Fuel), Pembroke Mobil, Superior Energy Soucook Ln (formerly Rymes Oil), Superior Energy Keith Ave (formerly Rymes Oil). See also **Economic Asset** facilities. **Assessed structure (only) valuation for these hazardous material facilities total \$9.3m.**

**Cemeteries and Churches** include: CHURCHES: First Presbyterian Church of Concord\*, Grace Capital Church\*, Hillside Baptist Church\*, Next Level Church, Pembroke Congregational Church, Suncook Methodist Church\*. CEMETERIES: Abbott Cemetery, Blueberry Hill Cemetery, Buck Street Cemetery, Evergreen Cemetery, French Family Cemetery (Private), French-Dearborn Cemetery (Private), North Pembroke Cemetery, Pembroke Hill Cemetery, Pembroke Street Cemetery, Richardson Cemetery. **Assessed structure (only) valuation for church facilities and headstone replacement estimates for cemeteries total \$7.4m.**

**Historic Sites and Buildings** include: Downtown Suncook Village Area, Hearse House (Historic horse-drawn hearse Shed), Langmaid Monument, Old Buck Street Schoolhouse/ Historical Society (One Room Schoolhouse), Pembroke Town Clock Tower, Pembroke Town Pound, Pembroke Water Works Historic Building (private), Robert Frost Bench, Town Grange (School), First School in Town, Whittemore Homestead (private). See also **Recreational and Gathering Sites**. **Assessed structure (only) valuation for these historic facilities total \$831k.**

**Recreational and Gathering Sites** of both land and buildings include: BUILT RECREATION: Keystone Pembroke LLC, Golf Course, Maple Grove Campground, Memorial Field Facilities\*, Pehaugun Men's Club, Pembroke Academy Sports Fields, Pembroke Hill School Fields, Pembroke Town Library\*, Three Rivers School Sports Fields. CONSERVATION EASEMENTS: Ames Conservation Easement, Associated Grocers Easement, Baxter Conservation Easement, Beck Conservation Easement, Bragfield Pond Conservation Area, Brittnay Conservation Easement, Butterfield Conservation Easement, Clark Conservation Easement, Doherty Parcel, Gamelin Conservation Easement, Girard Conservation Easement, Heiser Conservation Parcel, Keniston Conservation Easement, Merrimack River Conservation Parcel, New Hampshire Soccer Association, Pembroke Pines Easement, Poirier Open Space Conservation Land, Richard Conservation, Easement, Schuett Conservation Easement, Scripture Conservation Easement, Taylor Conservation Easement, White Sands Conservation Area (Town Beach), Whittemore Conservation Easement. Some of these sites can be **Economic Assets** to the Town even if the land is untaxable. Only some structure valuations were available. **Assessed structure (only) valuations for the recreational facilities for land and/or structures total \$5.6m.**

**Future Development** includes both residential and commercial development potential in Pembroke. FUTURE DEVELOPMENTS: As of **05-21**, there are several APPROVED/UNBUILT developments or potential developments according to the Planning Board: Continental Paving, Expand Commercial Zone, On-Spec Sand and Gravel LLC, Pembroke AG Holdings, Pitco Co, Residential Development, Residential Development, Silver Hills Business Park. LEGACY PARCELS (large lots with development potential): 612-644 Pembroke St. (MNP Realty LLC), 16 Sheep Davis Road (Pembroke Commercial Group Inc). LOTS IN PEMBROKE FOR SALE 05-21: lots for sale during this snapshot include 0 Poor Town Road (Eames) [67 acres], 245 Pembroke Hill Road (Pembroke Hill Estates LLC) [14 acres], 307-323 3rd Range Road (Eight Thumbs LLC) [27 acres], 107 Sheep Davis Road\* (D'Pergo Realty Investments LLC) [11 acres], 441 6th

Range Road\* (Arsenault) [135 acres], 65 Sheep Davis Road\* (65 Sheep Davis Rd LLC) [1.1 acres]. **Assessed valuation for the Potential/Approved PB Developments (LAND) Legacy Parcels (LAND) and Lots for Sale properties (LAND) only totals \$51.7m.**

## **PROBLEM STATEMENTS AND EVALUATION**

During discussion of these Community Facilities, the Hazard Mitigation Committee identified specific issues or problems that could be further evaluated. **Problem Statements** were developed after ascertaining the **Primary Hazard Vulnerabilities** to the sites and known existing issues. These potential hazards were typically those from the **Hazard Risk Assessment**. The Committee also evaluated these statements to determine whether mitigation actions could be developed. See **APPENDIX A CRITICAL AND COMMUNITY FACILITIES VULNERABLE ASSESSMENT** for the referenced Tables:

### Vulnerable Populations Table

- ⊙ Many vulnerable population groups have only 1 egress which can cause evacuation issues.
- ⊙ There is no accountability for the number/names of residents in buildings by the building managers - no evac plans, no tenant lists available to the Town.
- ⊙ Silva's manufactured home park on North Pembroke Rd on the Soucook River over the bridge is eroding and low-lying, a danger to residents during flood conditions. Erosion is an ongoing concern with lack of vegetation and soil which is unstable, and the issues are compounded by the vibration of heavy truck traffic over the bridge. The bridge will be replaced in future years.
- ⊙ INFO: Former Pembroke Village School building sold to new owner, Cornerstone Realty. Want 32 apartments, currently in front of PB May 2021. Students now at Pembroke Hill School.

### Economic Assets Table

- ⊙ Worst case scenario - businesses in Suncook Village within 2.2 miles are subject to anhydrous ammonia exposure from rail lines hazard in Bow across Merrimack River (Granite Shore Power). No time to evacuate Suncook Village and surrounding from a vapor cloud based on the School Dist evacuation plan, which suggests 150 kids shelter in place instead of evacuation.
- ⊙ People sign up for Nixle on a voluntary basis [Code Red is used for amber alerts in NH.]
- ⊙ Public health crises have been devastating to businesses during the COVID-19 pandemic. Future public health crises may surpass or equal the economic struggle. Both unemployment and business disruption have been problems for residents and the Town.



- ⊙ Associated Grocers (AG) on Cooperative Way has on site anhydrous ammonia (pipeline on roof), truck in trailers idle and offload. Large tanks (anhydrous ammonia 650 gallons) are in their cooling rooms. AG also has a diesel fueling station. There is only one means of egress/access if there is need to evacuate. AG/Cooperative Way evacuation of the area is similar to the Suncook Village issue.
- ⊙ Directly situated next to AG is NG Advantage (NG) on Cooperative Way. A significant hazardous materials incident could occur if one of the facilities had a leak, with potential causation for the other site to be damaged for a secondary hazard. Cooperative Way area is low-lying, so the released gas cloud would stay low around Cooperative Way and the Merrimack River.
- ⊙ Over Cooperative Way is the Concord Airport flight path with low flying planes and helicopters. A crash impacting AG or NG could have a significant explosive, with the gas cloud emerging from the low-lying area.
- ⊙ There have been individuals attempting to exercise rights of liberty and protests on the Edward Cross Grounds, but this is not a public site for this purpose. In the future, there may be an active threat situation at this location. [NH State Police was stationed at the gate May 2021 to help protect the ballot recounts onsite.] The location may be used again for similar purposes. ECG has a security company for overnight. No active MP onsite, but facility is for National Guard Reserve MP. Equipment (armory) and administration.
- ⊙ Half of Pembroke is in the path of Concord Airport's landing path (US 3, between Pembroke & Bow). Lot of activity during political activities and race events. JBI come in from all angles with their helipads. A potential exists, but how to solve or mitigate is unknown.
- ⊙ INFO: COVID was a test for how local and state decisions were made. The Town was pleased with its experience, its approach to COVID was sound.
- ⊙ INFO: Annually, Pembroke POLICE DEPT signs agreement to supply assistance within 7 minutes if called when there is an issue. State Police take longer to respond. Police Dept monitors and patrols. Handled like any other business in town.
- ⊙ INFO: Fire Dept had pre-plan tour of facility, with knox box. Learned of alarm proximity, when law enforcement will arrive.

#### Hazardous Materials Table

- ⊙ Severe traffic impact on I-393 and US 4/9 if the Superior Energy (formerly Rymes) facility on Soucook Lane and corner of Horse Corner Rd suffers any leakage. May have a E/W highway alternative to review. Needs Chichester, Pembroke, Epsom and Concord to determine detour, and State Police.

- ⊙ There is a decision making problem with how to handle haz mat fire at any facility- let facility burn to consume contaminants or extinguish? Competing reasons for both options. Fire Dept makes decisions. Type of incident determines response. Central NH Haz Mat Team consulted on best way to handle incident. Initial determination made to contain or prevent spread, determine risk. Old Rymes tanks/AG tanks– contact Team who has experts on chemicals, can monitor them remotely. Fire Dept has access to NG Advantage cameras (6) to enable pre-staging. AG can provide Fire Dept with access to their camera system upon request, also has 1 AG portable radio to communicate with facility. AG has high pressure yard hydrants onsite, has redundant and changing safety systems. Fire Dept members need to be able to keep up with equipment and technology – training is regular with AG, about (50%) of Fire Dept members participated. Have management team, safety team, sprinkler systems, more.
- ⊙ Many other businesses in town cause more concern. Change occupancies, chemicals, locations without communication with Fire Dept. Places without sprinkler & alarm systems are concerning. (recently found auto repair in basement of house). Small businesses have unknown haz mat. PB communication system works – TRC has department involvement for new development. Most illegals are reported to BI/PB. Chemicals and safety data sheets reported with PB applications. Sprinkler and alarm systems (yes/no) reported with PB. Existing businesses grandfathered from life safety and fire safety, awareness of these locations (like childcare).
- ⊙ JBI Helicopter facility has 10,000 gallon underground tank of aviation fuel. The issue is potential aquifer contamination. Fire Dept met in 2021, upcoming training to deal with helicopter emergencies. JBI meets all minimum + FAA requirements, Fire Dept has been given access to activate landing lights.
- ⊙ NG Advantage (NG) has mercaptan (additive to gas that creates the odor) on site in 50 gallon aboveground tank. In addition, the Fire Department has responded to 45 calls for service in earlier years (mostly for leaks due to faulty gas lines or equipment) at this facility since 2016. Fire Dept held meetings with NG, who implemented to prevent some of the calls. Truck hauler vendor was changed, has trained staff who remains, decreased the number calls. Interagency communication is current and very useful.
- ⊙ INFO: Nortrax has a 500- gallon diesel aboveground fuel storage tank.
- ⊙ INFO: Public Works Dept removed these barrels several years ago. (From 5 years ago: Investigate hazardous waste barrels on 6th Range Road - Fire Dept & NHDES investigation of substance & who. Potential contamination of aquifers. If on a conservation or public land, uses may be conflicting.)
- ⊙ INFO: Energy Improvements has a storage tank on Clough Mill Road, a 500- gallon gasoline or diesel aboveground tank.

Cemeteries & Churches Table

- ⦿ There are no true costs as to what the total financial impact would be on the cemeteries for their monuments if damaged by vandalism or heavy winds (tree fall). Some stones have been repaired over the last five years by tree fall at Pembroke Street Cemetery and others. Public Works Dept performs cemetery annually walk throughs to identify and remove trees/limbs. Cemetery Commission monitors the condition of cemeteries.
- ⦿ INFO: Churches do not pay taxes but are taking up the room of commercial properties in the commercial zone.

Historic Sites & Buildings Table

- ⦿ Unoccupied properties are more vulnerable to fire, vandalism and other damage such as Pembroke Water Works (newly a private property), Old Buck St School House and the Whittemore Homestead.
- ⦿ Tried unsuccessfully to get unsafe structures on 2020 Town Meeting ballot. PB considered the provision but was not comfortable with required timeline for property owners. Can revisit and modify the language as suitable.
- ⦿ INFO: Town Grange was evaluated under an impact analysis to determine its potential use. The building is leaking with roof issues and collapsing. Owned by the School District because the building at one time had also been a school. Historical Society was looking to purchase. School was to hire engineer for evaluation to determine its historical monument status and condition.

Recreation & Gathering Sites Table

- ⦿ Natural weather disasters, limited security and limited access at Town recreational facilities and conservation easements.
- ⦿ Illegal camping and homeless groups camp along rivers and streams, without owner permission. Along Merrimack River on First Range Road, and Soucook River on US 3 all along. Landowners are not aware, but if they are made aware of camping, will ask to have them removed for liability and fire. About 50-100 transient (independent or drug-dependent) population, higher number in summer. 2-3 small communities found near Concord. Winter population <5 because of cold and shelters in Concord. Homeless families will accept assistance. City and Pembroke push them back and forth. Resources are limited to assist them groups are aware of resources but prefer to handle the situation on their own and be independent. Police Dept reiterate what to do and where to go, bring to shelters when necessary – educate, give them resources, tried court, send to shelters,

feed them, call numbers- but are unresponsive and upset. Also trying to protect landowners from trespass. Nothing more to try.

- ⊙ White Sands Beach security is a problem. The road is gated and barred from vehicular use, so is unmonitored and unmaintained. The Town beach is so far away from US 3, trees are in danger of falling into the river, no lifeguard on site, no regulating the use of the beach. The Town monitors and maintains the parking lot on White Sands Road, Pembroke resident free permit required (offering service may increase liability). Any signage posted disappears (is stolen) very quickly. Boats dock from the Merrimack River on the bank from anywhere, no enforcement between White Sands and Memorial Field. Because PSNH is gated, both users of the beach and town emergency services would have to walk (Police Dept has no key, but Fire Dept does). The beach itself has glass on the sand, is experiencing erosion, and a large pine tree will be falling into river soon. The Police Dept's/TT's/Fire Dept's response time to the beach, once notified, may not be quick enough to save an individual. Access road not adequate for emergency vehicles. Not just Pembroke residents use, but people from out of town.
- ⊙ Eversource placed gates to prevent erosion. People had been parking at the beach itself instead of at the parking lot. Erosion is occurring at the beach, so crash gates installed 6-8 years ago. Unsure why Eversource/PSNH has gates on this town road. Keystone bridge/culvert and stream contribute to the erosion to the poles. Easement given to PSNH for the bridge and poles. Road is still not safe. Emergency services may be unable to drive down the road. Gates went up prior to 2007.
- ⊙ For water rescue, Fire Dept must put in their rescue boat in Allenstown at the Ferry Street boat ramp to the Merrimack River. The boat must travel upstream about 2.5 miles to the White Sands swimming area. There is no easy access for emergency services, and there will be a significant delay in response.
- ⊙ First Range Road conservation lands (from Memorial Field to White Sands) were having issues with OHRVs eroding the road on the PSNH (same as beach) and Sewer Easement and the road itself. Conflict of uses, used by walkers.
- ⊙ Town undertaking discussions currently about OHRVs (CC, Police Dept, Board of Selectmen) on OHRVs. Plan is to prohibit from Dec 15 to May 31 on all Town roads (mud season). No other restrictions.
- ⊙ INFO: CNHRPC provided some resources related to homeless residences in public places to the Police Dept. Resources contained studies of other communities and similar conclusions that homelessness is a complex social issue requiring a large support network active working to get people back on their feet.

Future Development Table

- ⊙ Severe weather, sabotage, and egress/access issues are inherent with developments. PB currently does not require 2 means of access but will look at this issue in future.
- ⊙ US 3 if blocked for any reason would require a secondary detour around. One detour is to NH 106 north to North Pembroke Road to NH 28 for either east or west.
- ⊙ Public health and earth hazards issues with residential and commercial development have been experienced.
- ⊙ Town still uses 2015 version of codes, as does the state Fire Marshal. Waiting for the state to adopt the 2019 codes.
- ⊙ Town infrastructure and services may not be able to keep up with large new development or multiple development.
- ⊙ Department budgeting needs to consider the potential for future development and additional services while requesting annual funding.
- ⊙ A list of potential legacy parcels over a certain acreage should be developed and provided to the Conservation Commission for future easement or land protection consideration.
- ⊙ CC has a conservation fund (100%) from the Land Use Change Tax (LUCT). Funds have accumulated to over \$300,000 to date. CC will speak with owners and hold a site walk on the property for sale \$110,000.
- ⊙ Planning Board desires to increase the lot size in the area from two acres to 5 acres. Discussions will be forthcoming.
- ⊙ INFO: Many parcels on the range roads are for sale and are inexpensive. Developers are looking to purchase this. Much activity related to appeals with new NH Housing and Appeals Board (help alleviate appeals that would have gone to the Supreme Court), may be forced to open the range roads. Town of Pembroke is the first community to be tried in this regard. The Board of Selectman will be voting on (Upper Beacon Road – Class VI, not range road) this in August 2021. Meeting with CNHRPC staff to determine options.
- ⊙ INFO: Emergency access is a tremendous delay. Safety Center is about midway on US 3/Pembroke Street . (Example, had to travel US 3 in Bow to get to North Pembroke about 20 minutes (both Pembroke St and North Pembroke Road were closed because of trees down). Sewer Dept drove NH 28 to US 4/9 to get back to NH 106 as another example during that same storm.

Many of these problem statements were developed into Actions discussed later in **7 PRIOR ACTION STATUS** and **8 MITIGATION ACTION PLAN**.

## Potential Losses from Natural Disasters

Natural disasters, including floods, wind events, severe winter storms and ice storms, secondary disasters as a result of the natural disasters (such as power loss) and to a lesser degree, human and technological hazards as documented in **4 HAZARD RISK ASSESSMENT** have occurred in Pembroke. This section estimates Town-wide structure/building damage in Town from natural hazard events. It is difficult to ascertain the amount of damage caused by a hazard because the damage will depend on the hazard's location and magnitude, making each hazard event somewhat unique. Human and technological hazards are typically even more incalculable. Human loss of life was not included in the potential loss estimates for natural hazards, but could be expected to occur, depending on the severity of the hazard.

While this Plan focuses on being pro-active in those geographic areas of Pembroke most prone to recurring hazards (like flooding), some initial estimates of measurable property damage and building damage have been discussed by utilizing simple techniques such as the numbers of structures and assessed valuation. This two-dimensional approach of calculating dollar losses from tangible structures offers a basic yet insightful tool to begin further loss estimation analyses.

### TOOLS FOR COMMUNITIES WITH GIS

For gauging more three-dimensional estimation of damages, FEMA has developed a software program entitled HAZUS-MH (for multi-hazard), which is a powerful risk assessment software program for analyzing potential losses from floods, hurricane winds and earthquakes. In HAZUS-MH, current scientific and engineering knowledge is coupled with the latest Geographic Information Systems (GIS) technology to produce estimates of hazard related damage before, or after, a disaster occurs. Developed for ARCGIS which produced the *Maps* for this Plan, HAZUS-MH takes into account various effects of a hazard event such as:

- Physical damage: damage to residential and commercial buildings, schools, critical facilities, and infrastructure;
- Economic loss: lost jobs, business interruptions, repair and reconstruction costs; and
- Social impacts: impacts to people, including requirements for shelters and medical aid.

Federal, State and local government agencies and the private sector can order HAZUS-MH free-of-charge from the FEMA Distribution Center. Pembroke should first ascertain whether a municipal geographic information system (GIS) of hardware and software is appropriate, and if so, consider training staff to perform models. With many Town existing and under-development infrastructure GIS data layers available, HAZUS-MH could prove very helpful for estimating losses for the community on a disaster-specific basis. However, much staff time is necessary to train staff and maintain a GIS system. Official map generation is typically subcontracted out to other agencies now, including the mapping and appraisal companies used by the Town and the Central NH Regional Planning Commission who developed the *Maps* for this **Hazard Mitigation Plan**.

## METHODS OF POTENTIAL DOLLAR LOSSES BY NATURAL HAZARDS

A more manageable technique was used for loss estimation for the purposes of this **Hazard Mitigation Plan Update**. Natural hazard losses are calculated based on dollar damage ranges over the entire community, or in the case of flooding, buildings in the Special Flood Hazard Areas (SFHAs) are counted and their value is collected. The number of total parcels in the community as of **March 2021** is **3,014**. Using Pembroke's MS-1 **2020** valuation data, **the total assessed value of all residential and non-residential structures ONLY in Pembroke (\$519,007,100)** is the basis for loss estimation calculations. *Land and utilities are not included here.*

### Potential Building Dollar Losses by SFHA Flooding

Using geographic information system (GIS) technology, parcels with buildings within the floodplain were identified using Pembroke's online digital tax maps developed by AxisGIS in **March 2021** that contained assessing data, and geospatially overlaid this data with the **2010** FEMA Digital Flood Insurance Rate Maps (DFIRMs) digital map. An intersection operation identified all the parcels with buildings in the SFHAs, although this evaluation does not determine whether the building itself is situated within floodplain boundaries. **Building Type** was characterized into one of four categories, single-family homes, multi-family homes, manufactured homes, and non-residential buildings. Building number and value were excerpted from the assessing database. **Table 31** summarizes this data, identifying **56** primary buildings by address in the SFHA. *Land value, building contents value and infrastructure were not considered in these calculations.* Pembroke parcels and assessing data can be found at [www.axisgis.com/PembrokeNH](http://www.axisgis.com/PembrokeNH).

**Table 31**  
**Building Value in the Special Flood Hazard Areas (SFHAs)**

Building Type	Number of Buildings	Total Value of Buildings in SFHA	Average Replacement Value
Single Family Homes	34	\$4,353,100	\$128,032
Multi-family Homes	13	\$2,926,000	\$225,077
Manufactured Homes	2	\$308,000	\$154,000
Non-Residential Buildings	7	\$845,200	\$120,743
<b>Totals</b>	<b>56</b>	<b>\$8,432,300</b>	-----

Sources: AxisGIS Town Assessing, Jun 2021, [www.axisgis.com/PembrokeNH](http://www.axisgis.com/PembrokeNH)

In **Table 31**, digital analysis and human interpretation identified **34** single family residential homes, **13** multi-family homes, **2** manufactured homes, and **7** non-residential buildings are situated within the Special Flood Hazard Areas (SFHAs). As the Town's total number of **2021** housing units is estimated at **2,925**, about **1.7%** of Pembroke's residences seem to be located in a floodplain area. The average replacement value is **\$128k** for a single-family home or **\$225k** for a multi-family home, **\$154k** for a manufactured home, or **\$121k** for a non-residential building in the SFHA. The total value of all buildings in the Special Flood Hazard Areas from this analysis is about **\$8.4m**.



There are alternative ways to calculate potential SFHA losses. In the following tables, the average building replacement value was calculated by adding the assessed values of all structures in the special flood hazard areas and dividing by the number of structures. The Federal Emergency Management Agency (FEMA) has developed a process to calculate potential loss for structures during flooding. The potential loss was calculated by multiplying the average replacement value by the percent of damage expected from the hazard event, and then by multiplying that figure by the number of structures.

*The costs for repairing or replacing infrastructure such as bridges, railroads, power lines, roads, drainage systems, telephone lines, or natural gas pipelines, land destruction, and the contents of structures are not included in these building damage estimates.*

**Table 32** represents the **worst case scenario of all** single-family homes, multi-family homes, manufactured homes, and non-residential buildings within the Special Flood Hazard Area that are damaged by a flood hazard event.

**Table 32**

**Dollar Damage Ranges for Total Buildings in Special Flood Hazard Areas (SFHA)**

Building Type	Total Value of Buildings in SFHA	Total Value of Potential Damages in SFHAs by Respective Building Type		
		Eight-Foot Flood 49% Damage	Four-Foot Flood 28% Damage	Two-Foot Flood 20% Damage
Single Family Homes	\$4,353,100	\$2,133,019	\$1,218,868	\$870,620
Multi-Family Homes	\$2,926,000	\$1,433,740	\$819,280	\$585,200
Manufactured Homes	\$308,000	\$150,920	\$86,240	\$61,600
Non-Residential Buildings	\$845,200	\$414,148	\$236,656	\$169,040

Sources: See **Table 31**; FEMA

If **all 34** single family homes were damaged by a **Two-Foot Flood (20% Damage)**, the dollar damage to the buildings could be **\$871k** while an **Eight-Foot Flood (49% Damage)** could cause **\$2.1m** in building damage. If all **13** multi-family homes identified in the SFHA were damaged by a **Two-Foot Flood (20% Damage)**, the damage could be **\$585k** for buildings only, while an **Eight-Foot Flood** could cause **\$1.4m** in building damage. If **all 7** nonresidential buildings in the SFHA were damaged by a **Two-Foot Flood**, the dollar damage to the buildings only could be **\$169k**, while an **Eight-Foot Flood** could cause **\$414k** in building damage. Dollar damage estimations vary according to the standard percentages of damage levels associated with flooding levels set by FEMA.

**Table 33** also represents the **worst case scenario**, but of **individual** single-family homes, multi-family homes, manufactured houses, and non-residential buildings within the Special Flood Hazard Area that are damaged by a flood hazard event.

**Table 33**

**Dollar Damage Ranges for Individual Buildings in Special Flood Hazard Areas (SFHA)**

Building Type	Average Value of Individual Buildings in SFHA	Individual Value of Potential Damages in SFHAs by Respective Building Type		
		Eight-Foot Flood 49% Damage	Four-Foot Flood 28% Damage	Two-Foot Flood 20% Damage
Single Family Homes	\$128,032	\$62,736	\$35,849	\$25,606
Multi-Family Homes	\$225,077	\$110,288	\$63,022	\$45,015
Manufactured Homes	\$154,000	\$75,460	\$43,120	\$30,800
Non-Residential Buildings	\$120,743	\$59,164	\$33,808	\$24,149

Sources: See **Table 31**; FEMA

One (1) single family home averages **\$26k** when damaged by a **Two-Foot Flood** while an **Eight-Foot Flood** could cause **\$63k** in *building* damages only. One (1) multi-family home compares at **\$45k** for a **Two-Foot Flood** in *building* damages only and at **\$110k** for an **Eight-Foot Flood**. One (1) manufactured home compares at **\$31k** for a **Two-Foot Flood** in *building* damages only and at **\$75k** for an **Eight-Foot Flood**. One (1) non-residential building in the SFHA is could have **\$24k** in *building* damages for a **Two-Foot Flood**, while experiencing **\$59k** in *building* only damages for an **Eight-Foot Flood**.

Although not an accurate assessment, these dollar damage ranges for **Inland Flooding** in the designated floodplains (SFHAs) provide a general sense of the scale of potential disaster and financial need in the community during flooding events.

**Potential Building Dollar Losses by Other Natural Hazards**

Flooding is often associated with heavy rains and flash floods, hurricanes, ice jams, rapid snow melting in the spring, and culvert washouts. These are all types of flooding hazards discussed or evaluated previously but can also occur outside of the SFHAs.

Building damage by natural disasters in New Hampshire is not limited to SFHA flooding alone, which is easier to quantify and predict. Simple calculations can be made based upon generalizations of a disaster impacting a certain percentage of the number of buildings in the Town. The **MS-1 2020** assessed value of **all residential, commercial, and industrial structures in Pembroke is \$519,007,100 (no land) on 3,014 parcels**. Disaster damages are often illustrated in the following section utilizing a percentage range of town-wide building damage. At **2,925** housing units in Pembroke counted in the preliminary **2020 US Census**, any type of disaster impacting **10%** of Pembroke housing units would yield **293** damaged homes.

The inventory of Town sites or buildings in **APPENDIX A Critical and Community Facilities**

**Vulnerability Assessment** indicates which hazards each site is most susceptible to and provides its assessed valuation. This dollar value can be used as a damage estimate from the natural hazard events listed below. Yet the potential losses discussed in this section involve all buildings across the community to provide a more distinct portrait of potential losses using the assessed valuation of all town buildings. Damages from natural hazards to anything other than buildings, such as infrastructure, land, humans or building contents, are not examined here. Specific individual studies would be needed to assess more detailed scenarios. Following are potential building-only dollar damages from select natural hazards.

### **Drought**

**Drought** is often declared on state-wide or region-wide basis, and sometimes by individual town. Dollar damage caused by drought would be difficult to quantify but would most likely impact the agricultural and economic base of a community. Although everyone could be charged to conserve water, agriculture and forestry operations would be most affected and the risk of wildfire increases.

As physical damage is usually isolated to specific locations, the effects of potential disasters at certain facilities could be researched utilizing the Town's assessor's database for valuation on targeted land. Agricultural and forested lands may be among the most affected by drought. Many farm operations have been inventoried in Pembroke. People who rely on private well water have found their dug wells running dry in **2015-2016** and again in **2018** and **2020** and have needed to dig bedrock wells. Agricultural operations run the risk of high damage from **drought** which also brings economic consequences. In Pembroke, these areas include maple tree crops, livestock, produce, orchards, tree farms and hay fields. Conservation land forests in Town are also susceptible to loss and fire during **drought** conditions.

These lands could be vulnerable to **droughts** and physically and may become economically damaged by these long-term droughts. A dollar estimate is incalculable.

### **Earthquake or Landslide**

**Earthquakes** can cause buildings and bridges to collapse, disrupt water supplies, electricity and phone lines and are often associated with **landslides** and **flash floods**. Buildings that are not built to a high seismic design level or are large in size could be susceptible to structural damage. Large facilities or historic buildings including the Town Hall and Congregational Church, or the Clock Tower, the manufactured housing parks, and the densely populated locations are particularly at risk because of building sizes, building age, and/or their large numbers of people contained within. US 3/Pembroke Street travels over several bridges including the Soucook River and Suncook River and serve as local highways for a great number of people.

Loss of infrastructure or other community buildings or highways could result in fewer services available to residents or reduce the ability to evacuate. Buildings which are located on or near the sides of river and stream banks or that are located on a hill over **15%** could be subject to **landslide** triggered by rains or

**erosion.** The Central NH Region area of Boscawen, Canterbury, Webster, Hopkinton (Contoocook), Henniker, Hillsborough, Salisbury, and Warner (Davisville) hosts frequent epicenters of deep earthquakes.

With a scenario range of **0.5%** to **1%** of buildings damaged throughout the Town, an **earthquake** or **landslide** could potentially cause up to **\$2.0m** to **\$5.2m** in building-only damage costs, not including contents, infrastructure, or land.

### **Extreme Temperatures**

**Excessive heat** and **extreme cold** can harm property, such as landscaping and agriculture, or infrastructure. People will draw more water from their wells to help alleviate these conditions. Extreme heat can sicken people, causing sunstroke, heat exhaustion and dehydration if the environment is not cool enough or water intake is too low. Conversely, extreme cold can cause hypothermic conditions. In this manner, neither extreme heat nor cold is measurable for dollar damage. Pembroke has many vulnerable populations, including public, private, and charter Schools, multi-family neighborhoods, manufactured housing parks, remote neighborhoods on cul-de-sacs, and more. The local Allenstown Senior Center is open to residents, and there are a few independent living communities for 55+ and older. A detailed inventory of **Vulnerable Populations** can be undertaken by the Town and regularly updated which can be used by emergency responders to ensure susceptible people remain healthy. Dollar damage estimates are not feasible for **extreme temperature** hazards.

### **High Wind Events or Tropical and Post-Tropical Events**

The high wind event storms include the **wind events**, **flooding** and **lightning**, but can also just be simply severe winds, downbursts, tornadoes, or hurricanes. When summer **rainstorms** or **thunderstorms** occur, they are often regional in nature, but could just as commonly be localized in some areas, easily identifiable when one section of a roadway is dry and another section of the same road is wet. Sometimes **hail** accompanies these storms. **Thunderstorms** and **rainstorms** are more likely to damage trees, powerlines or crops than buildings, which are more readily damaged by downbursts, tornadoes and hurricanes. These storms typically cover most of, if not the entire, Town, as **winds** and **storms** are large enough and blow through to impact multiple New Hampshire counties. High wind events could be particularly fierce in areas along the Merrimack River bluff, in Suncook Village, and at higher elevations. The Town typically clears trees from the same roads each storm (wind, snow, ice, etc).

With a scenario range of **1%** to **5%** of buildings damaged by wind events throughout the Town, a wind event could potentially cause up to **\$5.2m** (for more localized **downburst**, **high winds** and **hail**, or **tornadoes**) to **\$26.0m** (for more damaging and widespread **tropical storms and hurricanes**) in building-only damage costs, not including contents, infrastructure, or land.

### **Lightning**

Damage caused by **lightning** would not be Town-wide because it typically strikes in smaller areas. Few places in Pembroke are at specific risk but lightning strikes can cause fires. Damages will vary according to the value of the structure and home and the contents inside, and dollar amounts would depend on if the hazard hit an area with a high density of buildings. Specific sites which would cause the greatest impact if struck by **lightning** include conflagrations in the Suncook Village area, high density multi-family neighborhoods around the wildland urban fire interface areas, manufactured housing parks, cul-de-sac neighborhoods; high elevations; densely populated buildings including the Schools; historic buildings like the Town Hall and Congregational Church, private homes; and Cooperative Way businesses. Town Facilities like the Public Works Garage, Town Hall & Safety Center, Library, Transfer Station are necessary for governmental function and provision of basic services.

The Town's utilities, including powerlines, high tension powerlines, telecommunications tower, switching stations, telephone lines and broadband cable internet service, gas lines, water and wastewater facilities and their software control systems, as well as the municipal and School computer systems, are vulnerable to **lightning strike**. Tall buildings could be vulnerable without lightning rods.

With a scenario of **0.5%** of buildings damaged throughout the Town, a **lightning strike** could potentially cause up to **\$2.6m** in building-only damage costs alone, not including contents, infrastructure, land, or additional damage through fire spreading.

#### **Public Health**

Dollar damage estimates are not feasible for public health hazards, with such a variety of potential issues, locations, and populations.

#### **River Hazards**

**Ice jams** on the **Suncook River**, **Soucook River**, **Merrimack River** or one of the brooks would be a major cause of **flooding** which could recur in the future. Woody material causing **debris impacted infrastructure** may be more likely to impact bridges than ice jams, especially any the structurally deficient State or Town bridges. Several bridges or roads span across the rivers, named brooks and many unnamed brooks. Small brooks culverts and drainage systems offer additional opportunity for ice jams, debris blockage, and more. The **2023-2032 NH Department of Transportation Ten Year Plan (TYP)** provides many examples of basic cost estimates bridge replacement and rehabilitation.

This average figure of **\$750,000** can be used for one (1) local bridge *replacement* in Pembroke due to the physical damage caused by **river ice jams** or **debris impacted infrastructure**. The same bridge damaged by **ice** or **debris** which only requires *rehabilitation* could cost **\$500,000**.

Another way to view potential **river hazard** damages is if half (17) of the 34 single family homes in the floodplain were damaged by **Two-Foot Flooding (20% Damage)** resulting from **river ice jams** or **debris impacted infrastructure**, there could be up to **\$2.2m** in *building* damage costs.

### **Winter Weather**

Heavy **snow loads**, **icy conditions**, **extreme cold**, **wind chill**, and the secondary hazards (including **power failure**, **transportation accidents** and **debris impacted infrastructure**) are result of **winter storms**. Storms with these conditions have been felt in Pembroke in the past. These hazards and secondary impacts are a risk to the community, including isolation, more falls and personal injury (especially by the older residents), and the potential for roof collapse. The most remote locations in Pembroke, wooded and forested sections vulnerable to tree fall, include the entire Town. Damage caused by this type of hazard varies according to wind velocity, snow accumulation, tree/limb fall and duration.

With a scenario range of **1% to 5%** of buildings damaged throughout the Town, **severe winter storms** could potentially cause up to **\$5.2m** to **\$26.0m** in building-only damage costs.

### **Solar Storms and Space Weather**

Dollar damages to structures are not measurable from solar winds, radio blackout, or geomagnetic storms. These hazards impact utilities such as communication systems, electric grids, and technology. The Town, School, Water Works, Wastewater and repeater state and county technology are vulnerable to **solar storms**, such as computer systems, emergency response dispatch systems, electricity, internet, satellite dishes, and software programming interruption that upkeeps essential functions. Although a potential natural hazard, dollar damage estimates are not feasible for solar storms and space weather.

### **Wildfire**

The risk of **wildfire** is difficult to predict based on location. Forest fires are more likely to occur during years of **drought**. In addition, areas and structures that are surrounded by dry vegetation that has not been suitably cleared are at high risk. Humans can contribute by accidents in the woods or dry fields, or by the deliberate setting of **fire** in a structure. The heavily forested woodlands of Town are often remote locations and difficult to access by emergency vehicles. Subdivisions in remote hilltop locations and on private, cul-de-sac or non-Town maintained roads are especially vulnerable.

The public access conservation lands and their trails offer wonderful recreational opportunities for residents and visitors. Forests and woodlands are particularly vulnerable to **wildfire** because accidental human-caused fires could occur. Remote fires might not be reported until they become large enough to be spotted. Dollar damage would depend on the extent of the fire, the number and type of buildings burned, and the amount of contents destroyed within the buildings.

With a scenario of **1.0%** of buildings damaged in the Town, a **wildfire** could potentially cause up to **\$5.2m** in *building-only* damage costs, not including contents, infrastructure, or land.



## National Flood Insurance Program (NFIP)

In 1968, Congress created the National Flood Insurance Program (NFIP) to help provide a means for property owners to financially protect themselves. The NFIP offers flood insurance to homeowners, renters, and business owners if their community participates in the NFIP. Participating communities such as Pembroke agree to adopt and enforce ordinances that meet or exceed FEMA requirements to reduce the risk of flooding. For more information on the National Flood Insurance Program, visit <https://www.floodsmart.gov/why/why-buy-flood-insurance>.

The initial identification of Pembroke's Flood Hazard Boundary Maps was produced on **May 3, 1974**, and later the first Flood Insurance Rate Maps (FIRM) were developed on **April 2, 1979** and included the Special Flood Hazard Areas (SFHAs). The Town entered the regular phase of NFIP membership on **this date**. Pembroke's first Flood Insurance Study (FIS) was produced in **October 1978**. No amended FIS or FIRMs were developed for the Town until over four decades later, consistent with other Central NH Region communities.

In the present day, Pembroke's effective FIRMs are digital (DFIRMs) dated **April 19, 2010** as is the Merrimack County Flood Insurance Study (FIS) which includes Pembroke (community **#330019**); individual community FIS are no longer being developed. These **2010** newest documents were adopted by the Board of Selectmen, supersede all previous NFIP documentation, and are placed into the Town Zoning Ordinance. **Table 34** summarizes the historical background of the Town's NFIP effective dates.

**Table 34**  
**NFIP History of Pembroke – Effective Dates**

Version	Flood Insurance Study (FIS)	Flood Insurance Rate Maps
Original	October 1978	April 2, 1979
Current	April 19, 2010	April 19, 2010

Source: FEMA Merrimack County Flood Insurance Study (FIS) Table 9 & Bibliography, 2010



## PEMBROKE'S NFIP STATISTICS

In **Table 35** is a cumulative history of the trends and overall totals of flood insurance policies and losses of those property owners utilizing the NFIP insurance in Town. Four snapshots in time, one from each of Pembroke's **Hazard Mitigation Plan** versions, display the number of NFIP policies in force and paid loss statistics between **December 2002 – September 2018**, the last date of accessible data.

**Table 35**  
**History of NFIP Policy and Paid Loss Statistics**

Report Date	Policies in Force	Insurance in Force	Number of Paid Losses Since 1979	Total Losses Paid Since 1979
Dec 2002	13	\$1,726,500	4	\$18,010
2009 Plan	25	\$3,967,400	28	\$862,947
Nov 2015	22	\$4,573,400	38	\$1,028,418
Sep 2018	22	\$4,110,600	39	\$1,028,418

Source: Pembroke Hazard Mitigation Plans, FEMA last accessed 09-18; Policies in Force Data no longer publicly available by Town <https://www.fema.gov/openfema-data-page/fima-nfip-redacted-policies-v1>

From **Table 35**, in **Dec 2002** prior the severe flooding event period of **2005-2008**, **13** properties in Pembroke were covered by NFIP flood insurance and **4** claims had been paid since **1979**. By the **2009 Plan** after the flooding period, the number of policies nearly doubled to **25** with **28** losses paid. By **Nov 2015**, policies had decreased again to **22** while the paid losses increased to **38**. By **Sep 2018**, the latest available data for policies, Pembroke property owners still had only **22** policies in place and by **Feb 2021** the number of paid losses (**39**) totaled over **\$1m**.

As noted, since **2009 Plan**, the number of properties (policies) covered by flood insurance fell by nearly **50%** to total only **18** policies in the community. Normally, the number of policies would fluctuate, influenced by the number of current severe flooding events, recent changes in flood insurance regulation, the higher cost of insurance, uncertainty about exact floodplain location, mortgage requirements, the changing real estate market, and assumptions that flood insurance is unnecessary if one's property is outside of the floodplain. Since there has been no recent severe flooding, fluctuation did occur in Pembroke and is remaining consistent.

**Table 35** also illustrates that while the property owners anywhere in the entire Town of Pembroke are eligible to purchase flood insurance for their property, only **22** properties out of the **3,014** total parcels in the entire community are insured against flooding. As described previously, a total of **56** parcels with homes and non-residential buildings seem to be at least partially situated in the Special Flood Hazard Areas (SFHA).

*Assuming the 22 NFIP policy properties are within the SFHA, then 39% of buildings in the floodplain are insured against flooding.*

Virtually all of Pembroke’s buildings and properties are uninsured for when the next flooding event occurs. **Inland Flooding** conditions can occur anywhere in the community due to runoff, debris impacted infrastructure (culverts), drainage overflow, rapid snowpack melt, road washouts, beaver dam breaks, heavy rains, etc. which are not limited to the floodplain (SFHAs) areas and are not covered by homeowner’s insurance or any other insurance than National Flood Insurance Program (NFIP) flood insurance. Buildings and properties are also vulnerable to **River Flooding** from the **Suncook River**, **Soucook River**, and the **Merrimack River**.

Flood hazards between **2005-2008** are described in more detail in the previous **2017 Plan** along with graphics and maps. The **Suncook River’s** and the **Soucook River’s Fluvial Geomorphology Assessment Maps** and **Fluvial Erosion Hazard Belt Maps**, and the **Suncook River’s Large Woody Debris Maps** are attached to this **2021 Plan** to remind the community of the potential risky areas during widespread inundation flooding.

## REPETITIVE LOSS PROPERTIES

A specific target group of properties is identified and serviced separately from other NFIP policies when repetitive losses occur on the same properties. The group includes every NFIP-insured property that, since **1979** and regardless of any change(s) of ownership during that period, has experienced four or more paid flood losses of more than \$5,000 each or two or more separate claim payments (building payments only) where the total of the exceeds the current value of the property. Two of the claim payments must have occurred within 10 years of each other. The loss history includes all flood claims paid on an insured property, regardless of any changes of ownership, since the building's construction or back to **1979**.

As of **April 2018**, Pembroke had a total of **2** remaining repetitive loss properties according to records kept by the Federal Emergency Management Agency and supplied by the NH Office of Planning and Development (NH OPD). After the **2005-2008** floods, the Town had voluntarily acquired **6** of these repetitive loss properties. **Table 36** displays the general repetitive loss data:

**Table 36**

### Number of Repetitive Loss Properties

Building Type	Number of Repetitive Loss Properties as of 12-12	Number of Buildings Acquired by Town	Remaining Repetitive Loss Buildings
Single Family	7	6	1
Multi-Family	1	0	1
Non-Residential	0	0	0
<b>Total Properties</b>	<b>8</b>	<b>6</b>	<b>2</b>

Source: NH Office of Planning and Development (NH OPD) on behalf of FEMA, April 2018

These RPL data records are confidential for the property-specific information they contain. Repetitive losses are determined by any repetitive damage claims on those properties that hold flood insurance through the NFIP. Should repetitive losses occur, the Town could consider participating in voluntary property acquisition (“buyouts”) which would eliminate the threat to several homes by incorporating newly vacant land into the Town’s flood storage capacity.

## **FLOODPLAIN ORDINANCE**

A major objective for floodplain management is to continue participation in the National Flood Insurance Program. Communities that agree to manage Special Flood Hazard Areas shown on NFIP maps participate in the NFIP by adopting minimum standards. The minimum requirements are the adoption of the Floodplain Ordinance and Subdivision Regulation / Site Plan Review requirements for land designated as Special Flood Hazard Areas (SFHAs). Flood insurance is available to any property owner located in a community participating in the NFIP.

### **Community Assistance Visits in Pembroke**

A Community Assistance Visit (CAV) is a process required by the National Flood Insurance Program (NFIP) as a way of reviewing a town’s compliance with established floodplain regulations to be sure that they meet NFIP requirements. If the Town is not in compliance with regulations in any way, the officials that conduct the CAV provide assistance and guidance to assist with correcting any violations.

Since the NH Office of Planning and Development (NH OPD) identified Pembroke as a repetitive loss community, which is based upon **Table 36** data, Pembroke is classified as a Tier 1 community. For a Tier 1 community that has experienced repetitive losses, a new CAV will be undertaken every five years or if there is a severe flooding event. For towns without any repetitive losses, they are classified as Tier 2 where a telephone call may be made to the Town every 5-10 years or otherwise as needed when so classified.

A Community Assistance Visit (CAV) was conducted for review and education on NFIP policies in **2008** when NH Office of Planning and Development (NHOPD) staff identified a number of necessary ordinance changes which were approved into the zoning ordinance at Town Meeting. The last CAV in Pembroke was conducted in **2012** by NHOPD staff; no changes to procedures or to the Floodplain Ordinance were necessary. Although the Town seems to be currently in compliance with the NFIP, another CAV could be scheduled at any time or when the next severe flood event occurs in Pembroke.

Any minor problems with the floodplain management regulations or process was rectified. When the next severe flood occurs, a CAV should be made by NH OPD to request a review of zoning compliance procedures and the contents of the Floodplain Development Ordinance, Subdivision Regulations and Site Plan Review Regulations.

### Floodplain Development District Ordinance

The Town of Pembroke has a Floodplain Ordinance that currently contains the required FEMA regulations to remain eligible for the NFIP. The Town of Pembroke approved their first Floodplain Ordinance at Town Meeting in **March 1979** prior to becoming a NFIP member on **April 2, 1979**. The Zoning Ordinance does not indicate all revision dates and the origin date within the Floodplain Development District.

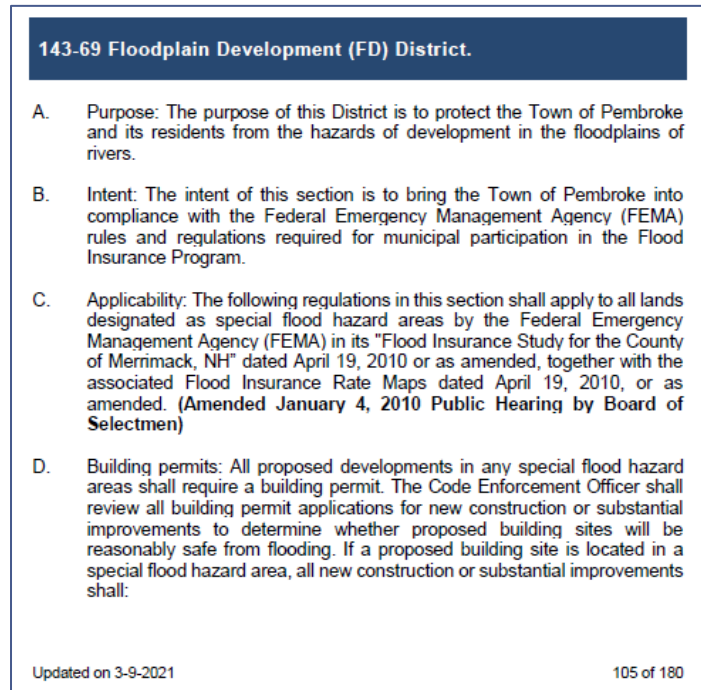
In **March 2008**, Pembroke updated the Floodplain Development District Ordinance to comply with a round of changes to the NFIP program.

Revisions are noted in **January 2010** to adopt the new 2010 Flood Insurance Study and DFIRMS. This is when the the Board of Selectmen adopted the new **April 19, 2010** Flood Insurance Rate Maps (FIRMS) and Merrimack County Flood Insurance Study (FIS).

The **2021** Pembroke Floodplain Development Zoning Ordinance contains the elements requested to date by FEMA and the NH Office of Planning and Development's Floodplain Management Program. A Floodplain Develop Overlay District map is available at the Town's Community Development and Planning Office. An excerpt of the Floodplain Ordinance is displayed in **Figure 27**.

Figure 27

#### Latest National Floodplain Development Zoning Ordinance



Source: Section of Pembroke Zoning Ordinance March 2021

### NFIP Familiarity in Pembroke

According to NFIP policies, when an applicant files a request for a building permit in the floodplain, the applicant must include an elevation certificate in order to be in compliance. In addition, if an applicant intends to fill onsite, a letter of map of revision must be submitted along with the application. According to NFIP requirements in the Floodplain Ordinance, building permits should be reviewed to assure sites are reasonably safe from flooding and require anchoring to prevent flotation, collapse, or lateral movement and construction out of flood resistant materials.

Ongoing attention and familiarity with the NFIP will keep Town staff and volunteers in top form. In order to reduce flood risks, the Building Inspector, Town Assessor, Town Administrator, Town Planner, volunteer Planning Board members, and other Town staff whose duties include review/inspection of development or construction, should be familiar with the Floodplain Ordinance and the NFIP.

Because of their unique position to ensure development conforms with ordinances prior to approval, the Planning Board should be familiar with NFIP policies, especially those regulations that are required to be incorporated into the Subdivision and Site Plan Review regulations. A workshop sponsored by the NH Homeland Security and Emergency Management (NHHSEM) or the NH Office of Planning and Development (NH OPD) would be appropriate to educate current staff and volunteers. New online courses by FEMA for floodplain management, mapping, elevation certificates and more are available at no charge. For online training taken at the convenience of the individual, see the [\*FEMA Emergency Management Institute's\*](#) current training course index for flooding:  
<https://training.fema.gov/is/searchis.aspx?search=NFIP>.

An essential step in mitigating flood damage is Town and property owner participation in the NFIP. Pembroke should work to consistently enforce NFIP compliant policies to continue its participation in this program. Town staff field property owners asking for assistance because their mortgage lenders are requiring proof that the properties in question are not located in a Special Flood Hazard Area to determine whether NFIP flood insurance is required. The only way to rectify this issue is to have a survey completed of the property to complete a Certificate of Elevation to keep on file at the Town Office. If the property is shown to be located out of the floodplain, a Letter of Map Amendment should be completed by the owner or by the Town to ensure future flood maps are corrected.

When possible, Town staff should try to promote flood insurance to property owners in Town; only **22** properties out of the **3,014** parcels in Pembroke are protected by flood insurance and currently take advantage of the NFIP insurance opportunity. Informational links for the public on flood topics could be located on the Town's website at <https://www.pembroke-nh.com/>.

## 6 CAPABILITY ASSESSMENT

Local mitigation capabilities are existing authorities, plans, ordinances, policies, mutual aid, programs, staffing, technical skills and assets, funding, outreach, public education, and resources that reduce hazard impacts or that could be used to help implement hazard mitigation activities. These capabilities were inventoried for the **Pembroke Hazard Mitigation Plan Update 2022**.

The **Capability Assessment** contains an inventory of locally-important existing mitigation support activities, or capabilities, which have a positive impact on the way hazard events are handled within the community. Most capabilities are not hazard mitigation Actions but support the Action Plan and help decrease the community's hazard risk. These community-strengthening capabilities are not STAPLEE-rated (Social Technical Administrative Political Legal Environmental and Economics questions) like the Actions, but instead the capabilities serve to sustain and assist the community to maintain and accomplish its hazard mitigation Actions and priorities. Selected **Future Improvements** (mitigation-oriented) to some of these capabilities have the potential to be considered as Actions in **7 POTENTIAL ACTION EVALUATION** and **8 MITIGATION ACTION PLAN**.

CAPABILITY ASSESSMENT TABLES	
<b>Planning &amp; Regulatory</b>	<ul style="list-style-type: none"> <li>Plans and Planning Documents</li> <li>Building Codes, Permitting, Inspections</li> <li>Land Use Ordinances, Regulations</li> </ul>
<b>Administrative and Technical</b>	<ul style="list-style-type: none"> <li>Administrative Programs, Policies, Mutual Aid Agreements, Partnerships, Operations, Procedures</li> <li>Technical Skills, Training, Drills</li> <li>Assets, Security, Resources (Specialized Equipment)</li> </ul>
<b>Financial Resources</b>	<ul style="list-style-type: none"> <li>Financial Programs or Funding Resource for Hazard Mitigation Projects</li> </ul>
<b>Education and Outreach</b>	<ul style="list-style-type: none"> <li>Public Outreach Program, Educational Activity, Notifications</li> </ul>

There are four overall Capabilities considered for which an inventory of mitigation support items was identified by the Hazard Mitigation Committee, **Planning & Regulatory, Administrative and Technical, Financial Resources, and Education and Outreach**.

Each Capability had inventoried the latest version or adoption Date; a Description of the item; the location of the capability in Town; the Level of Effectiveness of the Capability; which Department, Board or other has Responsibility for the capability; what Changes were made to the capability since the **2017 Hazard Mitigation Plan**; and Future Improvements to the Capability.

## Town Capabilities

A summary of the items within the four Capability tables is provided here to offer a portrait of resources Pembroke has at hand to assist with mitigation. Careful consideration of each Capability's **Level of Effectiveness** helped the Departments to determine any clear **Future Improvements** to undertake. Many of the Town's Capabilities involved existing plans, procedures, reports, policies, regulations, and resource documents from individual Departments. These plans and documents were reviewed and incorporated into the **Capability**

**Assessment**. **Future Improvements** to these documents were identified and many later became Action items in **8 MITIGATION ACTION PLAN**. Capabilities of all Town Departments and the School District as related to hazard mitigation are detailed within the following tables.

Level of Effectiveness	Description
High	Capability is working well and is regularly followed
Moderate	Capability could use some revisions but is followed
Low	Capability is not working and needs revisions

### DEPARTMENT ABBREVIATION KEY:

BI	Building Inspector
BOS	Board of Selectmen
CC	Conservation Commission
EM	Emergency Management
FD	Fire Department
PWD	Public Works Department
LU	Land Use Department
PB	Planning Board
PD	Police Department
PRI	Private or Non-Town
SD	School District
TA	Town Administration
TT	Tri-Town Ambulance
SC	Sewer Commission
WW	Pembroke Water Works

Primary Mitigation Department



## PLANNING AND REGULATORY CAPABILITIES

The planning and regulatory capabilities displayed in **Table 37** are the plans, policies, codes, and ordinances that reduce the risks or impacts of hazards. There are **3** categories: **Plans and Planning Documents; Building Codes, Permitting, and Inspections;** and **Land Use Ordinances, Regulations, and Town Ordinances.** Most of the documents listed below are the Town's documents, but others are School, local, regional, state and federal which support the Town's the hazard mitigation goals, objectives, and/or Actions.

**Table 37**  
**Planning and Regulatory Capabilities**

<u>Latest Adoption or Version Date</u>	<u>Capability Assessment: Planning and Regulatory Resources</u>	<u>Description</u> Related to hazard mitigation planning and coordination	<u>Location of Capability</u> Entire Town or Selected Areas	<u>Level of Effectiveness</u>	<u>Responsibility</u>	<u>Changes Since Last Haz Mit Plan (2017)</u>	<u>Future Improvements to Capability</u>
<b>PEMBROKE PLANS AND PLANNING DOCUMENTS</b>							
March 2010	<b>CC Town Open Space Plan</b>	Developed with CNHRPC and a Town Committee, created a green infrastructure with maps, alternative way to protect Town's resources, not yet adopted. First adopted in March 2010.	Entire Town	Low	Conservation Commission	Information was incorporated into the 2020 Master Plan	Revisit the Open Space Plan, update, and adopt by the PB so can some of the regulatory actions can be implemented
2017	<b>CC Town Natural Resource Inventory</b>	Evaluates water, wildlife habitat, soil, aquifer, bedrock, flora, etc resources in Pembroke and provides maps of resources and evaluates wetlands by importance	Entire Town	N/A	Conservation Commission	NRI was adopted 2017.	Revisit land use strategies for protection of natural resources.
Jan 2017	<b>EM Hazard Mitigation Plan Update</b>	Fourth version of HMP underway since original 2004 Plan; 2010 update; 2017 update. All Plans have been developed by Haz Mit Committees to current HSEM/FEMA standards. Many mitigation actions have been completed, including acquiring select floodprone properties, revising PB regulations, and upgrading stream crossings.	Entire Town	Moderate	Emergency Management	Completed several mitigation actions. Began 2021 Plan update. Provided an online public survey for broad input on mitigation priorities.	Implement the Mitigation Action Plan after 2021 Plan is approved.
May 2009	<b>EM Emergency Operations Plan</b>	Sets Dept responsibilities, establishes EOC	Entire Town	Moderate	Emergency Management	Implemented procedures	Update the 2009 EOP to current standards.

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 6 CAPABILITY ASSESSMENT

Latest Adoption or Version Date	Capability Assessment: Planning and Regulatory Resources	Description Related to hazard mitigation planning and coordination	Location of Capability Entire Town or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2017)	Future Improvements to Capability
						more with COVID.	
2008	<b>EM Critical Infrastructure Protection Plan</b>	To protect critical infrastructure in town, including Associated Grocers - designated ci for transportation and food	Entire Town	High	Emergency Management	Held training for familiarization with facility. Update response plan. Ran communication tests. Changes to response plan to improve communication.	Create detailed pre-plan to include ways to overcome communication problems in the building.
September 2019	<b>PB Capital Improvements Program</b>	Can contain haz mit Actions funded in CIP, infrastructure improvements	Entire Town	High	CIP Committee for Planning Bd	Have acquired equipment needed	Add hazard mitigation Actions to future CIP Plans
February 2021	<b>PB Master Plan</b>	Improve Town infrastructure, protect environmental, guideline for Depts, basis for ordinances and regulations	Entire Town	Moderate	Planning Board	Full update of Master Plan (all chapters).	Implement recommendations for departments and regulations
July 2021	<b>PWD Procedure of Yearly Culverts Inspection</b>	Annual field review, have pricing for replacements of 4 culverts as of 12-15. Inspect the culverts the year prior to paving so they can be replaced with the road rehabilitation. Culverts are expensive, need to find funding.	Roadways, Culverts	Moderate	Public Works Department	Annually replace about 4-5 culverts since 2017. Replaced 2 and repaired 1 so far in 2021. Approved a Infrastructure Improvement capital reserve fund in 2020.	Have a culvert line item in the budget for replacement and repair.  Replace culverts annually by priority.
Jul 2021	<b>PWD Culvert Inventory and Assessment</b>	Working with CNHRPC to identify culverts, review 10-year paving plan and assessment the culverts prior to roadwork.	Roadways, Culverts	High	Public Works Department	Project is in early stages, began in 2019/2020.	Combine the culvert inventory with the asset management program so the

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 6 CAPABILITY ASSESSMENT

Latest Adoption or Version Date	Capability Assessment: Planning and Regulatory Resources	Description Related to hazard mitigation planning and coordination	Location of Capability Entire Town or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2017)	Future Improvements to Capability
		Revolving loan from NHDES for asset management program.					data is in one software.
unknown (Private)	<b>PRI Green Valley School Emergency Management Plan (Private)</b>	Private school has plan but not realistic to current needs/standards.	Green Valley School	Low	Green Valley School (Private)	Newly added (private) capability. Pembroke PD will reach out to see what they have.	PD & FD need to meet with Green Valley School to assist in rewriting
August 2020	<b>PRI Strong Foundations School Emergency Management Plan (Private)</b>	Charter school in Pembroke. Private school has a realistic emergency management plan in place. Works with Town Depts on drills and updates. Town works closely with school.	Strong Foundations School	High	Strong Foundations School (Private)	Private capability, progress unknown. Pembroke PD will reach out to see what they have.	Plan is updated annually and they send a copy of the plan to PD and the SAU every year. PD & FD should obtain and Strong Foundations EMP and review with school
Sep 2020	<b>SD Pembroke Academy Emergency Response Action Plan (School)</b>	Emergency response plan is a School District guide, covers the schools, the overall template is shared. Each building has specific plan of evacuation routes, places to evacuate, stay in place, active threat reverse evacuations, drills to practice, etc. Town has a strong working relationship with schools.	Pembroke Academy	High	School District (School)	Have a new Emergency Safety Coordinator. Plans were rewritten annually.	Hold drills to test the Plan. Annual revision of Plan as needed in conjunction with Pembroke public emergency response staff. Evaluate the plan annual and Incorporate additions to EOP as needed.
Sep 2020	<b>SD Pembroke School District Emergency Response Action Plan (School)</b>	Emergency response plan is a School District guide, covers the schools, Three Rivers, Hill School each have their own information, but overall template is shared. Each building has specific plan of evacuation routes, places to evacuate, stay in place, active threat reverse evacuations, drills to practice, etc. in 2017, adopted most of the ALICE protocol into	Three Rivers School and Hill School	High	School District (School)	Have a new Emergency Safety Coordinator. Plans were rewritten annually.	Hold drills to test the Plan. Annual revision of Plan as needed in conjunction with Pembroke public emergency response staff. Evaluate the plan annual and Incorporate additions to EOP as needed.

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 6 CAPABILITY ASSESSMENT

Latest Adoption or Version Date	Capability Assessment: Planning and Regulatory Resources	Description Related to hazard mitigation planning and coordination	Location of Capability Entire Town or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2017)	Future Improvements to Capability
		the EOP. Alert, Lockdown, Inform, Counter, Evacuate. Town has a strong working relationship with schools.					
Jun 2021	<b>TT Tri-Town Ambulance Service Policy and Procedure's Manual</b>	Pembroke and Allenstown share one ambulance service. They provide mutual aid service to nearby communities	Entire Town and Allenstown, nearby towns	High	Tri-Town Ambulance	Reorganized to 2 towns in ambulance service (Hooksett left). Continued services.	Produce further updates to Service Policy and Procedure's Manual when needed.
January 2021	<b>WW Pembroke Water Works Emergency Response Plan</b>	This Plan is designed to provide information and guidance in emergency situations.	Entire Town, especially water service areas	High	Water Works Department	Revisions submitted to NHDES every 6 years. Pandemic response added to plan.	Follow NHDES requirements, provide temporary water or boil water order if needed
<b>PEMBROKE BUILDING CODES, PERMITTING, INSPECTIONS</b>							
2015	<b>BI NFPA 101 Life Safety Codes Occupancy Inspections</b>	Contains 15 types of occupancies that may be inspected by Fire Departments <b>- Places of Assembly</b> - Mercantile - Business - Health Care - Ambulatory Health Care - Residential Board and Care <b>- Day Care</b> <b>- Educational</b> - Apartment Buildings - Lodging or Rooming Housing - Hotel or Dormitory - 1 and 2 Family Dwellings - Industrial - Storage - Detention and correctional	The Wilds of New England, Residential Board and Care (His Mansion and Robin Hill), Church, Residential Homes	High	Building Inspector	Conducted inspections for these types of buildings, and state adopted new 2017 codes	Would like to see the State adopt the current version, consider adoption of requirement for sprinklers for all new residential and places of assembly.  Adopt the State's current version
2015	<b>BI</b>	The State has adopted statewide requirements	Entire Town	High	Building Inspector	State adopted the	Would like to see the State

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 6 CAPABILITY ASSESSMENT

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	State Building Codes	for compliance of 2017 residential and commercial building codes.				most recent & current editions of the building codes, as did the Town.	adopt the current version
2009	FD State NFPA Commercial Sprinkler Code	Adopted through the State Fire Marshal, residential 1-family and 2-family removed.	Entire Town	High	Fire Department	Applied the codes to buildings. Added option of Cisterns for developments in non-hydrant areas.	May be adopting 2017 code noted below
2015 (State)	FD NFPA 1 Fire Codes Permitting	Section 1:12, and Table 1.12.7a specifically outline instances when permits are required	All New structures	High	Fire Dept	Town followed State code. Issued permits for new and remodeled structures according to regulation.	Waiting for the State to adopt the current version (2019)
Jun 2021	PB FEMA Flood Insurance Rate Maps	April 2010 Merrimack County FIRMSs & Flood Insurance Study. DFIRMS also available. Ratings of different flood zones	Entire Town	High	Planning Board with Building Inspector	Posted the DFIRM floodplain layer online with the Axisgis tax maps for overlay.	Review and implement federal policy and follow any changes. Make the process as easy to possible for residents and businesses.
<b>PEMBROKE LAND USE ORDINANCES, REGULATIONS</b>							
November 2020	PB Site Plan Review Regulation Requirements	MS4 requirements added in 2020, but has not had major changes since about 2012	Entire Town	Moderate	Planning Board	Updated to MS4 requirements	Review and update regulations to fit the needs of the town
November 2020	PB Subdivision Regulation Requirements	(Latest overhaul 1994, revised in 2011) MS4 requirements added in 2020. Looking to update	Entire Town	Moderate	Planning Board	Updated to MS4 requirements	Review and update regulations to fit

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

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		for more substantial changes later this year.					the needs of the town
March 2013	<b>PB Zoning Ordinance Height Standards (Zoning)</b>	Contains 35' maximum structure height. Makes it easier to control fires.	Entire Town	Moderate	Planning Board	Height changes for split level homes	Adopt horizontal building buffer accessibility to structures
January 2010	<b>PB Floodplain Development District Ordinance (Zoning)</b>	Complies with NFIP, updated 2010, building in FP is permitted	Floodplains	High	Planning Board	Applied the ordinance during Planning Board application review and building inspection	Follow Federal guidelines on permitting and ordinance.
March 2021	<b>PB Wetlands Ordinance (Zoning)</b>	Protects 17 delineated wetlands with a 50 foot buffer.	Wetlands	High	Planning Board	Updated at Town Meeting 2020 and 2021	Review permitted uses and priority wetlands.
March 2015	<b>PB Aquifer Conservation Overlay District (Zoning)</b>	Protects identified aquifers and drinking water sources	Aquifer areas	High	Planning Board	Updated annually	Follow NHDES requirements
March-May 2013	<b>PB Wellhead Protection Area</b>	Best Management Practices	Wellhead Protection Areas (WPA)	High	Pembroke Water Works	Triennially update	Locate the wellhead protection areas on the Town Tax Maps
March 2021	<b>PB Open Space Ordinance (Zoning)</b>	Ordinance repealed to be reevaluated by the Planning Board	Entire Town	Moderate	Planning Board	Repealed 2021	Strategy for next steps whether to adopt a new ordinance or not
March 1995	<b>PB Shoreland Protection District Ordinance (Zoning)</b>	Protect land located within 125' of Merrimack, Suncook, and Soucook Rivers	Shorelines of Merrimack, Suncook, and Soucook Rivers	High	Planning Board	Applied ordinance to Planning Board applications.	Revise Zoning and adopt the State Shoreland Water Quality Protection Act (SWQPA)
March 2002	<b>PB Suncook River Development TIF District (Zoning)</b>	Combines commercial/ industrial and enviro/ agricultural goals through more intensive development and	SRD Zoning District	Moderate	Planning Board	Applied ordinance to Planning Board applications	Review periodically for possible improvements

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 6 CAPABILITY ASSESSMENT

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		financial return on public infrastructure					
July 2016	<b>PB Excavation and Reclamation Ordinance</b>	The Town has a materials excavation and reclamation ordinance which provides operational and reclamation standards.	Excavation Areas	High	Planning Board	Applied the regulations during Planning Board excavation application review.	Review the regulation and update as necessary to fit Pembroke's changing needs.
March 2020	<b>PB Telecommunications Zoning Ordinance</b>	Amended to reflect updates to state and federal laws.	Entire Town	High	Planning Board	Applied the ordinance during Planning Board application review.	Make sure ordinance remains compliant with state and federal changes.
March 2009	<b>PB Buildable Land Requirement Zoning Ordinance</b>	Buildable Land Requirement ensures that all developed sites have adequate area to support improvements outside areas of special hazards	Entire Town, Pembroke District	High	Planning Board	Applied the ordinance during Planning Board application review.	Review minimum standards and update as necessary.
Nov 2020	<b>PB Soils Erosion and Sediment Control Plan Requirement (Subdivision &amp; Site Plan)</b>	Erosion Plan – major subdivisions and site plans must provide an engineered erosion & sedimentation control plan. Some individual house lots have bonds to cover their culverts.	Entire Town (New Developments)	Moderate	Planning Board	Applied the regulations during Planning Board application review.	Review the regulation and update as necessary to fit Pembroke's changing needs.
Nov 2020	<b>PB Drainage and Grading Plan Requirement (Subdivision &amp; Site Plan)</b>	Engineered Drainage and Grading Plan ensures that storm drainage is infiltrated on site and does not cause erosion.	Entire Town (New Developments)	Moderate	Planning Board	Use the Drainage and Grading Plan regulations when reviewing development applications	Periodically update in response to emerging technology.
2019	<b>PB Firefighting Water Standards</b>	New Firefighting Water Supply Ordinance and Standards adopted by BOS in 2019. Developers must supply firefighting water for all multifamily, cluster developments, or subdivision of 3 lots or more.	Entire Town (not on municipal water supply)	High	Planning Board w/ Fire Dept	New Firefighting Water Supply Ordinance and Standards adopted by BOS in 2019.	Review the regulation and update as necessary to fit Pembroke's changing needs.



# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

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Nov 2020	<b>PB Subdivision Road Limitations</b>	Dead end roads restricted to 600 feet in length or less. Working on regulations to discourage dead end road development.	Entire Town (New Developments)	Moderate	Planning Board	Currently revising Subdivision Regs for a future update.	Attempt to interconnect the dozens of dead end roads in Town if possible.
Nov 2020	<b>PB Road Design and Construction Standards (Subdivision /Site Plan Regulations)</b>	Road design and construction provide specifications for building new & private Town roads and driveways. PB updated documents recently. Engineer contracted for application to follow the standards	Entire Town (New Developments)	High	Planning Board, with Public Works Dept	Applied the regulations during Planning Board application review.	Review the regulation and update as necessary to fit Pembroke's changing needs.
July 2021	<b>PWD MS-4 Regulations for Stormwater</b>	Currently in year 4 of the MS4 permit process	MS4 areas designated by EPA	Moderate	PWD	EPA designated Pembroke as an MS4 community	Compliance of MS4 permit regulations
2009	<b>PWD Road Construction Standards</b>	Specifies method of construction and materials. Contains NH DOT roadway and drainage standards for Town Class V roads. Standards may appear in or be referenced to the Planning Board's Site Plan Review Regulations and Subdivision Regulations and the Board of Selectmen's road policies.	Roadways	High	Public Works Department	New subdivisions and Town road followed these standards. Regulation update status unknown.	Review annually for possible improvements to the Town's Road Construction Standards.
July 2021	<b>PWD Storm Water Drainage Standards</b>	Adopted NHDES and NHDOT standards, in subdivision regulations	Entire Town, MS4 area	High	Public Works Department	In year 4 of MS4 permit requirements adopted elicit discharge ordinance June 2021	Monitor regulations for effectiveness and develop new as needed
Dec 2019	<b>SC Sewer Use Ordinance</b>	Follows NHDES & EPA rules & regulations. Indicates what can go through the sewer system and how the Comm can bill users for the service. Per 1,000	Entire Town, especially sewer service areas	High	Sewer Department	Readopted in 2019. Reviewed new rates and adjusted as necessary. Per unit fee	Review annually and adjust rates as needed for the budget.

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 6 CAPABILITY ASSESSMENT

Latest Adoption or Version Date	Capability Assessment: Planning and Regulatory Resources	Description Related to hazard mitigation planning and coordination	Location of Capability Entire Town or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2017)	Future Improvements to Capability
		gallon rate remains the same, but the residential units were raised \$5.00 quarterly.				was raised from 2015.	

*Source: Pembroke Hazard Mitigation Committee*

## ADMINISTRATIVE AND TECHNICAL CAPABILITIES

The administrative and technical capabilities in **Table 38** include policies, mutual aid agreements, partnerships, standard operating procedures, training, skills and tools that can be used for mitigation planning and to implement specific mitigation actions. Smaller jurisdictions without local staff resources often rely on public or shared resources. There are **3** categories: **Administrative Programs, Policies, and Partnerships; Technical Skills, Training and Drills;** and **Assets, Security and Resources.**

**Table 38**

**Administrative and Technical Capabilities**

<b>Latest Adoption or Version Date</b>	<b>Capability Assessment: Administrative and Technical</b>	<b>Description Related to hazard mitigation planning and coordination</b>	<b>Location of Capability Entire Town or Selected Areas</b>	<b>Level of Effectiveness</b>	<b>Responsibility</b>	<b>Changes Since Last Haz Mit Plan (2017)</b>	<b>Future Improvements to Capability</b>
<b>PEMBROKE ADMINISTRATIVE PROGRAMS, POLICIES, MUTUAL AID AGREEMENTS, PARTNERSHIPS, OPERATIONS, PROCEDURES</b>							
Jul 2021	<b>BOS 911 Street Address System (Chapter 60 Number of Buildings) Ordinance</b>	Permits Selectmen to number buildings on all streets. First adopted March 1946. The Board works in conjunction with the Fire Department on any 911 or address issues.	Entire Town	High	Board of Selectmen with Fire Dept	Followed 911 ordinance and assigned house numbers accordingly.	Review periodically for possible improvements
Jul 2021	<b>BOS Seasonal Restrictions on Class VI Highways</b>	Permits Selectmen to post roads to restrict access during vulnerable times as of April 2012.	Class VI Roads	High	Board of Selectmen	Followed the Class VI Road Policy. The Town is currently looking to post the road for seasonal restrictions- this matter is under review currently with legal.	Add seasonal restrictions to Class VI Road Policy. Review periodically for possible improvements
2021	<b>CC Acquisition of Easements</b>	There are more than 700 acres of conservation land in town. The Commission is actively acquiring more land every year.	Entire Town	High	Conservation Commission	Identified highest priority parcels for conservation or purchase. Talked with landowners for potential easement purchases.	Locate funding sources to find and acquire more parcels or easements
Jun 2021	<b>EM Communication Among</b>	Depts work cooperatively during emergencies	Entire Town	Moderate	Emergency Management	Took steps to add PWD and Schools to	Work toward having a single method of communication

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 6 CAPABILITY ASSESSMENT

Latest Adoption or Version Date	Capability Assessment: Administrative and Technical	Description Related to hazard mitigation planning and coordination	Location of Capability Entire Town or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2017)	Future Improvements to Capability
	Town Departments					communication system.	g with all Town Departments.
Jan 2021	FD + TT Capital Area Mutual Aid Fire Compact	Pembroke is a member of Capital Area Mutual Aid Fire Compact with 21 towns in the greater Concord area. All towns required to have MAA drills in each community at least every other year.	Capital Area, including Pembroke	High	Fire Department and Tri-Town Ambulance	Updated Department Policies to align with Capital Area Mutual Aid Compact policies and guidelines.	Revise policies when needed, ensure FD & TT member participation in Capital Area Mutual Aid.
Jun 2021	FD Rules of Procedure	Rules incorporate procedures and policies that are covered in meetings and training sessions. FD is currently collecting SOGs for examples. Members know what they need to do but currently as of 2021 they are verbal.	Entire Town	Low	Fire Department	Have a set of rules by which the FD members operate, Modified as needed. Committee has been established for written SOGs.	Develop the rules into written SOGs and distribute to members.
Jan 2021	FD Central NH Hazardous Materials Team Member	Pembroke FD is a member of the Central NH MUA Compact. Hazardous spills response, FDs trained to operations level, call CNH Haz Mat to handle. Town currently does not have any specialty personnel, but have members who can decomm. Very active team.	Entire Town	High	Fire Department	Use services for advice, no recent activation for Pembroke. Central NH Haz Mat recently joined forces with the Lake Region Haz Mat.	Meet with Command Staff to see how Pembroke FD can contribute and, how to better support each other.
2021	FD + TT Call "Response Cards"	Call "Response Cards" indicate who responds to which emergencies or disasters within the Mutual Aid (MAA) Compact. Town has ____ primary zones and target areas for MAA towns coming in.	Entire Town	High	Fire Dept and Tri-Town Ambulance	Response Cards are in the process of being reviewed and changed to adjust to needs.	Reevaluate the effectiveness of the protection zones and target areas as Pembroke grows.
2020-updated each year	PD Standard Operating Procedures (SOPs)	Procedures for responding to incidents, calls, cruiser operation, etc. baseline of PD operations, electronic copy ONLY	Entire Town	High	Police Department	Regularly reviewed, annually and changed SOPs if needed according to	Update SOPs regularly as new threats and concerns arise.

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 6 CAPABILITY ASSESSMENT

Latest Adoption or Version Date	Capability Assessment: Administrative and Technical	Description Related to hazard mitigation planning and coordination	Location of Capability Entire Town or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2017)	Future Improvements to Capability
						current standards.	
2020	<b>PD Mutual Aid MOU Agreements</b>	Have Mutual Aid MOU Agreements with all abutting towns & departments of interest. Allenstown, Bow, Epsom, Loudon, Chichester, Concord. Updated when changes are made to the Chief of Police Position.	Entire Town, MOU Towns	High	Police Department	Updated MAA with Allenstown's new PD Chief Pending updated MAA for Bow PD Chief opening. Provided mutual aid assistance to MAA towns.	Participate in mutual aid activities. Consider the possibility of adding more departments to our MOU list.
2021	<b>PD Explorer Post</b>	For age 14-21 young adults interested in law enforcement, Pembroke Police Explorer Post provides training. Purpose is for young adults to provide support in times of need to PD: Parking and traffic control, public relations and notification, organizing food, and general support during disasters. Members would never be assigned to anything dangerous.	Entire Town	Low	Police Dept	Program hosted by other agencies. The PD has not taken an active role to date to enter cadets into that program.	Request assignment of a member from the Agency to become the PD Liaison for this program to determine future involvement.
2021	<b>PD School District Resource Officer Response Program</b>	School Resource Officer SRO (Pembroke) works with district officials to ensure the safety, security and welfare of students, staff, and visitors. Mutual Aid is used from Pembroke to cover issues. Town pays into school district, which funds SRO program.	Pembroke Academy, Three River school and Pembroke Hill School. Assist with other charter schools in Town	High	Police Dept/ Pembroke School District Superintendent	Provided SRO services to Pembroke schools. Remains a valued position within the PD to work with all schools to ensure student & staff safety and for guidance to administration staff for legal issues.	Consider the potential for an additional SRO position in the coming years. Another SRO is necessary because of the volume of work at the High School, and the younger/ smaller schools receive less attention than they should. This position is

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 6 CAPABILITY ASSESSMENT

Latest Adoption or Version Date	Capability Assessment: Administrative and Technical	Description Related to hazard mitigation planning and coordination	Location of Capability Entire Town or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2017)	Future Improvements to Capability
							a huge opportunity for building relations with younger kids before High School.
July 2021	<b>PWD NH Public Works Mutual Aid Agreement Member</b>	PWD is dues paying member of this mutual aid coordinated by UNH Technology Center. Most of NH's towns are members. Share equipment and labor when needed.	Entire Town, MUA towns	High	Public Works Department	Annual dues paying member. Assisted other towns, loaned equipment, and received assistance.	Water Works and Sewer Dept could be a member in the future
July 2021	<b>PWD Procedure on Tree or Limb Reporting to Utility Companies</b>	PWD handles it electronically and by phone to utility companies. FD dispatch center will automatically notify for electric lines	Entire Town	High-Electric. Low-Internet, phone & other	Public Works Department	Regularly participate with new reporting policy from Eversource	Use reporting procedure provided by utilities
July 2021	<b>PWD Culvert and Storm Drain Maintenance</b>	Currently working on an asset management plan to locate all our culverts and catch basins to identify needed repairs. Clean catch basins yearly.	Drainage Systems	Moderate	Public Works Department	Replaced and repaired several culverts and catch basins	Upgrade culverts and storm drainage areas
July 2021	<b>PWD Memorial Field's Merrimack Riverbank Stabilization</b>	Situation monitored for further action annually, began in 1990s. Performed emergency repair on failing outfall to stop erosion.	Memorial Field	Moderate	Public Works Department	Annual visits and stabilization efforts, applied for CCWSRF planning loan to develop plan to repair failing outfalls.	Nearly annual stabilization of bank needed until a current engineering study can be produced for more permanent methods.
Jan 2021	<b>PWD Snow and Ice Control Policy</b>	Updated policy January 2021. Includes provisions for priority roads, salt free areas, parking, mailboxes, transfer station, sidewalks, parking lots, 5 Plow Routes, and more. First priority is given to the following streets due to steep hill conditions & high traffic volume:	Roadways and sidewalks	High	Public Works Department	Revised to shorten plow routes to provide quicker response time and added all public sidewalks to winter maintenance list/	Revise to add more plowing routes to the policy, address obstructions on sidewalks

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		Broadway, Brickett Hill, Bean Hill Road, Center Hill Road and Pembroke Hill Road, Fourth Range Road, North Pembroke Road, Cross Country Road, Main Street & Glass Street. Second priority given to schools and school routes when open. Ten total priorities are described.					
March 2020	SC Capacity, Management, Operation, and Maintenance (CMOM) Program	Maintains systems and identifies areas that need improvement reactively.	Entire Town, especially sewer line areas	High	Sewer Department	Actively maintained sewer lines and systems, databases	Must be updated yearly for NHDES & EPA
Sep 2020	SD Standard Operating Procedure: Run, Hide & Fight and ALICE Program	Adopted a Lockdown SOP and post posters describing actions. Use the ALICE program now as well.	Schools	High	School District	Conducted annual drills at the schools and trained the teachers. Incorporated ALICE into their SOP. Pembroke PD has a School Resource Officer who visits all 3 schools. Will hold drill in Sep 2021.	Train collectively with Fire and Police Depts on warm and hot zones and where to gather at mass casualty incident (MCI) sites and medical staging.
Dec 2020	TA Joint Loss Management (Safety) Committee	Topics include employee and facility safety, first aid equipment, etc. meetings are held monthly.	Town Buildings and Facilities	High	Town Administrator	Met quarterly over the last five years.	Follow the necessary regulations for compliance with current laws.
<b>PEMBROKE STAFF AND VOLUNTEERS</b>							
Volunteer	CC Conservation Commission	5 members, 1 alternate, 1 PB rep and 1 ex-officio BOS rep, very active Commission and	Town Hall	Moderate	Conservation Commission	Members remain the same after many	Need to establish subcommittees, establish



# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

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		discussions, monitor properties annually, review NHDES and PB apps				accomplishments	school visits to educate kids, need younger members for Cons Comm, get other people involved, have joint meetings of CC, PB, BOS, ZBA to share issues & information, need more Town staff support
Volunteer & Staff	<b>EM Hazard Mitigation Committee</b>	Staff & around volunteers meet to update Plan	Safety Center	High	Emergency Management	HMC has ensured the completion of several actions.	Meet every two years or quarterly to keep on track of the actions.
PT FD Staff	<b>EM Emergency Management Director and Deputy EMD</b>	1, filled by the PT Fire Chief with a small stipend. 1 Assistant FD Chief is PT Deputy EMD.	Safety Center	Moderate	Fire Department	Completed the necessary duties. EMD is a member of the FD. Appointed a Deputy EMD.	Two individuals can handle the EM responsibilities.
PT Staff	<b>FD Fire Department Chief</b>	1 PT, about 10 hrs/week for admin.	Safety Center	Moderate	Fire Department	New Chief is the largest change. Created a library and redesigned some office space.	Obtain additional training to support different roles.
Volunteer	<b>FD Fire Fighters - Structural and Support</b>	32 on-call volunteers, Capital Area Mutual Aid Compact member	Safety Center	Moderate	Fire Department	Members received ongoing training to keep up to date on practices	Need more daytime people (volunteers are at work).
7 Volunteers Jun 2021	<b>PB Volunteer Planning Board</b>	7 volunteer Planning Board members	Town Hall	Moderate	Planning Board	All Alternate positions are vacant	Need more membership in Planning Board
1 Staff, Jun 2021	<b>PD Police Department Chief</b>	1 Chief who over sees Department. Info current through 06.14.21	Safety Center	Moderate	Police Department	New Chief, instituted new or updated policies	Update and keep fresh all policies and

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

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							Protocols for department
13 Staff, Jun 2021	<b>Police Department Officers and Administrative</b>	11 Officers 2 Administrative	Safety Center	Moderate	Police Department	Newly added capability	Update Job descriptions and response when needed.
1 Staff, Jul 2021	<b>PWD Public Works Department Supervisor</b>	1, available 24/7	Public Works Garage	Moderate	Public Works Department	Newly added capability	Monitor the effectiveness and review status
10 Staff, Jul 2021	<b>PWD Public Works Road Crew</b>	9 full time, 1 part time available on call	Public Works Garage	Moderate	Public Works Department	Currently one open position	With the MS4 requirements and continued development consider adding staff
Jul 2021 3 Staff	<b>TA Administration and Finance Department</b>	Currently there is one FT Clerk in Finance full time and one FT Deputy tax/Admin Sect. The Board will be making changes in 2022's budget for increased staffing in certain areas	Town Hall	Moderate	Town Administration	Since 2017 there has been a reduction in with the employees	Increase the 2022 staffing budget to enable additional admin staff time.
Jul 2021 4 Staff	<b>TA Planning and Land Use Department</b>	3 FT, M-F 8-4, + 1 PT Tax Assessor responsible for Planning, Building, zoning, and assessing.	Town Hall	Moderate	Town Administration	Hired a new planner in 2018.	Monitor the effectiveness and review status
Jul 2021 8 Members	<b>TA Joint Loss Committee</b>	8 staff members on Committee	Town Hall	Moderate	Town Administration	Met quarterly, including through the COVID-19 restrictions.	Meet quarterly to determine issues and solutions.
Jul 2021 Members	<b>TA Technical Review Committee (TRC)</b>	Meets to review and discuss Planning Board development applications. Includes heads of all Depts, Boards & Commissions	Town Hall	High	Town Administration	Met weekly to discuss each Planning Board application and determine necessary Departmental improvements to plans.	Determine whether an enhanced role could be designed for the TRC related to mitigation
Jul 2021 1 Staff	<b>TA Health and Welfare Officer</b>	1 P/T staff. Oversees licensing for daycares and schools, records all communicable and health issues. Inspections of any health complaints.	Town Hall	Moderate	Town Administration	Fulfilled health and welfare duties of the Town. Backup officer left, one position short.	Locate a backup officer to replace the person who left position. Monitor the effectiveness

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

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							and review status
Jun 2021 Staff	TT Tri-Town Ambulance EMS Director	4 FT & Balance P/T and Per Diem. Requires staff to have ICS 700 & 800 level courses, admin takes 300 & 400 level courses. Certification remains even if out of date.	Safety Center	Moderate	TTEMS Board of Directors	Added RSI Service Ventilator to both Ambulances	Monitor the effectiveness of staffing and review status as needed.
<b>PEMBROKE TECHNICAL SKILLS, TRAINING, AND DRILLS</b>							
Jul 2021 – refresh training needed	EM Fire, Police, Highway, and Land Use Depts Trained in ICS and NIMS	Few are trained, need all Dept staff/ volunteers trained in basic, Dept Heads in advanced ICS & NIMS- ICS 700 & 800.	Safety Center	Low	Emergency Management	Depts and Boards have not recently taken ICS or NIMS courses.	Refresh ICS and NIMS basic courses for all Town staff. Dept Heads should receive advanced training.
2021 All	FD Fire Department Training	Members trained in multitude of disciplines.	Safety Center	High	Fire Department	Worked with NH Fire Standards and Training to improve in-house training. Increase use of Fire Academy for training not available inhouse.	Modify training program yearly to provide necessary training. Meet with Fire Academy Staff for availability of advanced training.
2021	PD Police Department Officer Training	Mandated training hours for PSTC. Mandated diversity training by the end of the year	Entire town	High	Police Department	Training includes proficiency of each tool used as well as specific position training	Exceed training requirements and be aggressive in training our department above and beyond requirements.
Jul 2021	PWD Public Works Department Employee Training	Crew trained in Roads Scholar, UNH T2 and Primex. Training greatly appreciated by staff	PWD Garage	Moderate	Public Works Department	Increased training opportunities including	Provide more training opportunities for employees

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

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						available online classes	
Jul 2021	<b>PWD Public Works Training on Use of Chain Saws</b>	Primex chainsaw training class scheduled for October 2021. Staff recertification	Entire Town, Roadways	High	Public Works Department	Upgrade chain saws as needed	Send new employees to chain saw training and refresh training for existing staff
N/A	<b>PB Cartographic Associates Mapping of Tax Parcels</b>	Company is paid to revise tax map yearly after April 1	Town Hall, Offsite	High	Planning and Land Use Department	Revised the tax maps annually each April	Locate the wellhead protection areas on the Town Tax Maps
Jul 2021	<b>SC Sewer Department Training on Use of Chain Saws</b>	Taught safety and operation of chain saws (by professional loggers).	Entire Town	High	Sewer Department	Trained personnel in current techniques	Send employees to chainsaw training to refresh and enhance skills
Jul 2021	<b>SC Sewer Department Training in Confined Space</b>	Taught safety in a confined space and use of safety equipment for confined spaces	Entire Town	High	Sewer Department	Trained personnel in current techniques	Send employees to confined space training to refresh and enhance skills
2021	<b>TT Tri-Town Training</b>	Staff and per diem staff engage in regular trailing drills. Included Active Shooter Event Drills to training.	Entire town	High	Tri-Town Ambulance	Added Active Shooter Gear to Primary Ambulance	Hold regular training and drills. Add ASE Gear to Back Up Ambulance
<b>PEMBROKE ASSETS, SECURITY, AND RESOURCES (SPECIALIZED EQUIPMENT)</b>							
2021	<b>EM Emergency Operations Center (Safety Center)</b>	The EOC is located at the Safety Center which is the combined PD & FD. The conference room serves as the EOC. Contains 5+ phone lines, internet VOIP and wifi connection, and accommodations for 6 computers/ laptops. At least 1 copper landline is available if the cable fails. The conference room is the new communications	Entire Town	Moderate	Emergency Mgt	EOC Office has been eliminated and returned to its original purpose of a Conference Room for Emergency Operations. Six of the FD members are	Create a library of resources in the EOC Conference Room. Ensure other FD members can take the amateur radio class.

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		room, which can serve 4 working positions -2 phone calls & -2 communications. Have amateur radio communications CARES. The office is now the conference room with library of emergency management resources.				licensed for amateur radio. New base station and amateur radio repeater to talk with neighboring states. (Every hospital in NH has an amateur radio backup)	
2021	EM Safety Center Generator	The building has a permanently mounted and hard wired installed generator from 2004. It should still be able to power the necessary services of the building. Uses diesel fuel.	Safety Center	High	Emergency Mgt	Maintained every spring and fall. Tested weekly. The entire building and EOC are covered with the generator.	Service, maintain, and test the full-staffed capacity during a drill using the Safety Center.
Several bundles of 100	PWD Sandbags	Stored at Highway Garage, have a few bundles of 100. From the 2005-2008 time frame.	Highway Garage	Low	Emergency Mgt	Used bags recently and have not been an issue.	Collect all emergency response items in a mobile trailer (no room in Safety Center for a trailer)
2020	EM Emergency Shelters and Warming Center	No current cooling/warming centers designated. Grace Capital Church has a generator and may be willing to serve as a c/w center. No Red Cross shelter in Town. Middle School in Allenstown is the local shelter.	Library	High	Emergency Mgt	In Town, no shelters have been activated. But the Allenstown School District, the Town's official shelter, is being rearranged.	Look into coordinating cooling/warming shelter agreements with Grace Capital Church and with Allenstown School District for Town overnight sheltering.
2021	FD Water Rescue Capabilities	The Town has a boat to use for water rescue in response to extreme flooding and Pembroke Lake emergencies. More equipment was obtained to facilitate rescue during flooding conditions:	Suncook River, Soucook River, Merrimack River, Water bodies	High	Fire Dept	Recently replaced flotation devices rated at class 3 to class 5 swift water rescue devices.	Locate and take training related to water rescue, which is not easy to find or coordinate

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		trailer, ice rescue suits, ropes, personal flotation devices, and water rescue helmets					with volunteer schedules.
2021 1 portable	<b>FD and AGNE Two-Way Radio Communication</b>	AGNE gave the FD a portable radio in 2020 with their frequencies for communication capabilities during emergencies	Associated Grocers of New England (AGNE)	<b>Moderate</b>	Fire Department & AGNE (private)	Conducted regular frequency checks to ensure communication equipment is working.	Train with AGNE security testing radio communication. Cost continues to prohibit the installation of equipment that would improve communication.
2021 4 Base 12 Mobiles 40 Portables 3 amateur radios + 1 amateur repeater	<b>FD Digital Radios</b>	FD uses Analog Radios for communication, but Dept also has digital radio capabilities for communication with Police Dept.	Fire Dept	<b>High</b>	Fire Department	Department radios are capable of both analog and digital.	Department radios can communicate with police in digital mode. Regularly train fire staff on use of the digital modes on the radios.
May 2021- 1 Base 9 Mobiles 15 Portables	<b>PD Digital Radios</b>	Set up for both analog and digital communication by Police Dept	Safety Center	<b>High</b>	Police Department	Radios used regularly by all Department members including admin staff.	Replace radios on a regular cycle to maintain technological capabilities with all Departments.
July 2021	<b>PWD/FD/TT/EM/PD Public Safety Tower Communications Array on Plausawa Hill</b>	Repeater on the Plausawa Hill tower as coordinated and owned by Global Partners (has equipment room with switching equipment). Also used by Pembroke PD (Merrimack County Sheriff's Office with repeater at Bailey Avenue), FD TT, EM (uses Capital Area/Lakes Region Mutual Aid), and services the community. Electricity is provided by	Entire Town	<b>High</b>	Public Works Dept	Used daily by Pembroke emergency responders, especially by Public Works. Maintained by owner. Repeater is responsibility	Encourage 5G technology placement.

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		Eversource. Generator on site, owner of tower is responsible for its operation.					
July 2021 ~12 barricades ~10 barrels ~ 50-100 cones of various sizes	<b>PWD Barricades and Barrels And Cones</b>	Used for traffic control, safety regulations enforced. Regularly purchased hundreds of cones through grant, not replaced. Police Dept has about 10 cones in sally port. Fire Dept has about 6 barricades and 2 dozen cones. Not enough for a major Town detour.	PWD Garage & Fire/Police Depts	Low	Public Works Department	Used barricades for road detours. Have not purchased more since the last Plan.	Upgrade the quality and number of barricades, cones, and barrels for future flooding and road detours.
July 2021 1 Base 17 Mobiles 2 Portables	<b>PWD Public Works Department Digital Radios</b>	Radios in vehicles	PWD Garage	High	Public Works Department	New radios installed in newly purchased vehicles	Purchase new interoperable equipment for ready communication with all Depts
Jul 2021	<b>TA Security Measures: Town Hall Fire Alarm System and Town Clerk Alarm, and Video Cameras</b>	The Town Hall has fire alarm system which is routinely tested and maintained by an alarm company. Town Clerk, Admin Assistant employees have panic buttons.	Town Hall	High	Town Administrator	Installed video cameras in 2021. Alarm maintained annually by company. Mounted buttons tested annually and batteries changed by vendor.	Install additional security measures as needed or as recommended by the Police Dept.
Future – 2021 or 2022	<b>TA Common Telephone System</b>	Link all municipal phone systems even in different areas of Town	Town Facilities	High	Town Administration	Phones operational with each individual facility.	Research a shared town facility phone system in 2021
Jun 2021	<b>TA Town Hall Interior Security Measures</b>	Locking doors and half doors are inaccessible by the public. Fire extinguishers, radio to call Police Department, etc.	Town Hall	High	Town Administrator	Ensured the center door of the Town Hall is locked and can only be opened by staff or those on the other side.	Review the Town Hall safety systems and propose changes as necessary.

Source: Pembroke Hazard Mitigation Committee



## FINANCIAL CAPABILITIES

The financial resources in **Table 39** available for hazard mitigation projects are those the Town has access to, has used in the past, or may be eligible to use in the future for hazard mitigation projects. These often include FEMA Public Assistance Grants (Disaster Recovery Costs), Warrant Articles, Town Capital Improvements Program (CIP) 2021 Project Funding, Department Operating Budgets, Bonds and FEMA and NH Department of Transportation grants. There are **2** categories, **Financial Programs or Funding Resources**; and **Potential Funding Programs** for hazard mitigation projects.

**Table 39**  
**Financial Capabilities**

<u>Latest Adoption or Version Date</u>	<u>Capability Assessment:</u> Financial	<u>Description</u> Related to hazard mitigation planning and coordination	<u>Location of Capability</u> Entire Town or Selected Areas	<u>Level of Effectiveness</u>	<u>Responsibility</u>	<u>Changes Since Last Haz Mit Plan (2017)</u>	<u>Future Improvements to Capability</u>
<b>PEMBROKE FINANCIAL PROGRAM OR FUNDING RESOURCE FOR HAZARD MITIGATION PROJECTS</b>							
Oct 2017	<b>BOS FEMA Public Assistance Grants (Disaster Recovery Costs)</b>	Public Assistance Categories A-G may become available when disasters are declared if the community has an unexpired approved Haz Mit Plan. Continue to utilize the FEMA funding to help recover from declared disasters.	Entire Town	High	Town Admin with EM	Used for PA-B Protective Measures DR-4355 Oct 2017 Wind and Rain Storm	Utilize the FEMA PA program to help with disaster costs
2020-2021	<b>BOS NH COVID-19 Funding</b>	The NH Governor's Office administered funding provided by FEMA, including GOFFER, First Responder Stipend.	Entire Town	High	Town Admin with BOS & EN	Received reimbursement funding	Obtain funding for other Town programs and staff as necessary as funds are available.
Mar 2020	<b>BOS NH Department of Transportation (NH DOT) Bridge Aid Program</b>	The bridge program is an 80/20 funding opportunity, with only 20% required by towns. Using the CIP Capital Reserve Funds, communities can set aside money for the several years it takes for the state to undertake the local bridge project.	Town Bridges	Medium	Town Admin	Changed the Fund in 2020 by Town Meeting to a Roadway and Infrastructure Capital Reserve Fund.	Add funding annually to Capital Reserve Fund
May 2011	<b>CC USDA Farm and Ranch Protection Program</b>	50% match, protected Hilman agricultural dairy farm property 1,500' along the Suncook River, 46-acre easement to Five	Entire Town	High	Conservation Commission	Took two years to complete easement acquisition, 2008-2011	Consider using the program for future easements, need a grant

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 6 CAPABILITY ASSESSMENT

Latest Adoption or Version Date	Capability Assessment: Financial	Description Related to hazard mitigation planning and coordination	Location of Capability Entire Town or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2017)	Future Improvements to Capability
		Rivers Trust, 2.5 year project completed by Town volunteers on Cons Comm					writer and someone to organize and work on future projects
Mar 2021	CC Conservation Easement Fund	The Conservation Easement Fund protects water supplies through purchase of conservation easements.	Priority locations	High	Conservation Comm	Funds were deposited to the CCE fund when current use land converted to developable land.	Consider using fund for water and flood protection
Mar 2021	EM Emergency Management Operating Budget	Budget can contain funding for outreach programs, mitigation projects (includes staffing). Fund has about \$5,000 currently, but if a major issue occurs (lightning strike), not enough funding for what may be needed.	Entire Town	Low	Emergency Mgt	Used the fund for training/drills of FD members.	Add \$10,000 annual funding to use Emergency Management Operating Budget.
July 2015	EM FEMA Hazard Mitigation Assistance Grants	High competition for \$, can fund mitigation projects	Entire Town	High	Emergency Management	Funded Haz Mit Plan Update 2015 through HMGP	Write more grants for hazard mitigation projects
2014	FD FEMA FMA Assistance to Firefighters Grants	Annual competitive grant program	Entire Town	Low	Fire Department	Apply annually	Write more grants for fire prevention and safety projects
Sep 2019	PB Town Capital Improvements Program (CIP) 2021 Project Funding	Sets aside funds for large equipment	Entire Town	High	PB's CIP Committee	Capital reserve fund set aside yearly, used for all singular items/programs	Use for water and sewer infrastructure upgrades. CIP could include expensive or long-term hazard mitigation projects
Oct 2017	PWD FEMA Public Assistance Grants	PWD applies for recovery funding after disasters	Entire Town	High	Public Works Department	Last applied for severe storm (wind & rain) funds October 2017	Write more grants for pre-disaster and recovery projects

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 6 CAPABILITY ASSESSMENT

Latest Adoption or Version Date	Capability Assessment: Financial	Description Related to hazard mitigation planning and coordination	Location of Capability Entire Town or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2017)	Future Improvements to Capability
July 2021	PWD NH Department of Transportation Bridge Program	North Pembroke Rd bridge replacement scheduled to start July 2021	Bridges	Moderate	Public Works Department	Funded by State of NH, City of Concord & Town of Pembroke for replacement of the North Pembroke Rd Bridge	Provide more funding for the Town bridge Capital Reserve Fund to be prepared for the next bridge rehabilitation or replacement
PEMBROKE FUTURE FINANCIAL RESOURCES TO EXPLORE FOR HAZ MIT PROJECTS							
Not Yet Used	BOS Municipal Bonds to Incur Haz Mit Project Debt	Could be used for structural projects or land conservation projects. Bonds are for expensive mitigation strategies, pay overtime	Entire Town	N/A	Board of Selectmen	New potential financial program	Consider using bonds to fund significant mitigation projects
Not Yet Used	BOS Warrant Articles	Could be used for hazard mitigation structural projects, including building or infrastructure or land acquisition.	Entire Town	N/A	Board of Selectmen	Warrant articles approved annually by Town Meeting. Some indirectly provide mitigation benefits (Dept apparatus, etc)	Consider using warrant articles to fund mitigation projects
Not Yet Used	CC NH Conservation "Moose Plate" Grant	Supports land conservation, conservation planning, BMPs, soil conservation and flooding, wildlife habitat, and water quality	Entire Town	N/A	Conservation Commission	New potential financial program	Consider using for conserving Suncook or Soucook River shoreline properties
Not Yet Used	EM FEMA Emergency Management Performance Grant EMPG	High competition for \$, can fund mitigation projects, 50/50	Entire Town	High	Emergency Management	Not used, new potential financial program	Write grant for update of Emergency Operations Plan or for generator, equipment
Not Yet Used 2013 adopt	PB Impact Fees for New Development	PB is authorized to develop and implement, but currently have no documentation in place to implement	Entire Town	N/A	Planning Board	2013 amended zoning to adopt RSA 674:21.	Undertake facilities and/or economic studies to

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 6 CAPABILITY ASSESSMENT

Latest Adoption or Version Date	Capability Assessment: Financial	Description Related to hazard mitigation planning and coordination	Location of Capability Entire Town or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2017)	Future Improvements to Capability
							obtain background information for setting fees
Not Yet Used	<b>SC User Fees for Water, Sewer, Gas, or Electric</b>	Portions of water and sewer user fees could be set aside to upgrade infrastructure	Entire Town, especially existing water, sewer areas	N/A	Board of Selectmen (Sewer, Gas, Electric), Water Commission	Sewer user fees could be applied toward upgrading infrastructure	Consider using portions of user fees for upgrading water and sewer infrastructure
Not Yet Used	<b>WW Water Works Department Budget</b>	Water lines and infrastructure funded in annual budget from user fees.	Entire Town, especially water line areas	N/A	Water Works	New potential financial program	Consider future Water Dept mitigation projects

*Source: Pembroke Hazard Mitigation Committee*

## EDUCATION AND OUTREACH CAPABILITIES

In **Table 40**, identifying Town Departments have *Public Outreach Programs, Educational Activities and Notification* methods already in place or those which could be implemented can supplement or encourage mitigation activities and communicate hazard-related information to residents, businesses and the general public.

**Table 40**

**Education and Outreach Capabilities**

<b>Latest Adoption or Version Date</b>	<b>Capability Assessment: Education and Outreach Programs</b>	<b>Description Related to hazard mitigation planning and coordination</b>	<b>Location of Capability Entire Town or Selected Areas</b>	<b>Level of Effectiveness</b>	<b>Responsibility</b>	<b>Changes Since Last Haz Mit Plan (2017)</b>	<b>Future Improvements to Capability</b>
<b>PEMBROKE PUBLIC OUTREACH PROGRAM, EDUCATIONAL ACTIVITY, NOTIFICATIONS</b>							
October 2012	CC Conservation Commission Tire Clean Up Day	Collected 150 tires on Range Roads	Entire Town	Moderate	Conservation Commission	This was a 1-time project	Advertise the clean up to encourage people to stop dumping on conservation lands
Jul 2021	CC Conservation Commission White Sands Clean Up Day	Field trip to White Sands with students from Three Rivers School and Pembroke Academy. CC led a clean up and educational activity	White Sands Conservation Area	Moderate	Conservation Commission	Held a clean-up activity	Coordinate with School Dept for more student volunteerism and educational opportunities for preserving this natural resource.
Jul 2021	CC Conservation Commission Facebook Page	Site hosts photos of wildlife in Town, describes conservation lands, trails, activities. CC member began page on May 28, 2015 with periodic updates, but moved between 2017-2021. Need a new CC member to take over Facebook page.	Entire Town	Low	Conservation Commission	Periodic updates to site. Facebook page is outdated	Need regular updates on current conservation issues, documents for review, ask questions or hold surveys to determine major Town conservation projects. Member who ran page has since moved away. Need to find someone else to continue managing page.

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 6 CAPABILITY ASSESSMENT

Latest Adoption or Version Date	Capability Assessment: Education and Outreach Programs	Description Related to hazard mitigation planning and coordination	Location of Capability Entire Town or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2017)	Future Improvements to Capability
October 2014	CC Conservation Commission Acorn Planting at Three Rivers Middle School	5&6 graders planted acorns in Ames Brook Conservation Area to get oak trees to grow in open areas	Three Rivers Middle School	Moderate	Conservation Commission	This was a 1-time project	More school outreach to set up a junior Cons Comm with Town projects
2021	EM NIXLE	People choose to receive calls. Town has advertised for people to join, used by PD, PWD, FD	Entire Town	Moderate	Emergency Management	Enhanced and publicized the emergency communication system program	Needs to become more successful in public
2020	FD Fire Department Annual Open House	Open House each fall, introduce fire safety to the community	Fire Station	High	Fire Department	Held the open house annually, except during 2020	Needs better publicity
October 2019	FD Fire Department School Safety Program	Visit all public & private schools and daycare facilities to teach about fire safety and prevention.	All public and private schools	High	Fire Department	Conducted the program in schools annually through 2019. COVID forced shutdown of the school programs in 2020- fall 2021.	Work on regaining access to the schools as COVID restrictions are lifted.
Jun 2021 (Regularly in Use)	FD/ PD Safety Center Message Board	Changeable signboard outside Safety Center.	Safety Center	High	Fire Department  Police Dept.	Purchased more letters to increase message ability on each side. Provided public services messages regularly.	Use the message board to provide public service messages. Maintain the message board's appearance and repair when needed.
Jun 2021	PD Police Department DARE	Educational tool not only for drugs but safety protocol for children	Entire Town	Medium	Police Department	DARE Program is being phased out with the LEAD program	Provide the DARE program and implement the LEAD program as well.

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 6 CAPABILITY ASSESSMENT

Latest Adoption or Version Date	Capability Assessment: Education and Outreach Programs	Description Related to hazard mitigation planning and coordination	Location of Capability Entire Town or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2017)	Future Improvements to Capability
						taking its place over time.	
Jun 2021	<b>PD Police Department Safe Routes to School Program</b>	Grant funded plan and program to allow children a route to travel safely to their school. Construction Phase previously completed. No change since Dec 2015.	Three Rivers, Village School, Hill School, and Pembroke Academy	Medium	Police Department	No program changes since 2015. Sidewalk previously constructed. Officers are aware of program.	Evaluate travel as kids use it, modify any changes that need to be made
2020	<b>PD Police Department Bicycle Safety Rodeo</b>	Safety training for kids to ride safely and be aware of surroundings	Three Rivers, Village School, Hill School, and Pembroke Academy	Medium	Police Department	Provided certificates and prizes annually, again partnering with Associated Grocers and Sullys Superette.	Planned 2021 Bike rodeo to t introduce safety to all kids on bikes when the COVID restrictions ease.
Jun 2021  Currently and regularly in use since 12-15	<b>PD Police Department Facebook Page</b>	Source of information and notifications of time sensitive or public information	Entire Town	High	Police Department	Extended the use of Facebook site to include assistance in Investigations and community news and updates	Assign an officer / intern responsible for the PD Facebook page to monitor its messages and update with new information.
Jun 2021  Jul 2015 Install	<b>PD Police Department Drug Take Back Box</b>	Monitoring started in 2003 when building was built, with procedure to assist residents with disposal of outdated prescription drugs. Installed box 07-20-15. By 2021, a 24/7 monitored take back box was in use.	Safety Center	High	Police Department	Provided drug take back services to residents. Monitored the container 24/7. Disposed of medicines properly.	Promote the container's availability to the public and participate in the National Drug Take Back events 2 times per year.
July 2021	<b>PWD Public Works Department Bi-Annual</b>	Held at Transfer Station every 2 years to collect household hazardous waste	PWD Garage	Moderate	Public Works Department	Held the program every 2 years	More public relations and newsletters to residents, better



# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 6 CAPABILITY ASSESSMENT

Latest Adoption or Version Date	Capability Assessment: Education and Outreach Programs	Description Related to hazard mitigation planning and coordination	Location of Capability Entire Town or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2017)	Future Improvements to Capability
	<b>Hazardous Waste Day</b>						participation to the program
July 2021  Currently and regularly in use since 12-15	<b>PWD Transfer Station Message Board</b>	Changeable letter signs signboard. Heavily used public outreach method.	Transfer Station	<b>Moderate</b>	Public Works Department	Purchased a new message board for Transfer Station. Supplied regular public info notices.	More message boards needed at different locations of town to convey messages to wider populations.
Jul 2021	<b>PWD Educated Homeowners on Private Culvert Maintenance</b>	Educate homeowners about private culvert maintenance. Provide information packet for homeowners so they can try to fix their own drainage issues.	Entire Town	<b>High</b>	Public Works Dept	Discussed private culvert problems with homeowners when issues arose. PWD is a member of the Town's Technical Review Comm which includes pre-review of culvert and drainage plans.	Educate homeowners and provide information packets
Currently and Regularly in Use July 2021	<b>SD Pembroke Academy Message Board (School)</b>	Electronic that changes regularly, on Route 3 for passing traffic to view. Complies with Zoning Article VIII Signs § 143-63: Special conditions for specific types of signs X (Electronic Changing Signs)	Pembroke Academy	<b>Moderate</b>	School District (School)	Regular sign changes (School)	Consider partnering with PA for sign information of preparedness & disaster events
Currently and Regularly in Use July 2021	<b>SD Three Rivers School Message Board (School)</b>	Message Board (Manual) that changes regularly	Three Rivers Middle School	<b>Moderate</b>	School District (School)	Regular sign changes	Consider partnering with school for sign information of preparedness & disaster events
2021	<b>SD School District One Call Now (School)</b>	Automated phone, text, email service to parents for alert	Three Rivers, Village School, Hill School, and	<b>High</b>	School District (School)	Upgraded and used messaging system continuously	Use emergency call/text system for school alerts

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 6 CAPABILITY ASSESSMENT

Latest Adoption or Version Date	Capability Assessment: Education and Outreach Programs	Description Related to hazard mitigation planning and coordination	Location of Capability Entire Town or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2017)	Future Improvements to Capability
			Pembroke Academy			to get messages to parents.	
Jul 2021 currently and regularly in use since 12-15	<b>TA Town Website Information, Calendar and Notification</b>	Used by multiple Town Depts, including zoning amendment changes, calendar of meetings, announcements, links to agenda, Town Reports, etc.	Entire Town	High	Town Administration	Updated almost daily with new information.	Use website as an outreach tool, allow Depts to manage their own pages and upload links and content.
January 2021	<b>WW Water Works Annual Water Quality Report</b>	Up to date Water Analysis reported to NHDES, customers informed of where they can obtain report.	Entire Town, especially Water Precinct District	High	Water Works	Updated water quality report yearly and provided to residents.	Meet NHDES water safety requirements and produce annual report.

*Source: Pembroke Hazard Mitigation Committee*

## Review of Existing Plans

As described above, during the Hazard Mitigation process and the identification of existing mitigation **Capabilities**, the Hazard Mitigation Committee used their knowledge of the existing plans, policies, procedures and other documents utilized for their Department duties to develop Capability **Future Improvements**. However, several additional documents not listed in the **Capability Assessment** are also utilized by the community and have a positive relationship to the **Hazard Mitigation Plan 2022**. Most of the documents below are not the Town's documents, but the hazard mitigation goals, objectives, and/or Actions in this Plan are supported by the **Mitigation Support and Resource Documents** listed below in **Table 41**.

**Table 41**

**Mitigation Support and Resource Documents**

<b>Latest Adoption or Version Date</b>	<b>Mitigation Support and Resource Documents Not Listed within Capability Assessment Tables</b>
<b>Feb 2007</b>	NH DHHS NH Influenza Pandemic Public Health Preparedness & Response Plan 2007
<b>2007</b>	USGS Flood of May 2006 in NH
<b>2008</b>	USGS Flood of April 2007 in NH
<b>May 2008</b>	Vanasse Hangen Brustlin, Inc. (VHB) Geomorphology-based Restoration Alternatives Suncook River, Epsom, New Hampshire, (with Appendix A)
<b>July 2008</b>	FEMA Independent Evaluation of Recent Flooding in New Hampshire, (with Appendix A & B)
<b>2009</b>	USGS Flood Study of the Suncook River in Epsom, Pembroke, and Allenstown NH 2009
<b>April 2010</b>	FEMA Flood Insurance Study for Merrimack County
<b>2010</b>	NWS Thunderstorms, Tornadoes, Lightning. Preparedness Guide
<b>Apr 2010</b>	NH Hospital Mutual Aid Network MOU
<b>2011</b>	NH DES Management of Collected Debris Following Severe Storm Events Fact Sheet
<b>Dec 2011</b>	NH DHHS Disaster Behavioral Health Response Plan
<b>Feb 2012</b>	NH DHHS Child Care Center Emergency Preparedness Guide
<b>October 2011</b>	USGS Analysis of the Transport of Sediment by the Suncook River in Epsom, Pembroke, and Allenstown New Hampshire, after the May 2006 Flood
<b>2012</b>	USGS Flood Inundation Maps for the Suncook River in Epsom, Pembroke, Allenstown, and Chichester New Hampshire 2012
<b>2012</b>	Central NH Regional Planning Commission's Natural Resource Maps
<b>2015</b>	NFPA 101 Life Safety Code 2015
<b>2015</b>	NFPA 1 Fire Code 2015
<b>Feb 2015</b>	Central NH Regional Plan 2015
<b>Spring 2015</b>	NH Geological Survey Suncook River Fluvial Geomorphic Assessment Discussion Guide
<b>2012-2015</b>	USGS Documents and Information available (Bedrock Aquifers, etc)
<b>2015</b>	NHOEP Easement Monitoring Guidelines

<b>Latest Adoption or Version Date</b>	<b>Mitigation Support and Resource Documents Not Listed within Capability Assessment Tables</b>
<b>Mar 2015</b>	NH State of NH Tickborne Disease Plan 2015
<b>Jul 2015</b>	NH DOS Statewide Fire Mobilization Implementation Master Plan 2015
<b>Jul 2015</b>	American Red Cross of NH Strategic Plan – Humanitarian Services FY 2015-2021
<b>Jul 2015</b>	NHHSEM NH Recovery Plan with RSFs 2015
<b>Jul 2015</b>	NH DHHS NH Excessive Heat Emergency Response Plan 2015
<b>November 2015</b>	NH Association of Conservation Commissions website documents (regularly updated)
<b>Jan 2016</b>	Eversource Energy Electric Operations Response Plan
<b>Oct 2016</b>	CNHREPC Central New Hampshire Regional Emergency Planning Committee Regional Hazardous Materials Emergency Plan 2016
<b>2016</b>	Capital Area Public Health Network Public Health Emergency Preparedness and Response Plan
<b>Sep 2017</b>	NH DOS Bureau of Emergency Management Services EMS Provider Manual 2017
<b>As provided</b>	NHDES Dam Emergency Action Plans for High, Significant & Low Hazard Dams
<b>Mar 2018</b>	NH DOT Recommendations for the Ten-Year Transportation Improvement Plan (Projects) 2021-2028
<b>2018</b>	USGS Preliminary Stage and Streamflow Data at Selected Stream Gages for Flood of Oct 2017
<b>Oct 2018</b>	State of NH Multi-Hazard Mitigation Plan Update 2018
<b>Jul 2019</b>	NH DHHS NH Arboviral Illness Surveillance, Prevention and Response Plan & Map 2019

*Source: Pembroke Hazard Mitigation Committee, CNHRPC*

## 7 PRIOR ACTION STATUS

The **Hazard Mitigation Plan Update 2017** provided a basis to begin Action development, many of which originated from prior **Plans**. A review of the **2017** Actions is provided by the Hazard Mitigation Committee, determining which Actions have been **Completed**, **Deleted**, or **Deferred** to the **2022 Plan**.

### Action Status Determination

The status of all Hazard Mitigation Plan Actions varies. Priorities over the previous five years can change, budgets are uncertain, and staff are allocated time for certain tasks. Actions developed, evaluated and implemented across Hazard Mitigation Plans accommodate existing, new, and future development (buildings and infrastructure). To accommodate the **2017 Plan's deferred** Actions in addition to the **New** Actions from the **2022 Plan**, there are four designated Action types to describe the detailed Actions following within the **7 PRIOR ACTION STATUS** and/or **8 MITIGATION ACTION PLAN**:

- ☐ **Completed**
- ☐ **Deleted**
- ☐ **Deferred**

Actions which were **Completed** from the **2017 Plan** are listed in **Table 42** along with completion dates.

Actions which were **Deleted** from the **2017 Plan** might have been no longer necessary or a priority to the Town, no longer relevant to the Town's situation or objectives, could not realistically be undertaken, were not financially feasible, were modified and incorporated into other existing Actions, or duplicated existing efforts of Pembroke's activities. Deleted Actions are listed in **Table 43**.

Actions which were **Deferred** from the **2017 Plan** are still important to the Town but were not completed because they did not have the staff capability or the funding to undertake them, other Actions took higher priority, more time was required for completion, or they may need to be repeated to be effective. These **Deferred** Actions are in **Table 44** and have been re-prioritized with the **New** Actions in the **Mitigation Action Plan**.

Changes in priority of the **Deferred 2017** Actions occurred over the last five years. The **2017 Plan** used the **12-36 Priority Score enhanced STAPLEE** system while the **2022 Plan** included both a **Ranking Score** and an **Action Timeframe** to determine priorities with a more useful **15-75 Priority Score enhanced STAPLEE** system. Both methods are described.

New Actions are described later in 8 MITIGATION ACTION PLAN.

## DEFINITIONS

The following definitions were used to ascertain which Actions should be considered *mitigation* Actions versus which should be considered *preparedness* Actions more suitable for incorporation into the *Town Emergency Operations Plan*. The mitigation Actions are those which are carried forth in this **2022 Plan** into the *Mitigation Action Plan*.

Action Type	Duration	Definition or Characteristics
<b>Mitigation</b>	<b>Long Term</b>	Action supports sustained risk prevention or reduces long-term risk to people, property and infrastructure. ↳ Best suited for <i>Town Hazard Mitigation Plan</i> .
<b>Preparedness</b>	<b>Short Term</b>	Action assists or supports planning, protective activities, public education, training and exercise. ↳ Best suited for <i>Town Emergency Operations Plan</i> .
<b>Response, Recovery, Other Related</b>	<b>Short Term</b>	Action supports preventative, response, recovery-related, repeated or deferred maintenance activities. ↳ Best suited for <i>Town Emergency Operations Plan</i> .

## HAZARDS CONSIDERED

With **23** individual hazards evaluated in this Plan, it is not always practical to list each one when describing location vulnerabilities or solutions. In many cases, listing the more encompassing main hazard categories from chapters **3 GOALS AND OBJECTIVES** and **4 HAZARD RISK ASSESSMENT**, which are **Flood, Wind, Fire, Extreme Temperature, Earth, Technological** and **Human**, should accurately define the issues of most of the identified Actions or locations. Using these hazard categories would often better accommodate the situation in their broadness. The categorized hazards have also been used in the **APPENDIX A Critical and Community Facilities Vulnerability Assessment** but tailored when necessary.

In some cases, further hazard detail at a specific location or to describe an Action is necessary. When needed, the specific hazards addressed in this **Hazard Mitigation Plan** could be utilized, such as **Erosion** from the *River Hazards* category, **Storm** (generally applying to warm weather, all-encompassing storms) or **Tree Debris** from the *Wind* category, **Excessive Heat** from the *Extreme Temperature* category, or **Communications** from the *Long Term Utility Outage*, to provide the specific information needed to understand certain issues in Pembroke.

Therefore, when the main hazard categories of **Flood, Wind, Fire, Extreme Temperature, Earth, Technological** and **Human** are not precise enough, one or more of the specific **23** hazards evaluated may be utilized for greater accuracy.

## Review of 2017 Actions

The **2017 Hazard Mitigation Plan** was written in a different format and its content had to comply with less specific review guidelines before the *Local Hazard Mitigation Review Guidebook (FEMA), 2011* became standardized and tailored by each FEMA Region over the years.

Pembroke's mitigation Actions from the **2017 Plan**, which included Actions from the Town's previous Plans, were allocated **Action Numbers** and each **Project's** status was determined by the Hazard Mitigation Committee as either **Completed**, **Deleted** or **Deferred**. Over the previous Plans, the Actions numbers denoted by years were recorded as such. Actions from **2004** which were **Completed** or **Deleted** and identified as such in the **2017 Plan** were not given numerical identifiers (**#NA**).

HMP	Action # Range	
2004 Plan	#NA	#NA
2010 Plan	#1- 2010 to	#14- 2010
2017 Plan	#15- 2016 to	#26- 2016
2022 Plan	#27- 2022 to	#69- 2022

A total of **6** mitigation Actions have been **Completed** from the previous **Hazard Mitigation Plans** as shown in **Table 42**. This includes **4** Actions most recently **Completed** between the **2017 Plan** and **2022 Plan**.

**Table 42**  
**Completed Mitigation Actions**

Priority Score (2017)	Action Number	Action	Completed By Date	Who is Responsible	Approx \$ Cost	Natural Hazards Addressed
<b>COMPLETED AFTER 2022 Plan (from CHAPTER 8)</b>						
		See Chapter 8 – Add completed Actions				
<b>COMPLETED BY 2022 Plan</b>						
<b>34</b>	<b>#11- 2010</b>	<b>Reduce the Risk of Fire Injury by Requiring Sprinklers and Fire Protection Systems in all New Single Family Homes</b>	<b>Adopted a Fire Fighting Fire Supply Ordinance (4+ houses) BOS Ordinance Nov 2019</b>	Board of Selectmen	\$5,000	Fire, Wildfire (Urban Interface)
<b>35 P</b>	<b>#12- 2010</b>	<b>Reduce Flooding, Erosion and</b>	<b>1 culvert replaced in</b>	Public Works Department	\$180,000	Flood, Scouring & Erosion, Wind, Winter, Debris,



## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 7 PRIOR ACTION STATUS

Priority Score (2017)	Action Number	Action	Completed By Date	Who is Responsible	Approx \$ Cost	Natural Hazards Addressed
		Overflow Damage by Upgrading the Failing Culverts on Nadine Drive	2019, 2 more to be replaced			Tropical, River, Ice Jam, Aging Infrastructure
35	#21-2016	Reduce the Risk of Floodwater Susceptibility by Rehabilitating the North Pembroke Road Bridge with the City of Concord	Completed in 2021, underway as of August 2021	Board of Selectmen	\$317,000	Flood, Scouring & Erosion, Wind, Winter, Debris, Tropical, River, Ice Jam, Aging Infrastructure
36	#22-2016	Reduce Flooding, Erosion and Overflow Damage by Upgrading the Micol and Ross Roads Culverts	2018	Public Works Department	\$65,000	Flood, Scouring & Erosion, Wind, Winter, Debris, Tropical, River, Ice Jam, Aging Infrastructure
COMPLETED BY 2017 Plan						
High	#03-2010	Purchase and install a generator at the Highway Department for emergency fuel.	2010	Public Works Director	EMPG Grant	Severe Winter Weather, Extreme Heat, Hurricanes, Severe Storms, Power Failure
Medium	#07-2010	Develop GIS mapping of sewer, culverts and catch basin systems.	February 2014, updated annually	Public Works Director	Staff Time / Regional Planning Commission, Tax Parcel Updates	Flooding, Rapid Snow Pack Melt, Hurricane, Severe Wind, Winter Weather, Debris Impacted Infrastructure

Source: Pembroke Hazard Mitigation Committee

P = Project Partially Completed – Appears in **2021 Mitigation Action Plan**

The pink highlighted rows indicate the **11** total **Deleted** Actions in **Table 43** from previous **Hazard Mitigation Plans** which will not be incorporated into the **2022 Plan** as **Deferred** Actions. Many of the recent Actions were **Deleted** because they were preparedness, response or recovery items and more appropriately belonged in the Town's **Emergency Operations Plan**.

**Table 43**  
**Deleted Mitigation Actions**

Priority Score (2017)	Action Number	Action	Deleted Date	Who is Responsible	Approx \$ Cost	Why Deleted? The Action...
<b>DELETED AFTER 2022 Plan (from CHAPTER 8)</b>						
		See Chapter 8 – Add deleted Actions				
<b>DELETED FROM 2022 Plan</b>						
<b>31</b>	<b>#16-2016</b>	Prohibit Future Hazardous Materials Facilities Located at Major Intersections by Revising Site Plan Review Regulations	<b>Aug 2021</b>	Planning Board with Town Planner	\$5,000	Was not relevant to Town's objectives
<b>33</b>	<b>#23-2016</b>	Eliminate the Potential Danger to Life and Property by Acquiring the Silva Manufactured Housing Park on 823 N Route 106 Along the Soucook River (FGA)	<b>Aug 2021</b>	Emergency Management with Board of Selectmen	\$350,000	Was incorporated into another activity
<b>DELETED FROM 2017 Plan</b>						
Medium	<b>#01-2010</b>	Conduct exercises and drills that test the capabilities of the Town's Emergency Operations Center and the Emergency Operations Plan.	<b>03-16</b>	Emergency Management Director (EMD)	Homeland Security Exercise Evaluation Program (HSEEP) Grant	Was a preparedness, response or recovery item
High	<b>#02-2010</b>	Purchase and install generators at the Shelter (at which School is to be determined).	<b>03-16</b>	Emergency Management Director (EMD)	Emergency Management Performance Grant (EMPG)	Was no longer relevant to the Town's situation
High	<b>#04-2010</b>	Develop a Memorandum of Understanding (MOU) between the town and the school district for use of school buildings for shelter.	<b>03-16</b>	Selectmen / School Board	In-kind Staff time	Was no longer relevant to the Town's situation

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 7 PRIOR ACTION STATUS

Priority Score (2017)	Action Number	Action	Deleted Date	Who is Responsible	Approx \$ Cost	Why Deleted? The Action...
High	#05-2010	Install centralized phone lines at EOC for town & school phone lines.	03-16	Emergency Management Director (EMD)	Emergency Management Performance Grant (EMPG)	Was Modified and incorporated into another Action
Medium	#08-2010	Conduct drills and mock emergency exercises with Pembroke's four public schools.	03-16	Emergency Management Director (EMD)	Homeland Security Exercise Evaluation Program (HSEEP) Grant	Was a preparedness, response or recovery item
Medium	#09-2010	Purchase and install generators at the Town Hall to be utilized as a secondary EOC.	03-16	Emergency Management Director (EMD)	Emergency Management Performance Grant (EMPG)	Was a preparedness, response or recovery item
Low	#10-2010	Develop rotation schedule for vehicle and equipment replacement that can guide the CIP.	03-16	Department Heads	In-kind Staff time	Was a preparedness, response or recovery item
Low	#13-2010	Purchase a culvert vacuum and sweeper truck for DPW.	03-16	Public Works Director	In-kind Staff time	Was a preparedness, response or recovery item
Low	#14-2010	Educate public on capabilities and use of Shelters (i.e. update town website).	03-16	Emergency Management Director (EMD)	In-kind Staff time	Duplicates existing efforts

*Source: Pembroke Hazard Mitigation Committee*

The tan highlighted rows in **Table 44** indicate the **10 Deferred** mitigation Actions from the **2017 Plan** which also appear in the forthcoming **2022 Plan's Mitigation Action Plan**. Many **Action** titles were revised to update the Action and to reflect the new focus on mitigation although the principle for each remains the same. The **Approximate Cost** may rise. They will all be reevaluated to accommodate **2021** standards in later sections.

**Table 44**  
**Deferred Mitigation Actions**

Priority Score (2017)	Action Number	Action	Deferred Date	Who is Responsible	Approx \$ Cost	Why Deferred? Because...	Hazards Addressed
32	#15-2016	Reduce the Impact of Injury from Natural Hazards by Requiring New Road Elevation and/or More than 1 Egress for New Developments	Aug 2021	Planning Board with Town Planner	\$5,000	More time is necessary to work on the action.	Wind, Winter, Wildfire, Tropical
35	#17-2016	Prioritize the Upgrade of Most Problematic Culverts and Drainage Facilities by Developing an Annual Culvert Replacement Program	Aug 2021	Public Works Department	\$0	More time is needed: PWD working on asset management program in Aug 2021, completed in 2022. Public culverts, catch basins, storm drains.	Flood, Erosion, River, Aging Infrastructure
36	#18-2016	Update and Enforce the Floodplain Ordinance to Comply with Federal NFIP Requirements	Aug 2021	Building Department	\$0	Action needs to be repeated regularly	Flood, Scouring & Erosion, Wind/Tropical, Winter, River Ice Jam
27	#19-2016	Prevent Further Human Encroachment onto and Reduce Further Erosion of the Merrimack, Suncook and Soucook Rivers Shorelands by Regulating More Stringent Setbacks and Buffers from the Shoreland Areas (FGA)	Aug 2021	Planning Board with Town Planner and Code Enforcement Officer	\$5,000	Other activities took higher priority.	River, Flood, Erosion, Rainstorms, Life & Safety
35 P	#12-2010	Reduce Flooding, Erosion and Overflow Damage by Upgrading the Failing Culverts on Nadine Drive	Aug 2021	Public Works Department	\$180,000	More time is needed: 1 culvert replaced in 2019, 2 more to be replaced	Flood, Erosion, Wind, Tropical, Rainstorms, Debris, Aging Infrastructure

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 7 PRIOR ACTION STATUS

Priority Score (2017)	Action Number	Action	Deferred Date	Who is Responsible	Approx \$ Cost	Why Deferred? Because...	Hazards Addressed
24	#20-2016	Protect the PWD Employees and Equipment by Underpinning the Public Works Facility Foundation to Prevent Movement	Aug 2021	Board of Selectmen	\$92,000	Other activities took higher priority. No funding. Has been a lower priority in CIP. Researching more options now for updated costs or repair for that section of building.	Earthquake, Wind, Tropical, Rainstorms, Winter, Life & Safety
36	#06-2010	Remove Hazardous Trees or Limbs Along Town Roadways	Aug 2021	Public Works Department	\$0	Action needs to be repeated regularly: Have a line item for tree removal. Crew assesses and removes if they can or calls tree service.	Wind, Tropical, Tree Debris, Winter
35	#24-2016	Eliminate the Erosion of the Merrimack River Bank at Memorial Field's Boat Launch by Obtain the Necessary Permitting (FGA)	Aug 2021	Public Works Department	\$20,000	No staff time or funding available: used for rec use currently.	Flood, Erosion, Tree Debris, Public Health & Safety
36	#25-2016	Reduce the Risk of Drug Overdose by Advertising the Police Department's Drug Take Back Container	Aug 2021	Police Department	\$0	Action needs to be repeated regularly: Box advertised, used, emptied. Large amounts collected.	Public Health & Safety
36	#26-2016	Reduce the Risk of Public Dumping of Household Hazardous Waste to Protect Groundwater Supplies by Advertising the Collection Program	Aug 2021	Public Works Department	\$0	Action needs to be repeated regularly: Bi-annual, every other fall – next is Sept/Oct. 2021. Advertise & hold. Great participation	Haz Mat, Public Health, Water Quality

Source: Pembroke Hazard Mitigation Committee

P = Project Partially Completed – Appears in **2021 Mitigation Action Plan**

## 8 MITIGATION ACTION PLAN

The Chapter provides a summary discussion of the Actions the community can consider completing to help mitigate the effects of hazard events.

The **Mitigation Action Plan** is the culmination of the work of the previous Assessments, inventories, and evaluations from the previous Chapters. Actions to help Pembroke mitigate the damages caused by disasters have been developed and prioritized by Hazard Mitigation Committee consensus in consideration of both existing and new development.

### SOURCES OF ACTIONS

After determining the status of the existing Actions, **New** Actions can be determined. **New** Actions were evaluated by Hazard Mitigation Committee the using the **Problem Statements** determined during discussion of critical facility and community facility sites' potential vulnerability to hazards in the **Critical Facility and Community Vulnerability Assessment**. Many of these problems were further evaluated and developed into **New** mitigation Actions.

The **Capability Assessment** yielded a wealth of information from the **Future Improvements** of the plans, programs, ordinances, policies, agreements, technical skills, financial resources, and other resources the Town Departments, School District, and Stakeholders had available. These activities are important to the community. They assist Departments with the procedures, training, regional coordination, mutual aid, planning and purchases needed to perform their duties effectively. These activities in turn increase the capability for mitigating hazard events. For the **2022 Plan**, most of the **Capability Assessment's Future Improvements** activities were not utilized as Actions since they are more appropriate for the Town's **Emergency Operations Plan** recommendations.

Other community ideas were introduced to or by the Hazard Mitigation Committee as a result of Department, Board, Commission or Town discussions. Where appropriate, supported activities were introduced as New mitigation Actions.

**Mitigation Actions developed emphasize both new and existing buildings and infrastructure to better protect populations of Pembroke.**

Several uncompleted **Deferred** (2017) Pembroke mitigation Actions have been carried forward into the **2022 Plan** with the updates to the evaluation, cost, prioritization, etc.

## ACTION MATRIX

A listing of **10 Deferred** mitigation Actions from **2017** and **43 New** mitigation Actions from **2022** important to the Town of Pembroke was developed for evaluation. Each Action identifies at least one **Hazard Mitigated** which correlates to **3 GOALS AND OBJECTIVES**, describing how it can mitigate these identified natural hazard objectives. A short **Description and Evaluation** is provided and the **Affected Location** is listed to ensure easier understanding and reassessment of the Actions in the future during implementation.

The Actions are numbered for easier tracking over the years with this practice beginning in this **2022 Plan**. The **2022** Actions begin where the prior Actions left off, **#27- 2022** through **#69- 2022**. Over time, the Actions can be tracked to see which have been **Deferred** and to organize the **Completed** or **Deleted** Actions. For those with funding needs, the ability to reference an Action within the Capital Improvements Program or in a Warrant Article can alleviate confusion and further support the mitigation Actions.

Each Action is sorted into one of these four mitigation Action categories, although it might identify with several:

Local Planning and Regulation  
Structure and Infrastructure Projects  
Natural Systems Protection  
Education and Awareness

Within the **Mitigation Action Plan**, the **Deferred 2017** Actions and the **New 2022** Actions are evaluated by the relative ease of completion using a numeric **Ranking Score** generated by the enhanced STAPLEE prioritization, by the **Action Timeframe** by which the Hazard Mitigation Committee would like to see the Action implemented, and by a basic **Cost to Benefit Analysis** as contained within the STAPLEE.

The **Responsible Department** is indicated for each Action as the party who will ensure the Action gets completed. An **Approximate Cost** is provided, although no definitive cost estimates or quotes have been obtained now. Ways the Action can be **Funded** is identified and offered as an avenue to explore during implementation. The purpose is to offer an idea of how much funding is provided for each Action and how it may be paid for.



## Pembroke's Mitigation Action Plan 2022

At the meetings, the Hazard Mitigation Committee identified by consensus these mitigation Actions from the various **Assessments** and evaluations conducted. The process for Action development has been described in previous Chapters and sections. Combined with the visual **Maps 1-4** of the **Hazard Mitigation Plan 2022**, the **Mitigation Action Plan** shown in **Table 45 Planning and Regulatory**; **Table 46 Structure and Infrastructure**; **Table 47 Natural Systems Protection**; and **Table 48 Education and Outreach** should be able to guide future hazard mitigation efforts in the Town through an annual implementation process.

Ten (**10**) **Deferred** Actions from **2017** and **43 New** Actions from **2022** combine to develop the **53** Actions of the **2022 Mitigation Action Plan**. The **Deferred** Actions' cells are highlighted in tan.

**Table 45**

**Local Planning and Regulation Actions**

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
#15-2016	Modify the Subdivision Regulations and Site Plan Review Regulations to Add Requirements for Secondary Egress to Reduce Safety Risks from Wildfire, Winter, and Severe Wind Events	Medium Term 3-4 Years	63	Planning Board	\$500	Emergency access is a tremendous delay. Many parcels on the range roads are for sale and are inexpensive. Developers are looking to purchase these properties. New developments will arise, and this is the opportunity to develop secondary egress regulations for certain high density or geographically isolated developments.	Wind, Winter, Wildfire, Tropical	New Development, Entire Town	Cost is for legal review, but other land use regulation changes in that year would help offset the cost.	Town Legal Budget Line Item
#17-2016	Developing an Annual Culvert Replacement Program to Prioritize the Upgrade of Most Problematic Culverts and Drainage Facilities to Reduce the Impacts of Flood and Erosion	Short Term 1-2 Years	69	Public Works Department	\$30,000	Pembroke is required to participate in the MS-4 program for stormwater. PWD is working on asset management program in Aug 2021 to be completed in 2023. Public culverts, catch basins, storm drains are included. Digital map and geodatabase are the products.	Flood, Erosion, River, Aging Infrastructure	Town Roads	Cost is for the development of the AMP by a contractor (Dubois & King).	NHDES Clean Water State Revolving Fund
#18-2016	Update and Enforce the Floodplain Ordinance to Comply with Federal NFIP Requirements to Reduce the Impacts of Flood	Short Term 1-2 Years	68	Planning Board	\$0	The Zoning Ordinance would need to be updated as new requirements to the National Flood Insurance Program are necessary for retention of NFIP participation. The Floodplain Ordinance protects life and property by regulating distance of structures to flood hazard areas, regulating elevation, clarifying definitions, regulating new structures and encroachments, stating duties of	Flood, Scouring & Erosion, Wind/Tropical, Winter, River Ice Jam	Merrimack, Suncook and Soucook Rivers	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal duties to fulfill this Action.	N/A

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
						the Code Enforcement Officer, etc. In 2010, the Town adopted the recommended updates to the ordinance. The existing ordinance is amended with federal updates as needed.				
#19-2016	Prevent Further Human Encroachment onto the Merrimack, Suncook and Soucook Rivers Shorelands by Regulating More Stringent Setbacks and Buffers from the Shoreland Areas to Reduce the Impacts of Flooding and Further Erosion (FGA)	Medium Term 3-4 Years	65	Planning Board	\$500	Has been 125' since early 2000s. Recommending the buffer distance greater than 125' from the three rivers.	River, Flood, Erosion	Merrimack, Suncook and Soucook Rivers	Cost is for legal review, but other zoning ordinance changes in that year would help offset the cost.	Town Legal Budget Line Item
#27-2022	Obtain Annual Lists of Tenants from Multi-Family Building Owners to Reduce the Risk of Natural and Human Hazard Impacts	Medium Term 3-4 Years	54	Building Department with Board of Selectmen Assistance	\$600	Many landlords are out of state and receiving the lists could take some time. The first stage is to request tenant lists from building owners for the assessing dept and ensure a copy is provided to emergency management. If owners do not comply, the second stage is to develop a Town policy or Town Ordinance to require multi-family building owners annually provide current and updated lists of tenants and tenant contact information.	Evacuation, Fire, Human Hazards	Multi-Family Buildings	Cost is for legal review and a public hearing, but may be less.	Town Legal Budget Line Item
#28-2022	Investigate How Towns in the Manchester-Boston Regional Airport	Short Term 1-2 Years	69	Police Dept, Emergency Management, assisted	\$0	Concern is high that Pembroke is in the Manchester-Boston Regional Airport flight path. Pembroke hosts an active	Crash, Mass Casualty, Fire, Haz Mat	Flight Paths across Town	Cost is \$0 for in-kind staff and/or volunteer labor	N/A

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
	Flightpath Address Low Flying Planes and Develop Operational Guidelines for Response to Crashes			by Board of Selectmen		helicopter piloting business that contributes to concerns. After reviewing how other towns address this issue, attempt to develop regulations to mitigate impacts. Also a single user flight path on Buck Street, and Pembroke is in the flightpath of Pease AFB. (PG will ask MHT response team, Pease and MHT have sent delayed equipment to towns during crashes). Also Concord Airport and Concord Air National Guard cross Pembroke to Bear Brook training area.			conducted during normal duties to fulfill this Action.	
#29-2022	Develop a Zoning Ordinance Amendment to Address Unsafe Structures and Include a Remediation Timeframe to Reduce the Risk of Fire and Public Health and Safety	<u>Short Term</u> 1-2 Years	62	Planning Board	\$500	Unoccupied properties are more vulnerable to fire, vandalism and other damage such as Pembroke Water Works (newly a private property), Old Buck St School House and the Whittemore Homestead. This measure was previously under consideration. If a structure is damaged or condemned, the owner must remediate it within a specified timeframe. This will help prevent abandoned buildings that fall into disrepair from becoming a public health issue or a nuisance (or a fire hazard).	Public Health, Fire, Vandalism	Entire Town	Cost is for legal review, but other zoning ordinance changes in that year would help offset the cost.	Town Legal Budget Line Item
#30-2022	Develop a Comprehensive Phasing Plan in Zoning Ordinance to Stipulate Phasing of Large Developments	<u>Medium Term</u> 3-4 Years	65	Planning Board	\$500	Town infrastructure and services may not be able to keep up with the large new development or multiple developments. Examples include Fire, Police and Public Departments' services,	Wind, Winter, Wildfire, Tropical, Health and Safety	New Development, Entire Town	Cost is for legal review, but other zoning ordinance changes in that year would	Town Legal Budget Line Item

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
	over Several Years to Reduce the Impact to Town Infrastructure and Services					vehicles, and equipment; Water, Sewer and School services and capacity. A phasing plan in the Zoning Ordinance would require large developments (residential or commercial) to be built in phases over time. The phasing can be supported in the Subdivision and Site Plan Review Regulations. Impact Fees and a Growth Management Ordinance are other tools to help accommodate a predicted growth boom.			help offset the cost.	
#31-2022	Amend the Capital Improvements Program to Account for Increases Necessitated by New Development and Include Hazard Mitigation Actions	Short Term 1-2 Years	59	Town Administrator or to request CIP Committee and Budget Committee	\$0	When the CIP is revised annually in spring 2022, include additional vehicles and equipment to keep current with new development. Add new hazard mitigation projects to the CIP. Recommend a Capital Reserve Fund (CRF) for hazard mitigation projects be approved at Town Meeting 2023. Most of these projects can be covered under existing CRF.	Drought, Earthquake, Temperature, Wind, Flood, Landslide, Lightning, Health, River, Winter, Solar, Tropical, Wildfire	New Development, Entire Town	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal duties to fulfill this Action.	Hazard Mitigation Project CRF (new)
#32-2022	Develop a Town Public Health Emergency Plan to Reduce the Impact of Infectious Diseases	Short Term 1-2 Years	58	Health Officer with Emergency Management	\$0	Use experience from COVID-19 pandemic to write down policies and procedures for long-term infectious diseases. Example: recently worked with downtown restaurants to establish an Outdoor Dining Policy for COVID. Could make other efforts to support local businesses and understand their needs. Could include economic factors (see	Public Health, Infectious	Entire Town	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal duties to fulfill this Action.	N/A

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
						Planning and Land Use Department).				
	ADD NEW ACTION HERE									

*Source: Pembroke Hazard Mitigation Committee*

**Table 46**  
**Structure and Infrastructure Projects**

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
#12-2010	Upgrade the Failing Nadine Drive Culverts to Reduce the Impact of Flood and Erosion	<u>Long Term</u> 4-5 Years	71	Public Works Department	\$100,000	1 culvert replaced in 2019, 1 or 2 more to be replaced, deteriorating metal. Would need to upgrade materials from 48 or 60", could use any material HDPE plastic or concrete when NHDES recommends. Plan to upgrade in 2027.	Flood, Erosion, Wind, Tropical, Rainstorms, Debris, Aging Infrastructure	Nadine Drive	Cost is for culvert material, permitting and engineering, and contractor labor.	PWD Infrastructure Upgrades and Repairs CRF
#20-2016	Stabilize the Public Works Facility Foundation to Prevent Movement From Subsidence, Earthquake, Snowload, Wind or Flood	<u>Medium Term</u> 3-4 Years	67	Public Works Department	\$65,000	Deferred, has been a lower priority in CIP. Researching more options now for updated costs or repair for that section of building. Old estimates, replacement would be higher. Existing movement and settling of Public Works Facilities' structure and foundation. Constructed on an old dumping ground, unstable over time. Experiencing cracks, visible light, leaning. Item to repair in CIP (low priority), equipment may not be retrievable if wall(s) fall. Reviewed by contracted engineer (GZA who produces an annual report) regularly who makes recommendations. Appears yearly, but not favorably reviewed. The fix is costly-\$60,000 for injection foam system, but no guarantee it will stop settling (caulking worked for a time). Have a CRF for all town buildings, annual basis. Scored	Earthquake, Wind, Tropical, Rainstorms, Winter, Life & Safety	Public Works Department Garage	Cost is for the foam injection system by contractor to repair cracks.	Warrant Article



# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
						highest gets the repair. Potential leakage from heavy rainstorms. PWD staff could be impacted by the shifting facility.				
#33-2022	Upgrade the Safety Center Roof with Improved Roofing Materials to Reduce the Impact of Winter Weather, Rainstorms, and Severe Wind	Short Term 1-2 Years	65	Fire & Police with Building Committee	\$100,000 - \$200,000	The roof at the Safety Center (both Fire Department and Police Department sides) needs replacement. New leaks every rainstorm. On the CIP list for 2021 or 2022 for replacement. When the flat roof leaks, damage to ceiling tiles, floors, structural damage could occur if nothing is replaced. Where the building joins at flat area, the roof leaks. Screws are backing out of the Teflon roof, which is where leaks are forming. Underbody of the roof deteriorating, screws falling, more spots for leaks. Police has a sally port with leaking or flooding. Potential impact on electrical. People may not be safe because of bulging ceiling tiles.	Winter, Wind, Tropical	Safety Center	Cost is structural engineering examination and report, roofing materials and contracted labor.	Town Building Maintenance or Safety Center Repair Maintenance, or Town Building CRF Fund
#34-2022	Evaluate and Install Lightning Rods and Grounding Systems at the Town Hall, Safety Center, Public Works Department Garage, Clock Tower, and Library to Reduce the impact of Lightning Strikes	Medium Term 3-4 Years	57	Fire Department	\$40,000	Town Hall and PWD Garage, other facilities do not have lightning rods. The Safety Center antenna tower is grounded (25 feet high) which may attract the lightning. HVAC is on the roof (metal casings). Grounding designed for electrical in the building, not for lightning. Surge protectors are used in many buildings for electronics. A lightning strike could destroy	Lightning, Fire, Communications, Utility	Town Hall, Safety Center, Public Works Department Garage, Clock Tower, Library	Cost is for five lighting rod and grounding systems, installation, and panel.	Hazard Mitigation Project CRF (new)

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
						electronic equipment, cause local fires, and would cause operations disruptions if not system is installed.				
#35-2022	Coordinate Future Radio Purchases for All Departments and the Schools to Ensure Regular and Consistent Communications During Emergencies	<u>Short Term</u> 1-2 Years then <u>Ongoing</u>	72	Police Dept coordination	\$350,000	All Depts have different frequencies and radios at present. Goal is to place a base radio (7) in each Dept, plus (25) mobiles \$2,500-\$3,500 each, portables (50). Norm is to use mobile and convert to base station with DC-> AC power converter. Placed into the CIP - FD \$110,000 to replace 45 portables in 2022, all 15 mobiles @ \$3,500 replaced 2021. FD have 4 base stations (3,500) including 1 HAM amateur, 1 for PWD/Schools, 2 in the FD. FD also has AG handset for communication. Some grants may not work for those radios in CIP.	All Emergency Services	Entire Town	Cost is estimated for new 32 mobiles/base radios (@\$3,500 each) and 50 portables (@\$2,500 each) across departments, plus inflated pricing in 3-4 years.	Town Department Budgets (individual), Federal Grants, Hazard Mitigation Project CRF (new)
#36-2022	Designate a Public Building as a Potable Outdoor Water Filling Station to Reduce the Impacts of Drought and Power Outage	<u>Medium Term</u> 3-4 Years	57	Emergency Management	\$5,000	Insert a water tap for outdoor filling at a public building that has a large parking lot. Options could include the Town Hall, Library, Public Works Dept, then consider the Pembroke Academy or Three Rivers School, or thirdly, Grace Capital (right below is AG) helps their 500 members first. A discussion and MOU may be needed first.	Drought, Winter, Utility Outage	Entire Town	Cost is for the hardware and installation.	Town Building Improvements or Emergency Management, Hazard Mitigation Project CRF (new)

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
#37-2022	Upgrade the Main Street and Bow Lane Water Lines to Reduce the Impact of Earthquakes and Maintain Public Health	<u>Short Term</u> 1-2 Years	71	Pembroke Water Works	\$125,000 - \$175,000 for each section	Main Street to be replaced due to age and potential for future breaks, to be upgraded in 2022. Bow Lane to be replaced due to poor quality piping and repeated breaks, due to be updated in 2023. These older lines serve many customers, yet demand is increasing. Both projects will be completed concurrent with Pembroke's Public Works roadwork.	Earthquake, Public Health	Main Street and Bow Lane	Cost is for pipes and materials, permitting, equipment, and contracted labor.	Water Works User Fees, Potential Capital Reserve Funding, Potential Grants
#38-2022	Upgrade the Littlefield Condos Culvert to Reduce the Impact of Flood and Erosion	<u>Long Term</u> 4-5 Years	69	Public Works Department	\$100,000	Small repair done in 2020. The culvert and drainage system into the Merrimack River is too small. Failure may occur during highest storm events. This project may be private and out of the Town's jurisdiction.	Flood, Erosion, Wind, Tropical, Rainstorms, Debris, Aging Infrastructure	Littlefield Condominiums	Cost is for culvert material, permitting and engineering, and contractor labor.	PWD Infrastructure Upgrades and Repairs CRF, possible NHDES Clean Water Revolving Loan Funds
#39-2022	Upgrade 747 Cross Country Rd Culvert to Reduce the Impact of Flood and Erosion	<u>Medium Term</u> 3-4 Years	70	Public Works Department	\$30,000	Culvert draining into brook and beaver pond is deteriorating. Plan to upgrade in 2023.	Flood, Erosion, Wind, Tropical, Rainstorms, Debris, Aging Infrastructure	Cross Country Road	Cost is for culvert material, permitting, equipment, and in-kind staff labor.	PWD Infrastructure Upgrades and Repairs CRF
#40-2022	Upgrade the 216 Brickett Hill Rd Culvert to Reduce the	<u>Short Term</u> 1-2 Years	72	Public Works Department	\$15,000	The stormwater runoff culvert is deteriorating. Plan to upgrade in 2022.	Flood, Erosion, Wind, Tropical, Rainstorms,	Brickett Hill Road	Cost is for culvert material, equipment,	Warrant Article

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
	Impact of Flood and Erosion						Debris, Aging Infrastructure		and in-kind staff labor.	
#41-2022	Upgrade the 339 Brickett Hill Rd Culvert to Reduce the Impact of Flood and Erosion	Short Term 1-2 Years	72	Public Works Department	\$7,500	The stormwater runoff culvert is deteriorating. Plan to upgrade in 2022.	Flood, Erosion, Wind, Tropical, Rainstorms, Debris, Aging Infrastructure	Brickett Hill Road	Cost is for culvert material, equipment, and in-kind staff labor.	PWD Infrastructure Upgrades and Repairs CRF
#42-2022	Upgrade the 766 Borough Rd Culvert to Reduce the Impact of Flood and Erosion	Short Term 1-2 Years	72	Public Works Department	\$22,000	Culvert draining into brook with ponds on both side of the road is deteriorating. Plan to upgrade in 2023.	Flood, Erosion, Wind, Tropical, Rainstorms, Debris, Aging Infrastructure	Borough Road	Cost is for culvert material, permitting, equipment, and in-kind staff labor.	Warrant Article
#43-2022	Upgrade the Drain from Exchange St. to Memorial Field to Reduce the Impact of Flood and Erosion	Short Term 1-2 Years	71	Public Works Department	\$250,000	Pipe that drains into the Merrimack River is deteriorating. Plan to upgrade in 2023 from 24" to 36". Could use any material HDPE plastic or concrete when NHDES recommends.	Flood, Erosion, Wind, Tropical, Rainstorms, Debris, Aging Infrastructure	Exchange Street to Memorial Field	Cost is for culvert material, permitting and engineering, and contractor labor.	PWD Infrastructure Upgrades and Repairs CRF, possible NHDES Clean Water Revolving Loan Funds
#44-2022	Upgrade the Fourth Range Road Culvert to Reduce the Impact of Flood and Erosion	Medium Term 3-4 Years	70	Public Works Department	\$17,000	Culvert that eventually drains into Merrimack River is deteriorating. Plan to upgrade in 2024.	Flood, Erosion, Wind, Tropical, Rainstorms, Debris, Aging Infrastructure	Fourth Range Road	Cost is for culvert material, equipment, and in-kind staff labor.	Warrant Article

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
#45-2022	Upgrade the 682 Thompson Rd Culvert to Reduce the Impact of Flood and Erosion	Medium Term 3-4 Years	70	Public Works Department	\$10,000	Culvert draining into the Suncook River is deteriorating. Plan to upgrade in 2024.	Flood, Erosion, Wind, Tropical, Rainstorms, Debris, Aging Infrastructure	Thompson Road	Cost is for culvert material, equipment, and in-kind staff labor.	Warrant Article
#46-2022	Upgrade the North Pembroke Rd Culverts to Reduce the Impact of Flood and Erosion	Long Term 4-5 Years	70	Public Works Department	\$30,000	Two stormwater runoff culverts are deteriorating. Plan to upgrade in 2025.	Flood, Erosion, Wind, Tropical, Rainstorms, Debris, Aging Infrastructure	North Pembroke Rd	Cost is for culvert material, equipment, and in-kind staff labor.	PWD Infrastructure Upgrades and Repairs CRF
#47-2022	Upgrade the Deerpath Lane Culverts to Reduce the Impact of Flood and Erosion	Long Term 4-5 Years	70	Public Works Department	\$60,000	The four stormwater runoff culverts are deteriorating. Plan to upgrade in 2025.	Flood, Erosion, Wind, Tropical, Rainstorms, Debris, Aging Infrastructure	Deerpath Lane	Cost is for culvert material, permitting, equipment, and in-kind staff labor.	PWD Infrastructure Upgrades and Repairs CRF
#48-2022	Upgrade the Bridge St Culvert to Reduce the Impact of Flood and Erosion	Long Term 4-5 Years	70	Public Works Department	\$15,000	The stormwater runoff culvert is deteriorating. Plan to upgrade in 2026.	Flood, Erosion, Wind, Tropical, Rainstorms, Debris, Aging Infrastructure	Bridge St	Cost is for culvert material, equipment, and in-kind staff labor.	Warrant Article
#49-2022	Upgrade the Cross Road Culverts to Reduce the Impact of Flood and Erosion	Long Term 4-5 Years	69	Public Works Department	\$30,000	Two stormwater runoff culverts are deteriorating. Plan to upgrade in 2026.	Flood, Erosion, Wind, Tropical, Rainstorms, Debris, Aging Infrastructure	Cross Road	Cost is for culvert material, permitting, equipment, and in-kind staff labor.	PWD Infrastructure Upgrades and Repairs CRF

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
#50-2022	Upgrade the Donna Drive Culvert to Reduce the Impact of Flood and Erosion	Long Term 4-5 Years	69	Public Works Department	\$20,000	The culvert that drains into the Merrimack River is deteriorating. Plan to upgrade in 2027.	Flood, Erosion, Wind, Tropical, Rainstorms, Debris, Aging Infrastructure	Donna Drive	Cost is for culvert material, equipment, and in-kind staff labor.	Warrant Article
#51-2022	Upgrade the Batchelder Road Culvert to Reduce the Impact of Flood and Erosion	Long Term 4-5 Years	67	Public Works Department	\$400,000	This is an undermined granite culvert under bridge flowing into Suncook River. Could use any material HDPE plastic or concrete when NHDES recommends. Plan is to upgrade in 2027.	Flood, Erosion, Wind, Tropical, Rainstorms, Debris, Aging Infrastructure	Batchelder Road	Cost is for culvert material, permitting and engineering, and contractor labor.	PWD Infrastructure Upgrades and Repairs CRF, possible NHDES Clean Water Revolving Loan Funds
	ADD NEW ACTION HERE									

Source: Pembroke Hazard Mitigation Committee

Table 47  
Natural Systems Protection Actions

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
#06-2010	Remove Hazardous Trees or Limbs Along Town Roadways to Reduce the Impact of Winter Weather and Severe Wind Events	Short Term 1-2 Years then Ongoing	70	Public Works Department	\$3,000	Trees can fall down onto roads and break power lines during heavy winds, winter storms, or rainstorms. The PWD has a line item for tree removal. Crew assesses and removes if they can or calls tree service. Ongoing/annual process budgeted for and undertaken.	Wind, Tropical, Tree Debris, Winter	Class V Maintained Town Roads	Cost is for equipment rentals or hiring contractors to remove the larger trees from roadways.	PWD Budget for Tree Cutting Maintenance (Annual)
#24-2016	Obtain the Necessary Permitting to Upgrade the Memorial Field Boat Launch to Reduce Erosion of the Merrimack River Bank (FGA)	Long Term 4-5 Years	63	Public Works Department	\$100,000 +	Used for recreational use currently. Mother's Day Floods caused Suncook River sediment down to mouth of the Merrimack, which filled in the boat launch. Needs to be dredged. No more large boats can launch from there. Only canoes and kayaks now. Fire Department must go to Allenstown to put in water rescue boat, must go upriver to get to White Sands.	Flood, Erosion, Tree Debris, Public Health & Safety	Merrimack River	Cost is for permitting, equipment, and labor.	NHDES Grants, Possibly Tax Dollars (Warrant Article)
#52-2022	Obtain the Most Recent Webster Mills, China Mills, and Emerson Dam Emergency Action Plans from NH DES to Reduce the Risk of Flood Inundation in Public Areas	Short Term 1-2 Years then Ongoing	69	Emergency Management	\$0	For the High, Significant, and Low Hazard Dams, obtain the Dam Emergency Action Plans to have available on file to use for flooding event. Around Webster Mill Dam finds erosion after each flood, closer to Mills Falls Condos. Obtain the Inundation Maps with each DEAP to visualize how far flooding could impact into the community. Meeting scheduled with Emerson Mills dam owner to request EAP.	Dam, Flood, River	Suncook River	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal duties to fulfill this Action.	N/A



# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
#53-2022	Inspect Conditions of Silva Manufactured Housing Park on 823 N Route 106 Along the Soucook River for Life Safety to Ascertain the Potential for Erosion and Bank Failure (FGA)	<u>Short Term</u> 1-2 Years for first steps, then <u>Long Term</u> 4-5 Years for last steps	69	Police Department with Building Department and Fire Department	\$0	After the Mother's Day Flood 2006, owner had no interest in selling. Some sections of the property may have been taken by the State for the new Soucook River NH 106 bridge (completed Nov 2021). Although acquisition was not supported by landowner when contacted by Town, owner may be more conducive to discussion as a result of the bridge. Options for property concerns: 1) Obtain the NHDOT environmental and engineering studies and evaluate the options. (Short Term) 2) Request NHDES NH Geological Survey to inspect the property and report recommendations. (Medium Term) 3) Develop an engineering study to determine how the NHDES recommendations could be implemented and at what cost. (Long Term) 4) Consider voluntary acquisition of the property after discussions with the owner using a FMA 75/25 or HMGP 75/25 grant. (Long Term)	River, Flood, Erosion, Landslide, Public Safety	Soucook River	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal duties to fulfill this Action.	N/A
#54-2022	Install Trail Kiosks at Town Forest Trailheads and Encourage Owners of Conservation Lands Install Kiosks to	<u>Short Term</u> 1-2 Years Promotion, <u>Medium Term</u> 3-4 Years	56	Conservation Commission, partnering with Eagle Scouts	\$0	Town Trails are located at the Batchelder Town Forest. Goal is to inform those who walk public or private trails of potential natural hazard dangers. Find financial resources for	Wind, Tropical, Tree Debris, Wildfire, Lightning	Conservation Lands	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal	N/A or Eagle Scout Project

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
	Reduce the Risk of Lightning and Wind Tree Debris Injuries	Installation				landowners to install a wooden trailhead kiosk to fill with standardized paper maps of the trails, a list what uses are permitted, and add information on what to do during lightning, wildfire, and severe wind events.			duties to fulfill this Action, or if an Eagle Scout does the work.	
#55-2022	Consider Options Related to White Sands Beach to Increase Public Safety and Reduce the Risk of Bank Erosion	Short Term 1-2 Years	62	Board of Selectmen with Police Department	\$0	Discussion is the first step. Because of the numerous issues related to monitoring, access, safety, and liability, White Sands Beach is a problem. The Town beach is far away from US 3, and White Sands Road is gated and barred from vehicular use beyond the parking lot. The Town monitors and maintains the parking lot on White Sands Road, where a Pembroke resident (free) permit required. Because the PSNH section is gated to the beach, the PD's (no key)/TT's/FD's response time to the beach, once notified, may not be quick enough to save an individual. As a result of these issues, offering public beach service may increase the Town's liability. Identified problems include: - locked and barred access gate not accessible by many Town Depts; - only some Depts have keys to private gate; - access road not adequate for emergency vehicles;	River, Flood, Erosion, Tree Debris, Public Health & Safety	White Sands Beach on Merrimack River	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal duties to fulfill this Action.	N/A

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
						- any signage posted disappears (is stolen) very quickly; - large pine trees are in danger of falling into the river; - no lifeguard on site; - no regulating the use of the beach, unmonitored and unmaintained; - no river enforcement between White Sands and Memorial Field; - emergency response time would be too long for most incidents; - riverbank is eroding; - glass is reported on the sand; - out of Town beach-goers; - Boats dock from the Merrimack River on the bank from anywhere (no permits); - beach is not tested for e. coli or other biological contaminants.				
#56-2022	Develop List of Priority Parcels for Conservation Commission for Future Land Protection Consideration to Encourage Regular Timber Harvesting and Reduce the Risk of Wildfire and Increase the Floodplain Capacity	Short Term 1-2 Years then Ongoing	62	Conservation Commission	\$0	Protect natural habitats, develop more trail systems, protect key parcels from future development. Perhaps the Conservation Commission could consider developing a long range open space plan to review and prioritize the properties of interest to conserve from development. Establishing forestry management plans can enable regular timber harvesting to reduce the risk of wildfire. Cons Comm receives 100% of LUCT.	Wildfire, Flood, Erosion	Forested Parcels, Floodplain Parcels	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal duties to fulfill this Action.	N/A

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
#57-2022	Partner with the Snowmobile Clubs to Clear Hazardous Trees along the Town Range Roads Creating a Firebreak to Reduce the Risk of Wildfire	Short Term 1-2 Years then Ongoing	73	Snowmobile Clubs with volunteer Fire Dept help	\$0	The Class VI Range Roads are not maintained by the Town, and if the Town spends money on them, they will become Class V roads that require maintenance. The Fire Dept has provided volunteers to assist the local snowmobile clubs with downed limbs, hazardous trees which makes the roads suitable for 2-way traffic and passable for fire apparatus. The clubs maintain their snowmobile bridges, making sure they are wide enough for Fire Dept equipment to pass. A natural firebreak is made with the tree and brush cutting along the Class VI Range Roads, reducing the likelihood of wildfire. A Range Road is the equivalent of a fire access road that equipment can pass through while a firebreak.	Wildfire	Class VI Range Roads and Trails	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal duties to fulfill this Action.	N/A
#58-2022	Inventory and Map Rural Water Supplies to Enhance Fire Suppression and Reduce the Impact of Wildfire	Short Term 1-2 Years then Ongoing	74	Fire Department with Public Works help	\$0	Seasonally sources change, beaver activity and drought levels can change the locations of water supplies. The Fire Dept obtained a Folding Tank as a Portable Water Supply from an older truck, can place the folding tank on the Forestry Tanker apparatus off-road. An inventory of the locations and alternate locations of water supplies will ensure personnel are aware of the most likely source in the vicinity of a wildland fire. The	Wildfire	Rural Fire Ponds, Large Water Sources	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal duties to fulfill this Action.	N/A

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
						mapped inventory can be done in conjunction with the training of members.				
	ADD NEW ACTION HERE									

*Source: Pembroke Hazard Mitigation Committee*

**Table 48**  
**Education and Awareness Actions**

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
#25-2016	Reduce the Risk of Drug Overdose by Advertising the Police Department's Drug Take Back Container	<u>Short Term</u> 1-2 Years then Ongoing	67	Police Department	\$0	Installed box (donated from dental office) and advertised. Social media - Facebook, Twitter, website, signs on doors. National semi annual Take Back events are done, bring in unused medication a large amount collected.	Public Health & Safety	Entire Town	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal duties to fulfill this Action.	N/A
#26-2016	Promote the Bi-Annual Household Hazardous Waste Collection Program to Reduce the Risk of Groundwater Contamination and Public Health Crisis	<u>Short Term</u> 1-2 Years then Ongoing	71	Public Works Department	\$100	Defer. Bi-annual, every other fall Sept/Oct. 2021 event is scheduled for Oct 30. Advertised by flyers, Town website. Budget has increased for the program (\$10,000), gets NHDES grant (10%). Reduces the risk of public dumping of old paint and garage liquids and protect groundwater supplies.	Haz Mat, Public Health, Water Quality	Entire Town	Cost is for printing flyer for advertising.	Solid Waste Collection / Waste Removal Budget line
#59-2022	Distribute and Publicize the Public Works Garage Wall Status Reports to Encourage Public Support for Funding Its Stabilization	<u>Short Term</u> 1-2 Years	68	Public Works Department	\$0	With public support, the PWD garage wall project could rate more highly in the CIP and other funding programs and could be funded for repair/improvement more quickly. Focus on staff safety and the availability to better respond to emergencies with facility improvements. Post online, Town email distribution list to indicate printed copies are available in Town Hall and Library.	Earthquake, Wind, Tropical, Rainstorms, Winter, Life & Safety	Public Works Facility	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal duties to fulfill this Action.	N/A
#60-2022	Encourage the Installation of Lightning Rods and	<u>Medium Term</u> 3-4 Years	67	Fire Department	\$0	During the process to install lightning rods and grounding systems in the Town buildings,	Lightning, Fire, Communications, Utility	Congregational Church,	Cost is \$0 for in-kind staff and/or	N/A

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
	Grounding Systems on the Congregational Church to Reduce the Impact of Lightning Strike					provide the information and costs to the Congregational Church. Describe why the Town chose to install these rods and systems and suggest they also consider installations. PA and Three rivers have installed grounding systems at main power panel, no rods.		Pembroke Academy, Three Rivers	volunteer labor conducted during normal duties to fulfill this Action.	
#61-2022	Develop Public Evacuation/Stay in Place Plans for Suncook Village Area, the Schools, and Nearby Populated Areas on US 3 to Reduce the Impact of Hazardous Materials Leaks	Short Term 1-2 Years	68	Emergency Management	\$0	Some work has done with Granite Shore and with School Districts. Answer is more to shelter in place. Existing plans should be refreshed. Several potential areal hazards exist in Suncook Village and US 3. 1) The aging Tennessee Gas Pipeline is located in an environmentally sensitive area over aquifers and is under federal control. No known leak to date. Town has only reactionary measures for fixing emergency leaks and an emergency phone number to call. Tenneco repaired an 8"x 100' section of pipe around 2019 near Memorial Field/PWD building. 2) Anhydrous ammonia leak from the Granite Shore Merrimack Station in Bow across the Merrimack River. 3) Associated Grocers natural gas leak. Evacuation plans and response plans should be made.	Hazardous Materials, Public Health & Safety	Suncook Village Area, Schools, US 3 residents & businesses	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal duties to fulfill this Action.	N/A
#62-2022	Establish a Public Notification System for Suncook Village,	Medium Term 3-4 Years	57	Emergency Management	\$50,000 + annual	The Town needs to obtain a mass notification system to all cell phones / and landline phones in	Hazardous Materials,	Suncook Village Area,	Cost is for the software calling system, any	Warrant Article for purchase,



# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
	the Schools and Nearby Populated Areas on US 3 to Reduce the Risk of Hazardous Materials Contamination				subscription	different zones of Town for emergency purposes. Evacuation could happen a little faster with targeted cell phone and landline calls. Associated Grocers (AG) on Cooperative Way has on site anhydrous ammonia (pipeline on roof), truck in trailers idle and offload. Large tanks (anhydrous ammonia 650 gallons) are in their cooling rooms. AG also has a diesel fueling station. There is only one means of egress/access if there is need to evacuate. AG/Cooperative Way evacuation of the area is similar to the Suncook Village issue. Need to determine what needs to happen, what software is used, where are the zones, who is in charge of notification, etc. School uses One Call Now, only those within the school system.	Public Health & Safety	Schools, US 3 residents & businesses	hardlines and phones needed, recording systems and the annual subscription fee.	operating budget for subscription
#63-2022	Develop Department Response Plans for Suncook Village Area, the Schools, and Nearby Populated Areas on US 3 to Reduce the Risk of Hazardous Materials Contamination	Medium Term 3-4 Years	57	Emergency Management	\$0	Few staff and volunteers available for staffing during incidents. Notification system would help greatly. Paired with the Evacuation Plan Action. All-Department Response Plans should be generated for areal hazards in Suncook Village and along US 3. 1) Aging Tennessee Gas Pipeline leak. 2) Anhydrous ammonia leak from the Granite Shore Merrimack Station in Bow across the Merrimack River. 3)	Hazardous Materials, Public Health & Safety	Suncook Village Area, Schools, US 3 residents & businesses	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal duties to fulfill this Action.	N/A

# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
						Associated Grocers natural gas leak.				
#64-2022	Promote Public Education and a Mass Notification System for Resident and Business Evacuation/Stay in Place Options for Suncook Village Area	Short Term 1-2 Years then Ongoing	62	Emergency Management	\$200	Promote public education for resident and business evacuation options for those in the Suncook Village area and discuss how to sign up for the mass notification system. Identify the Town's mass notification system and promote it on the Town website, on social media feeds, and Department & Board webpages. Print out flyers and post in businesses around community.	Earthquake, Extreme Temperature, Wind, Flood, Lightning, River, Winter, Solar, Tropical, Haz Mat, Utility, Crash, Aging Infrastructure	Suncook Village Area	Cost is for printing flyer for advertising and postage.	Emergency Management budget
#65-2022	Provide Outreach to and Develop a List of Hazardous Materials Facilities in Town to Reduce the Impact of Haz Mat Incidents	Short Term 1-2 Years then Ongoing	67	Emergency Management	\$0	Emergency responders from Pembroke need to identify the hazardous materials facilities in Town, then meet with the owners to share ideas for improvements to the safety of the facility. Request and share emergency spill and evacuation plans so the Town could respond more quickly during an incident. Emergency Management software is Firehouse now, transitioning to Emergency Reporting software instead. Can do pre-plans, target hazards, can pull up what they need at the scene, manages personnel, payroll. Total management software. Subscription fee about \$5,000 annually.	Haz Mat, Public Health, Water Quality	Entire Town	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal duties to fulfill this Action.	N/A
#66-2022	Include Provisions for Drinking Water Supplies into New	Short Term 1-2 Years	63	Emergency Management	\$1,000	Recent drought conditions from 2016 to present have seen many households outside of the Water	Drought	Entire Town outside of	Cost is for printing pamphlets/	Emergency Management

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
	Emergency Informational Pamphlets for Residents to Reduce the Impact of Drought and Other Natural Disasters					Works District with their dug wells going dry. Their only solution is to pay to have another well dug. During the time they have no drinking water, the Town should install and potable outdoor water fill faucet for residents to use at no charge. Part of this activity is publicizing the availability of the public faucet to residents. FD will partner with PD for Drug Take back table.		Water Works District	placards for residents to pick up.	ent budget
#67-2022	Discuss the Merits of a Mobile Emergency Management Trailer and Fill with Necessary Goods to Reduce the Localized Impacts of Natural Disasters and Utility Outages and Publicize its Availability to Residents	Short Term 1-2 Years	66	Emergency Management	\$0	A mobile trailer can be kept onsite at the Safety Center for ready transport to emergency locations. The trailer could include items such as blankets, cones, barriers, sump pumps, sand bags, cots, water, portable generator, portable scene lights, base station and mobile radios, variable message board, haz mat suits, a desk for mobile operations, and other emergency response gear. The items and gear should be rotated out to ensure all they are fresh and in good condition for use. PD has a trailer for ATV, trailer for water rescue, trailer for cold weather rescue, trailer for other things at Fire Dept. How many trailers are necessary or is a truck filled up to respond to incident? Must discuss to define the need.	Drought, Earthquake, Temperature, Wind, Flood, Landslide, Lightning, Health, River, Winter, Solar, Tropical, Wildfire	Entire Town	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal duties to fulfill this Action.	N/A

## Town of Pembroke, NH Hazard Mitigation Plan Update 2022

### 8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approx Cost to Town	Description and Evaluation of Action	Hazards Mitigated?	Affected Location in Town	What Cost Will Pay For	How Funded
						Perhaps a full garage and an empty trailer is the solution.				
#68-2022	Publicize the Town Public Health Emergency Plan to Reduce the Impact of Infectious Diseases	Short Term 1-2 Years	64	Health Officer with Emergency Management	\$0	Publicize the new Public Health Emergency Plan that included the COVID-19 pandemic policies and procedures for long-term infectious diseases. Website, social media, printed copy at the Library and Town Hall can help publicize the document and its contents.	Health, Infectious	Entire Town	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal duties to fulfill this Action.	N/A
#69-2022	Provide Educational Material for Residents and Businesses to Reduce the Risk of Injury or Damage During Severe Winter Weather	Short Term 1-2 Years then Ongoing	71	Emergency Management with Fire Department help	\$0	Obtain free FEMA pamphlets to give to residents about winter emergency topics such as: all fuel-burning equipment like generators during snowstorm should be vented to the outside; the importance of installing carbon monoxide monitors and alarms; staying away from downed wires on the roads and at homes; furnace ventilation, warming car in garage, keep dryer/furnace vents clear from snow build up; be careful raking snow off roofs.	Winter	Entire Town	Cost is \$0 for in-kind staff and/or volunteer labor conducted during normal duties to fulfill this Action.	N/A
	ADD NEW ACTION HERE									

Source: Pembroke Hazard Mitigation Committee

### Great Projects... And the Realities of Project Implementation in New Hampshire

These important but costly and/or time-consuming mitigation projects identified in the **Mitigation Action Plan** represent the best case scenarios (or to some, “wish-list” items) for completion. There are many barriers to successful implementation of any project which is outside the typical duties of a Town staff member or volunteer. The annual struggle to obtain municipal funding at Town Meetings and the uncertainty of political & local support needed for hazard mitigation projects, the limited staff time available to administer and complete the projects, and dwindling volunteer support to help locate grants and work on the Action Plan items all reduce the Town’s ability to complete successful hazard mitigation projects within the Plan’s 5-year lifespan. Town staff and volunteers are usually required to be reactive to their numerous daily duties or annual processes and have little availability to be proactive. This is especially true for the Central NH region’s smaller communities that rely on voter support for staff hiring and/or hazard mitigation project budget funding, which is 19 out of 20 municipalities (excludes the City of Concord).

Therefore, mitigation and other projects are generally completed on an “as-needed basis” or on an “as-available basis” despite the different ways of evaluation and prioritization shown within the **Hazard Mitigation Plan 2022**. Small New Hampshire communities do the best they can with the resources available to them to make ends meet, particularly in times of economic duress or hardship and our State’s aging population. Town Meeting voters decide whether to approve new zoning ordinances which can help mitigate hazards, vote to approve Department Budgets which usually are sustainable and do not allow enough flexibility to plan ahead, and vote to approve Warrant Articles for a hazard mitigation project. Town volunteers are relied upon to do much of the hazard mitigation work as Town staff are already engaged in real-time, constant public engagement issues and have little additional time available for planning. Few younger people are stepping up to the plate of community volunteering when our existing volunteers are retiring. Indeed, many staff or volunteers have dual or triple roles in the community to fill vacancies, such as a Town Administrator serving as Health Officer and Human Services Officer and a volunteer Fire Chief serving as volunteer Emergency Management Director. Town staff try to accomplish their priority hazard mitigation projects in between their normal duties, but the reactive nature of New Hampshire municipal operations does not provide the necessary support unless there is an urgent need.

Our State’s communities, including Pembroke, are used to “toughing it out” and will try to accomplish all they can with the time, funding, and resources available to them. However, many of these 2022 Actions may end up **Deferred to 2027** simply because of the unique nature of our independent State and community cultures.



## Action Evaluation and Prioritization Methods

A variety of methods were utilized to evaluate and prioritize the Actions. These methods include the enhanced STAPLEE (Social Technical Administrative Political Legal Environmental and Economics) criteria, designating the Action to be completed within a certain timeframe, and completing a basic **Cost to Benefits Analysis**, a later section. These prioritization methods are meant to enable the community to better identify which Actions are more important and are more feasible than others.

### ENHANCED STAPLEE METHOD

An enhanced provided a better methodology for prioritization the Actions against one another. The Hazard Mitigation Committee ranked each of the mitigation Actions derived from the evaluation process. The total **Ranking Score** serves as a guide to the relative ease of Action completion by scoring numerous **societal and ethical impact questions** and does not represent the Town's Action *importance* priority. Instead, the STAPLEE process evaluates each Action and attempts to identify some potential barriers to its success. As revised in **2022**, a score of **75** would indicate that the mitigation strategy, or Action, would be relatively among the easiest Actions to achieve from a social and ethical standpoint.

The previous Plans including the **2017 Plan** had answered the same questions, except the three new questions regarding funding, staffing, and historic preservation, on a scale of **1-3**, with "**1**" indicating a **NO** response, "**2**" indicating a **MAYBE** response, and "**3**" indicating a **YES** response, for a possible highest ranking total score of **36**.

There is more latitude in the **2022 Plan's** enhanced STAPLEE scores to more easily identify the relatively easiest Action projects for completion. All enhanced STAPLEE answers are subjective and depend on the opinions of the Committee members discussing them. The Committee answered these **15** questions with a numeric score of "**1**" indicating a **NO** response, "**2**" indicating an **UNCERTAIN** response, "**3**" indicating a **MAYBE** response, "**4**" indicating a **LIKELY** response or "**5**" indicating a **YES** response, about whether the Action can fulfill the criteria:

- Does the action reduce damage and human losses?
- 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?
- Is the action socially acceptable?
- Is the action technically feasible?
- Is the action administratively possible?
- Is the action politically acceptable?

Action Completion	
RANKING	SCORE
Excellent	75 - 60
Good	45 - 59
Fair	44 - 30
Poor	29 - 15

- Does the action offer reasonable benefits compared to its cost in implementing?
- Is the action legal?
- Is the action support or protect the environment?
- Does the action have the funding necessary for completion?
- Does the action have the necessary staff or volunteers to undertake?
- Does the action support historic preservation?

The enhanced STAPLEE scores can range from a low of **15** to a high **75**, the highest possible ranking. Pembroke's **Mitigation Action Plan** STAPLEE rating is shown in **Figure 28** and includes a basic benefit-cost ranking as shown in yellow.

**Figure 28**  
**Enhanced STAPLEE Ranking of Mitigation Actions**

Action Number	Does the Action..... or Is the Action.....	Reduce Damage? (or Injury?)	Contribute to Town Objectives? (Supported by Master Plan or current thinking?)	Meet Regulations? (If there are any)	Protect Sensitive Structures? (Buildings, roads, culverts, human-made things?)	Implement Quickly? (See also Action Plan for Timeframe)	Socially Acceptable? (People like project?)	Politically Acceptable? (Public Officials like project?)	Administratively Realistic? (Have admin skills or time for paperwork?)	Technically Feasible? (Have tech skills or special equipment?)	Have a Reasonable Cost to Benefits Gained? (Will project save \$\$ in long term?)	Legal? (Or will be legal upon completion?)	Support or Protect the Environment? (Natural resources?)	Have the Funding? (Can funding be obtained?)	Have Necessary Staff or Volunteers?	Support Historic Preservation? (Sites, neighborhoods, culture?)	Ranking Score 15-75
#15- 2016	Modify the Subdivision Regulations and Site Plan Review Regulations to Add Requirements for Secondary Egress to Reduce Safety Risks from Wildfire, Winter, and Severe Wind Events	4	4	5	4	4	4	4	4	4	5	5	5	5	5	1	63
#17- 2016	Developing an Annual Culvert Replacement Program to Prioritize the Upgrade of Most Problematic Culverts and Drainage Facilities to Reduce the Impacts of Flood and Erosion	5	5	5	4	5	5	4	4	4	5	5	5	5	5	3	69
#18- 2016	Update and Enforce the Floodplain Ordinance to Comply with Federal NFIP Requirements to Reduce the Impacts of Flood	4	4	5	5	5	4	4	5	5	5	5	4	5	5	3	68
#19- 2016	Prevent Further Human Encroachment onto the Merrimack, Suncook and Soucook Rivers Shorelands by Regulating More Stringent Setbacks and Buffers from the Shoreland Areas to Reduce the Impacts of Flooding and Further Erosion (FGA)	4	3	5	5	4	3	4	5	5	5	5	5	5	5	2	65
#27- 2022	Obtain Annual Lists of Tenants from Multi-Family Building Owners to Reduce the Risk of Natural and Human Hazard Impacts	4	4	5	1	2	3	4	4	4	4	5	1	5	5	3	54
#28- 2022	Investigate How Towns in the Manchester-Boston Regional Airport Flightpath Address Low Flying Planes and Develop Operational Guidelines for Response to Crashes	4	3	5	5	4	5	5	4	5	5	5	5	5	4	5	69
#29- 2022	Develop a Zoning Ordinance Amendment to Address Unsafe Structures and Include a Remediation Timeframe to Reduce the Risk of Fire and Public Health and Safety	4	4	5	5	4	4	4	4	4	5	5	2	5	5	2	62
#30- 2022	Develop a Comprehensive Phasing Plan in Zoning Ordinance to Stipulate Phasing of Large Developments over Several Years to Reduce the Impact to Town Infrastructure and Services	3	5	5	4	4	4	4	5	5	5	5	4	5	5	2	65
#31- 2022	Amend the Capital Improvements Program to Account for Increases Necessitated by New Development and Include Hazard Mitigation Actions	1	5	5	5	4	3	2	5	5	5	5	1	5	5	3	59
#32- 2022	Develop a Town Public Health Emergency Plan to Reduce the Impact of Infectious Diseases	5	4	5	1	4	3	4	5	5	5	5	1	5	5	1	58
#12- 2010	Upgrade the Falling Nadine Drive Culverts to Reduce the Impact of Flood and Erosion	5	5	5	5	3	5	5	5	5	5	5	5	5	5	3	71
#20- 2016	Stabilize the Public Works Facility Foundation to Prevent Movement From Subsidence, Earthquake, Snowload, Wind or Flood	5	5	5	5	4	4	5	5	5	5	5	3	4	5	2	67
#33- 2022	Upgrade the Safety Center Roof with Improved Roofing Materials to Reduce the Impact of Winter Weather, Rainstorms, and Severe Wind	5	5	5	5	5	3	3	5	5	5	5	1	3	5	5	65
#34- 2022	Evaluate and Install Lightning Rods and Grounding Systems at the Town Hall, Safety Center, Public Works Department Garage, Clock Tower, and Library to Reduce the Impact of Lightning Strikes	5	4	5	5	3	3	3	4	4	4	5	2	2	3	5	57
#35- 2022	Coordinate Future Radio Purchases for All Departments and the Schools to Ensure Regular and Consistent Communications During Emergencies	5	5	5	5	5	3	4	5	5	5	5	5	5	5	5	72
#36- 2022	Designate a Public Building as a Potable Outdoor Water Filling Station to Reduce the Impacts of Drought and Power Outage	4	5	5	1	3	5	4	5	4	4	5	2	4	5	1	57
#37- 2022	Upgrade the Main Street and Bow Lane Water Lines to Reduce the Impact of Earthquakes and Maintain Public Health	5	5	5	5	5	4	5	5	5	5	5	5	5	5	2	71



# Town of Pembroke, NH Hazard Mitigation Plan Update 2022

## 8 MITIGATION ACTION PLAN

Action Number	Does the Action..... or Is the Action.....	Reduce Damage? (or injury?)	Contribute to Town Objectives? (Supported by Master Plan or current thinking?)	Meet Regulations? (if there are any)	Protect sensitive Structures? (buildings, roads, culverts, human-made things?)	Implement ed Quickly? (see also Action Plan for Timeframe)	Socially Acceptable? (People like project?)	Politically Acceptable? (Public Officials like project?)	Administratively Feasible? (Have admin skills or time for paperwork?)	Technically Feasible? (Have tech skills or special equipment?)	Have a Reasonable Cost to Benefits Gained? (Will project save \$\$ in long term?)	Legal? (or will be legal upon completion?)	Support or Protect the Environment? (Natural resources?)	Have the Funding? (Can funding be obtained?)	Have Necessary Staff or Volunteers?	Support Historic Preservation? (sites, neighborhoods, culture?)	Ranking Score 15-75
ACTION																	
#38- 2022	Upgrade the Littlefield Condos Culvert to Reduce the Impact of Flood and Erosion	5	5	5	5	3	4	5	5	5	5	5	5	5	5	2	69
#39- 2022	Upgrade 747 Cross Country Rd Culvert to Reduce the Impact of Flood and Erosion	5	5	5	5	4	4	5	5	5	5	5	5	5	5	2	70
#40- 2022	Upgrade the 216 Brickett Hill Rd Culvert to Reduce the Impact of Flood and Erosion	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2	72
#41- 2022	Upgrade the 339 Brickett Hill Rd Culvert to Reduce the Impact of Flood and Erosion	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2	72
#42- 2022	Upgrade the 766 Borough Rd Culvert to Reduce the Impact of Flood and Erosion	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2	72
#43- 2022	Upgrade the Drain from Exchange St. to Memorial Field to Reduce the Impact of Flood and Erosion	5	5	5	5	4	4	5	5	5	5	5	5	5	5	3	71
#44- 2022	Upgrade the Fourth Range Road Culvert to Reduce the Impact of Flood and Erosion	5	5	5	5	4	4	5	5	5	5	5	5	5	5	2	70
#45- 2022	Upgrade the 682 Thompson Rd Culvert to Reduce the Impact of Flood and Erosion	5	5	5	5	4	4	5	5	5	5	5	5	5	5	2	70
#46- 2022	Upgrade the North Pembroke Rd Culverts to Reduce the Impact of Flood and Erosion	5	5	5	5	4	4	5	5	5	5	5	5	5	5	2	70
#47- 2022	Upgrade the Deepwater Lane Culverts to Reduce the Impact of Flood and Erosion	5	5	5	5	4	4	5	5	5	5	5	5	5	5	2	70
#48- 2022	Upgrade the Bridge St Culvert to Reduce the Impact of Flood and Erosion	5	5	5	5	3	4	5	5	5	5	5	5	5	5	3	70
#49- 2022	Upgrade the Cross Road Culverts to Reduce the Impact of Flood and Erosion	5	5	5	5	3	4	5	5	5	5	5	5	5	5	2	69
#50- 2022	Upgrade the Donna Drive Culvert to Reduce the Impact of Flood and Erosion	5	5	5	5	3	4	5	5	5	5	5	5	5	5	2	69
#51- 2022	Upgrade the Batchelder Road Culvert to Reduce the Impact of Flood and Erosion	5	5	5	5	3	3	4	5	5	5	5	5	5	5	2	67
#06- 2019	Remove Hazardous Trees or Limbs Along Town Roadways to Reduce the Impact of Winter Weather and Severe Wind Events	5	5	5	5	5	4	5	5	5	5	5	4	5	5	2	70
#24- 2016	Obtain the Necessary Permitting to Upgrade the Memorial Field Boat Launch to Reduce Erosion of the Merrimack River Bank (FGA)	4	5	5	4	3	4	4	4	5	4	5	5	4	5	2	63
#52- 2022	Obtain the Most Recent Webster Mills, China Mills, and Emerson Dam Emergency Action Plans from NH DES to Reduce the Risk of Flood Inundation in Public Areas	4	4	5	5	5	5	5	5	5	5	5	3	5	5	3	69
#53- 2022	Inspect Conditions of Silva Manufactured Housing Park on 823 N Route 106 along the Soucook River for Life Safety to Ascertain the Potential for Erosion and Bank Failure (FGA)	3	4	5	5	5	5	5	5	5	5	5	5	5	5	2	69
#54- 2022	Install Trail Kiosks at Town Forest Trailheads and Encourage Owners of Conservation Lands Install Kiosks to Reduce the Risk of Lightning and Wind Tree Debris Injuries	4	5	5	2	2	3	4	4	4	4	5	4	4	4	2	56
#55- 2022	Consider Options Related to White Sands Beach to Increase Public Safety and Reduce the Risk of Bank Erosion	5	4	5	1	4	4	4	5	5	5	5	5	4	4	2	62
#56- 2022	Develop List of Priority Parcels for Conservation Commission for Future Land Protection Consideration to Encourage Regular Timber Harvesting and Reduce the Risk of Wildfire and Increase the Floodplain Capacity	4	5	5	2	4	4	5	4	4	4	5	5	4	4	3	62
#57- 2022	Partner with the Snowmobile Clubs to Clear Hazardous Trees along the Town Range Roads Creating a Firebreak to Reduce the Risk of Wildfire	5	5	5	5	5	4	4	5	5	5	5	5	5	5	5	73
#58- 2022	Inventory and Map Rural Water Supplies to Enhance Fire Suppression and Reduce the Impact of Wildfire	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5	74
#25- 2016	Reduce the Risk of Drug Overdose by Advertising the Police Department's Drug Take Back Container	5	5	5	1	5	5	5	5	5	5	5	5	5	5	1	67
#26- 2016	Promote the Bi-Annual Household Hazardous Waste Collection Program to Reduce the Risk of Groundwater Contamination and Public Health Crisis	5	5	5	5	5	5	5	5	5	5	5	5	5	5	1	71
#59- 2022	Distribute and Publicize the Public Works Garage Wall Status Reports to Encourage Public Support for Funding its Stabilization	5	5	5	5	4	5	5	5	5	5	5	3	5	5	1	68
#60- 2022	Encourage the Installation of Lightning Rods and Grounding Systems on the Congregational Church to Reduce the Impact of Lightning Strike	5	4	5	5	3	4	4	5	5	5	5	2	5	5	5	67
#61- 2022	Develop Public Evacuation/Stay in Place Plans for Suncook Village Area, the Schools, and Nearby Populated Areas on US 3 to Reduce the Impact of Hazardous Materials Leaks	5	5	5	1	5	5	5	5	5	5	5	4	4	5	4	68
#62- 2022	Establish a Public Notification System for Suncook Village, the Schools and Nearby Populated Areas on US 3 to Reduce the Risk of Hazardous Materials Contamination	5	5	5	1	3	5	5	5	5	5	5	1	1	5	1	57
#63- 2022	Develop Department Response Plans for Suncook Village Area, the Schools, and Nearby Populated Areas on US 3 to Reduce the Risk of Hazardous Materials Contamination	5	5	5	1	3	5	5	5	5	5	5	1	1	5	1	57
#64- 2022	Promote Public Education and a Mass Notification System for Resident and Business Evacuation/Stay in Place Options for Suncook Village Area	5	5	5	1	4	5	5	5	5	5	5	2	5	4	1	62
#65- 2022	Provide Outreach to and Develop a List of Hazardous Materials Facilities in Town to Reduce the Impact of Haz Mat Incidents	5	5	5	4	4	4	5	5	5	5	5	4	5	4	2	67
#66- 2022	Include Provisions for Drinking Water Supplies into New Emergency Informational Pamphlets for Residents to Reduce the Impact of Drought and Other Natural Disasters	5	5	5	1	5	5	5	5	5	5	5	1	5	5	1	63
#67- 2022	Discuss the Merits of a Mobile Emergency Management Trailer and Fill with Necessary Goods to Reduce the Localized Impacts of Natural Disasters and Utility Outages and Publicize its Availability to Residents	5	5	5	3	4	5	5	5	5	5	5	2	5	5	2	66
#68- 2022	Publicize the Town Public Health Emergency Plan to Reduce the Impact of Infectious Diseases	5	5	5	1	5	5	5	5	5	5	5	2	5	5	1	64
#69- 2022	Provide Educational Material for Residents and Businesses to Reduce the Risk of Injury or Damage During Severe Winter Weather	5	5	5	5	5	5	5	5	5	5	5	2	5	5	4	71

Source: Pembroke Hazard Mitigation Committee

## ACTION TIMEFRAMES

The Actions are also prioritized by an estimated **Action Timeframe** for completion based upon the other Town activities (hazard mitigation-related or not), funding potential for the Action, the need for the Action project, and possible staff time and volunteers available to complete the Action. This relative Action importance priority is measured by the **time indicated for project completion**. All Action projects within the **Mitigation Action Plan** have been assigned an **Action Timeframe**.

Those projects which are designated as **Ongoing** mean the Action should be undertaken on a regular basis throughout the five-year lifespan of the Plan. Actions that could qualify as **Ongoing** include public education, zoning ordinance or regulation revisions, essential mitigation maintenance and more. However, even **Ongoing** Actions are completed once before repetition. As a result, those Actions with an **Ongoing Action Timeframe** also include a duration (**Short**, **Medium** or **Long Term**) included.

Action Timeframe	Description of Timeframe
<b>Ongoing</b>	Action undertaken throughout the life of the 5-year Plan
<b>Short Term</b>	Action should be undertaken during Years 1-2 of the Plan
<b>Medium Term</b>	Action should be undertaken during Years 3-4 of the Plan
<b>Long Term</b>	Action should be undertaken during Years 4-5 of the Plan

**Short Term** projects are those which are the more important Actions and should be undertaken during **Years 1-2** of the Plan's lifespan if possible. **Medium Term** Actions are recommended by the Hazard Mitigation Committee to be undertaken during **Years 3-4** of the Plan's lifespan, while **Long Term** Actions are those which should wait until last, with suggested implementation undertaken during Plan **Years 4-5**. It is important to remember the **Action Timeframes** are relative to each other and are another indication of Action importance. If an Action cannot be completed within the **Action Timeframe**, it may still be a higher priority than other Actions but was unable to be implemented for some reason.

Both the **Action Timeframe** and the **Ranking Score** are incorporated into the **Mitigation Action Plan** to assist the Town with implementing the hazard mitigation Actions. The Actions can be sorted within their Action Category by either priority for easy display of the desired characteristic; Actions can also be sorted by **Responsible Department** to keep them all together for ease of completion.

## COST TO BENEFIT ANALYSIS

A simple **Cost to Benefit Analysis** ranking is contained within the enhanced STAPLEE criteria as displayed in the previous **Figure**.

## Natural Hazards Evaluated for Which Specific Actions Were Not Identified

The Hazard Mitigation Committee assessed each of hazards and made determinations whether to specifically develop mitigation Actions for all natural hazards. Nearly all the potential Actions can be applied to multiple natural or other hazards based upon the generality of the Action's effect. Still, there could be no solutions or mitigation Actions developed for some of the more difficult to mitigate natural hazards. Many possible reasons are considered such as feasibility, prohibitive cost, jurisdiction, staff availability to develop and administer the project, lack of local support, unrealistic favorable outcome for the effort and more, all resulting in the point that for some natural hazards, potential Actions would not have worked for the Town.

Many Actions are general in nature and have the capacity to mitigate multiple types of natural hazards. From **4 HAZARD RISK ASSESSMENT**, those natural hazards rated a **LOW Concern** may not have been considered for an Action because their priority was not as important as other hazards. The **MEDIUM** and **HIGH Concern** hazards either have generalized or targeted Actions associated with them in the **Mitigation Action Plan** or the reason why no specific or feasible Action was developed for the highest **Concerns** is described in **Table 49**.

Table 49

Committee Assessment of MEDIUM & HIGH Natural Hazards with Mitigation Actions

CONCERN	Natural Hazard	Committee Assessment of Actions
HIGH	Public Health	See Actions related to Public Health, Health (Water Quality), Infectious, Life & Safety and general natural disaster.
HIGH	Severe Winter Weather	See Actions related to Winter, overall Severe Weather Storms, Ice, Tree Debris.
HIGH	Drought	See Actions related to Drought, Lightning, Extreme Temperatures, and Fire.
MEDIUM	Tropical and Post- Tropical	See Actions related to Wind, Tropical, Tree Debris, overall Severe Weather Storms.
MEDIUM	Inland Flooding	See Actions related to Flood, Dam, Erosion, River, and Aging Infrastructure.
MEDIUM	Wildfire	See Actions for Wildfire, Tree Debris, Lightning.
MEDIUM	River Hazards	See Actions related to River, Flood, Dam, Erosion, Landslide and overall Severe Weather Storms.
MEDIUM	High Wind Events	See Actions related to Wind, Tropical, Tree Debris, overall Severe Weather Storms.

Source: Pembroke Hazard Mitigation Committee

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## **9 ANNUAL IMPLEMENTATION AND EVALUATION**

The Town received FEMA approval for the prior **Hazard Mitigation Plan** in **January 2017**. The completion of a planning document is merely the first step in its life as an evolving tool. The **Hazard Mitigation Plan Update** is a dynamic document that should be considered by all Town Departments, Boards, and Committees within their normal working environments. While evaluating the effectiveness of Actions in its everyday implementation, everyone should be able to contribute to the relevancy and usefulness of the Plan and to communicate with the Hazard Mitigation Committee where changes should be made. An annual effort will be undertaken to complete Actions and add new Actions as old tasks are completed and new situations arise. This Chapter will discuss the methods by which the Town of Pembroke will review, monitor, and update its new **Pembroke Hazard Mitigation Plan Update 2022**.

### **Annual Monitoring and Update of the Mitigation Action Plan**

The Board of Selectmen should vote to establish a permanent Hazard Mitigation Committee within **3 months** of receiving the FEMA **Letter of Formal Approval** as indicated in **1 PLANNING PROCESS**. The purpose is to meet on a regular basis to ensure the **Hazard Mitigation Plan's** Actions are being actively worked on and the Plan is evaluated and revised to fit the changing priorities of the Town.

The Emergency Management Director or Board of Selectmen designee should continue to serve as Chair of the Committee for Hazard Mitigation meetings and should be officially appointed to such a capacity by the Board. Current Hazard Mitigation Committee members can be appointed to continue to participate as members of the permanent Committee. More information is provided in **APPENDIX B**.

Committee membership should include:

- |  |  |
|--|--|
| ✓ Emergency Management Director          | ✓ 1 Board of Selectmen member                |
| ✓ Deputy Emergency Management Director   | ✓ 1 Planning Board member                    |
| ✓ Town Administration                    | ✓ 1 Budget Advisory Committee member         |
| ✓ Fire Chief or designee                 | ✓ 1 Pembroke School District Representative  |
| ✓ Police Chief or designee               | ✓ 1 Library Representative                   |
| ✓ Public Works Director or designee      | ✓ 1 Historical Society member                |
| ✓ Building Inspector/ Zoning Compl. Off. | ✓ 1 Conservation Comm Representative         |
| ✓ Welfare Officer/Health Officer         | ✓ 1 Parks and Recreation Comm Representative |
| ✓ Transfer Station Supervisor            | ✓ Community (Stakeholders) at Large          |
| ✓ Town Planner                           |  |

Stakeholders who should be solicited to attend meetings and to participate equitably in the Plan development process include representatives from Pembroke School District, Library, Historical Society, NH Army National Guard, neighborhoods, local State Representatives, agricultural/farming operations, trails groups, local non-profits including the Capital Area Public Health Network, area emergency management directors, local, State or Federal agency representatives (such as NH HSEM), utility representatives, and other members of the public. This composition provides a wide spectrum of potential interests and opportunities for partnership to develop and accomplish Actions.

### HMC INTERIM MEETINGS AND ACTIVITIES

This Committee will **aim to meet up to 4 times per year** to follow these potential future meeting activities to update the **Mitigation Action Plan** and complete the Plan's annual evaluation as displayed in **Table 50**.

**Table 50**

**Hazard Mitigation Committee Preliminary Annual Future Meetings and Activities**

Meeting or Activity Month	ANNUAL Preliminary HMC Interim Meeting Agenda Items and Activities
<b>JANUARY</b> <b>HMC Meeting</b> <i>Budgets Determined</i>	<b>Town operating budgets are determined for the next year.</b> HMC assists Board of Selectmen and Budget Comm with getting their mitigation projects funded by Warrant Articles and written into Dept/Bd Operation budgets. Action implementation continues. HMC requests a <b>Progress Report #2</b> for This Year's & Next Year's Actions from responsible Depts/Bds by beginning of February. HMC continues update to the <b>Action Status File</b> using the <b>Department Mitigation Action Progress Reports</b> .
<b>February-March</b>	HMC staff updates <b>CHAPTER 8 Mitigation Action Plan Tables</b> using the revised <b>Action Status File</b> from the <b>Department Mitigation Action Progress Reports</b> . HMC staff provides revised <b>CHAPTER 8 Mitigation Action Plan Tables</b> to Department Heads/Board Chairs, keeps original Word and Excel files accessible on Town computer system and backed up to cloud.
<b>APRIL</b> <b>HMC Meeting</b> <i>\$ Available</i>	<b>Annual funding is received from March Town Meeting.</b> HMC completes annual update of the <b>CHAPTER 8 Mitigation Action Plan Tables</b> , polls Depts/Bds for new Hazard Events descriptions/impacts/locations/date <b>to add to CHAPTER 4 Local Hazard Event History Table</b> , requests photos of Hazard Events and updates <b>APPENDIX Photographic History</b> . HMC reviews and revises <b>CHAPTER 4 HIRA Table</b> . HMC determines Action Plan items to pursue for Year, including \$0 cost items.
<b>May</b>	HMC members ensure Depts/Bds are provided with information to work on their Actions for the Year. HMC members meet with Depts/Bds to discuss Action priorities and requests completion of This Year & Next Year Actions. Depts/Bds begin working on Actions. HMC posts a <b>Haz Mit/Severe Weather Survey</b> online for widespread public input. HMC helps Depts/Bds with grants for Actions.

Meeting or Activity Month	ANNUAL Preliminary HMC Interim Meeting Agenda Items and Activities
<b>JUNE</b> <b>HMC Meeting</b> <i>Infrastructure Projects Underway</i>	<b>Infrastructure projects will be underway.</b> HMC requests a <b>Progress Report #1</b> for This Year's & Next Year's Actions from responsible Depts/Bds by beginning of July. HMC completes <b>Annual Evaluation of the Plan File</b> . HMC works with the CIP Committee to get certain projects placed into the CIP. Depts/Bds to begin placement of Next Year's high-cost Action Plan items into the CIP.
<b>July- August</b>	HMC assists Depts/Bds with their Operating Budget requests to include Next Year's Actions, and to determine which Actions should have Warrant Articles. HMC staff continues assistance to Depts/Bds for <b>Action Plan</b> items. HMC continues update to the <b>Action Status File</b> using the <b>Department Mitigation Action Progress Reports</b> . HMC staff & members ensure Haz Mit Actions are added into the CIP.
<b>SEPTEMBER</b> <b>HMC Meeting</b> <i>CIP updated, Budgets drafted</i>	HMC to review <b>Action Status File</b> and identify Next Year's Actions to accomplish (including \$0). HMC to review <b>Haz Mit/Severe Weather Survey</b> results to help guide Action priorities. HMC polls Depts/Bds for new Hazard Events descriptions/impacts/locations/date <b>to add to CHAPTER 4 Local Hazard Event History Table</b> , requests photos of Hazard Events and updates <b>APPENDIX Photographic History</b> . HMC reviews and revises <b>CHAPTER 4 HIRA Table</b> if needed.
<b>October- December</b>	HMC attends Board of Selectmen Dept/Bd Operation Budget meetings and suggests Warrant Articles for Action Plan items. HMC attends Budget Committee meetings scheduled through January to champion Action item funding.

*Sources: Pembroke Hazard Mitigation Committee*

For each of the Hazard Mitigation Committee implementation meetings, the Emergency Management Director (or Staff Coordinator) will invite other Department members, Board and Committee members, Town Staff, Pembroke School District representatives, Stakeholders, and other participants of the **2022 Plan** Committee meetings. Identified and general members of the public will also be invited as indicated previously. Their purpose is to attend and participate in the meetings as full participants, providing input and assisting with decision making. Public notice will be given as press releases in local papers, will be posted in the public places in Pembroke, and will be posted on the Town of Pembroke website at <https://www.pembroke-nh.com/>.

The **Hazard Mitigation Plan's Mitigation Action Plan** will be updated and evaluated annually generally following the suggestions outlined within the Chapter. All publicity information, Agendas, and Attendance Sheets, should be retained and compiled for inclusion into **APPENDIX C**.

The Emergency Management Director and Department heads will work with the Board of Selectmen to discuss the funding of Action projects as part of the budget process cycle in the fall of each year. The projects identified will be placed into the following fiscal year's budget request if needed, including the Capital Improvements Program (CIP), Town Operating Budgets, and other funding methods.



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## Implementing the Plan through Existing Programs

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In addition to work by the Hazard Mitigation Committee and Town Departments, several other mechanisms exist which will ensure that the **Pembroke Hazard Mitigation Plan Update 2022** receives the attention it requires for optimum benefit. Incorporating Actions from the Plan is often the most common way the Hazard Mitigation Plan can be integrated into other existing municipal programs, as described below.

### OVERALL IMPLEMENTATION PROGRESS THROUGH LOCAL PLANNING MECHANISMS SINCE THE 2017 PLAN

As a successful, growing community, the Town of Pembroke has a comprehensive network of plans, processes, champions, regulations, and budgets to ensure its local objectives, projects and budgets are fulfilled. The **Pembroke Hazard Mitigation Plan 2022** is a tool for community betterment which works most effectively when partnering with existing planning mechanisms. Since the original **2004 Plan**, the overall integration and importance of the **Pembroke Hazard Mitigation Plan** into existing Town planning mechanisms continues to grow.

Although the **2017 Plan** was not adopted into Planning Board's latest **Master Plan 2020** the opportunity exists now for incorporation of the **2022 Plan**. The **Capital Improvements Program 2020-2025** has been recently updated and its projects influence new funding for Departments, including the Highway Department funding that previously upgraded culverts in the **Mitigation Action Plan**. The **Zoning Ordinance** was revised annually since **2017** and continues to encourage natural systems protection (see **6 CAPABILITY ASSESSMENT**). The **Subdivision and Site Plan Review Regulations** are in need of review and update between **2022-2027**. These regulations indirectly support hazard mitigation planning principles (such as excavation regulations, fire and emergency access, driveway standards, drainage, landscaping, erosion, etc.) that support all versions of the **Plan**. Annual budgets for Emergency Management have been very small but may be able to increase to consider the **Hazard Mitigation Plan** findings. By necessity of the overall tax dollars available as determined by voters, the Town budget limits funding for larger hazard mitigation projects such as box culvert upgrades or infrastructure inventories. The individual Town departmental budgets supported hazard mitigation planning where feasible or supported by voters, such as Capital Reserve Funds for Bridge Repair, Highway, Infrastructure improvements, Town Building Upgrades, Dry Hydrant, etc. Drainage upgrades, culvert upgrades, and asset inventory and management are priorities of the Public Works Department and are important mitigation projects in Pembroke.

Moving forward, Town Boards and Departments have room for further improvement of the **Hazard Mitigation Plan's** incorporation into existing planning mechanisms. For several of these planning

programs, a summary of the **Process to Incorporate Actions** as noted below offers ways for the **2022 Plan** to be utilized.

## **MASTER PLAN**

The latest Pembroke Master Plan was adopted by the Planning Board in **February 2021**. The goal for future updates is annual review and revision of a selection of Chapters. Chapters from the **2020 Master Plan** to update include Vision, Implementation, Housing, Economic Development, Community Facilities, Land Use, Transportation and Natural Resources. New future chapters to consider could include Energy and Historic and Cultural Resources.

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*To support mitigation efforts, the Planning Board should consider adopting the **Hazard Mitigation Plan 2022** as a separate Chapter or Appendix to its Master Plan in accordance with **RSA 674:2.II(e)**.*

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The **Hazard Mitigation Plan** should be presented to the Planning Board by the Town Planner and Emergency Management Director after FEMA's **Formal Approval**. The Plan can be considered for adoption after a duly noticed public hearing, just as any typical Chapter of a Master Plan. In addition, Actions and concerns from the Plan can be integrated into the Master Plan.

## **Process to Incorporate Actions**

The Hazard Mitigation Committee will present the approved **Hazard Mitigation Plan** to the Planning Board within **6** months after FEMA's **Letter of Formal Approval** is received for the Board's consideration and adoption into the Master Plan after a duly noticed public hearing. This is the same process used to adopt other components of the Master Plan. The NH State law supporting the development of a natural hazard mitigation plan as a component of a community Master Plan is **RSA 674:2-III(e)**. The Hazard Mitigation Committee will oversee the process to begin working with the Planning Board to ensure that the relevant **Hazard Mitigation Plan** Actions are incorporated into the Master Plan.

## **CAPITAL IMPROVEMENTS PROGRAM**

Pembroke's last adopted **Capital Improvements Program (CIP)** is **2020-2025** as adopted in **2019**. The goal is to ensure the CIP is reviewed and updated each year by the CIP Committee. The HMC would like to ensure Actions requiring capital improvements funding from the **Hazard Mitigation Plan Update** will be inserted into the Capital Improvements Program for funding during the CIP's next update with specific projects and equipment replacement identified as addressing needs cited in the Update. Depending on the Town's funding needs, Capital Reserve Funds for such items as road & bridge

improvements should be identified where appropriate as addressing projects in the **Hazard Mitigation Plan Update**.

### Process to Incorporate Actions

The Hazard Mitigation Committee (HMC)'s representative to the Planning Board will oversee the process to begin working with the Planning Board's CIP Committee to incorporate the various Hazard Mitigation Plan projects into the updated CIP. As the CIP is amended, the representative from the Hazard Mitigation Committee should be appointed to sit on the CIP Committee or the HMC should submit a CIP Project Application to ensure the mitigation projects are addressed as part of the CIP update process. A new Capital Reserve Fund for Hazard Mitigation Projects could be considered.

### **TOWN MEETING**

In Pembroke, the annual Town Meeting is held in March where the voters of the Town vote to raise money for capital projects and approve the annual operating budget of the Town. This is a good, revolving opportunity to explain the importance of the mitigation actions of the **2022 Plan Update** and **how the funding of specific capital projects simultaneously responds to these mitigation projects**.

### Process to Incorporate Actions

The Hazard Mitigation Committee (HMC)'s Town Department members will work with the Town Administrator, Budget Advisory Committee and Board of Selectmen to develop a capital budget and warrant article language for appropriate Actions for **Town Meeting vote**. The HMC members may also request deposits to appropriate Capital Reserve Funds for some of the larger projects. A representative from the Hazard Mitigation Committee will provide a copy of the current **Mitigation Action Plan** to both the Budget Advisory Committee and Board of Selectmen annually and validate the need for funding at the annual Town Meeting to accomplish the projects. The representative will work with Town Administration to write warrant article language for approval Action items if needed or to get the items placed into Department Operating Budgets.

### **OPERATING AND CAPITAL BUDGETS**

Many of the Actions will not require specific funding but are identified as requiring in-kind Staff labor to perform the work required to undertake the Actions. Town Departments and Staff have rigorous job functions that demand their undivided attention to the tasks required to run their respective Departments. Additions to the workload to accommodate the Actions can put a strain on their ability to serve the public during performance of their normal job duties. When possible, Pembroke Departments and staff will be able to prioritize their tasks to work on **Hazard Mitigation Plan Update 2022** Actions. The in-kind staff work performed is assumed under the Operating Budget for that particular Department. The Emergency Management Department could benefit from a higher annual budget.

### Process to Incorporate Actions

With obtaining assistance from the HMC, the Department or Board is given the responsibility to ensure their Actions are completed, either by working on the Actions allocated to him/her when their normal job duties permit or by delegating the Action to another person. The funding for the Actions comes out of the Department's operating budget as work is undertaken by the Staff person on an as-time-permits basis unless the Action is a component of the Town staff members' normal work duties. Staff or volunteers will attempt to follow the **Action Time frame** as a guideline for completion. A yearly review of the **Mitigation Action Plan** by the Hazard Mitigation Committee will re-prioritize the Actions, and the members can report on their progress, asking for assistance or more time as needed. **By connecting planned Town of Pembroke improvement projects to specific projects and objectives of the Hazard Mitigation Plan Update 2022**, the Departments can utilize their resources more effectively.

### Continued Public Involvement

On behalf of the Hazard Mitigation Committee, the Emergency Management Director and the Staff Coordinator, under direction of the Town Administration, will be responsible for ensuring that Town Departments and the public have adequate opportunity to participate in the planning process. Administrative staff should again be utilized to assist with the public involvement process.

For each interim meeting in the annual update process, and for the **5-year** update process procedures that will be utilized for public involvement include:

- Provide personal invitations to Town volunteer Board and Committee Chairs, Budget Advisory Committee members, and Town Department heads;
- Provide personal invitations to abutting community emergency management directors of neighboring Towns;
- Provide personal invitations to the major businesses, agencies, neighborhoods, non-profits, and other entities listed previously in **9 ANNUAL IMPLEMENTATION AND EVALUATION**;
- Post public meeting notice flyers and press releases on the Town's website at <https://www.pembroke-nh.com/> on the Town's online calendar on the same site, and place agendas and meeting materials on a Hazard Mitigation Committee webpage (off the Emergency Management section).
- Post meeting notices in the Pembroke Town Hall, outside on the Town Bulletin Board, at the Library, at the Safety Center, at the local schools, and at local business(es);
- Submit media releases to the Concord Monitor (a paid, regional daily newspaper serving over **40** communities around the Concord area) and other free, regional weekly newspapers serving

Central region NH communities (online newspapers and newsletters have unpredictable longevity).

In addition to previous suggestions for invitations to Hazard Mitigation Committee update meetings, review **APPENDIX A Critical and Community Facilities Vulnerability Assessment** Tables: Vulnerable Populations, Economic Assets and Recreational and Gathering Sites for further stakeholder opportunities. The NH Homeland Security and Emergency Management Field Representative for Pembroke will be invited. The Town will provide the Central NH Regional Planning Commission with Agendas, minutes and other materials for archiving, to be used when the **5-year** update again becomes necessary (email to [salexander@cnhrpc.org](mailto:salexander@cnhrpc.org)). Any State, regional or federal interest in Pembroke should be considered for direct invitation for MITIGATION, which is a transparent process. EMERGENCY OPERATIONS planning should have a more selective working group.

A new section of the Town website dedicated to Hazard Mitigation Committee activities and the **2022 Plan** should be kept updated with meeting notices and materials used by the Hazard Mitigation Committee. This online location would be an optimal place to post the final **2022 Plan** and its **Maps** and **Appendices** and to continue adding materials for annual Plan updates. Additional pages should be added for resources, information, and links to other websites for the public. Several Action Plan items which will be undertaken relate to public education and involvement and the Town website would be an exemplary method of getting the word out.

## Implementation and Evaluation of the Plan

During the Committee’s annual review of the **Mitigation Action Plan**, the Actions are evaluated as to whether they have been **Completed**, **Deleted**, or **Deferred**. Those Action types are placed into their respective Tables. Any **New** Actions will be added as necessary. Each of the Actions within the updated **Mitigation Action Plan** will undergo the enhanced STAPLEE ranking as discussed in **8 MITIGATION ACTION PLAN**.

A set of **Annual Interim Plan Evaluation and Implementation Worksheets** is available to assist the community with Plan implementation in **APPENDIX B**. These worksheets are to be used during the Hazard Mitigation Committee basic meeting schedule outlined previously in **Table 50**. The primary implementation tasks are to be completed depending on when the Town prepares and receives its yearly operating budgets and warrant articles.

### MAIN ANNUAL HMC IMPLEMENTATION TASKS

The rolling list of the Hazard Mitigation Committee’s annual main tasks to update and implement the Plan sections should include:

#### 1. Document New Hazard Events that Occurred in Town.

- ➔ Redo Hazard Identification and Risk Assessment (**CHAPTER 4** HIRA Table in Plan, HIRA file) ratings for natural hazards.
- ➔ Add new events to Local and Area History of Disaster and Hazard Events (**CHAPTER 4** Local History Table in Plan).
- ➔ Submit photos of events to add to the **APPENDIX** Photographic History file.

#### 2. Coordinate Annual Completion of Priority Mitigation Actions by Assigning to Departments.

- ➔ **APPENDIX B** Mitigation Action Progress Report file.

#### 3. Ensure Departments Acquire Funding for Actions & Document the Status of Priority Actions.

- ➔ **APPENDIX B** Mitigation Action/Project Status Tracking file.

#### 4. Evaluate Effectiveness of the Plan Each Year.

- ➔ **APPENDIX B** Plan Evaluation Worksheet file.

#### 5. Request Semi-Annual Progress Reports from Departments & Update Status File.

- ➔ **APPENDIX B** Mitigation Action/Project Status Tracking file.

**6. Update Mitigation Action Plan, Reprioritize Actions for Current Year, Update Supporting Plan Sections.**

- ➔ Update Mitigation Action Plan (**CHAPTER 8** Tables in Plan), place **Completed** or **Deleted** Actions into respective **CHAPTER 7** Prior Action Status Tables in Plan.
- ➔ Enhanced STAPLEE Prioritization (**CHAPTER 8** Figure in Plan, STAPLEE file).
- ➔ Update other sections as needed/if time permits including:
  - **CHAPTER 5** Critical and Community Facilities (narrative in Plan, Tables in file, and **APPENDIX A**),
  - **CHAPTER 5** Problem Statements narrative in Plan,
  - **CHAPTER 5** Culverts to Upgrade Table in Plan,
  - **CHAPTER 6** Capability Assessment Tables in Plan,
  - and more.
- ➔ Make note of everything added/changed in the **2022 Plan** for so we can track the adjustments and copy them over into the new **2027 Plan** update! The latest approved format and content will be different than the **2022 Plan**.
- ➔ Remember to invite the Stakeholders and public to all meetings, take minutes as needed, and keep PDF copies of publicity. Add to **APPENDIX C Meeting Information**.

**7. Send Interim Files to CNHRPC & Repeat.**

- ➔ Email copies of Agendas, meeting publicity, meeting minutes, Action Prioritization, Action Evaluation, other revised Plan files, and the revised Hazard Mitigation Plan itself to CNHRPC staff salexander@cnhrpc.org for archival and preparation for the next 5-year Plan update in 2026-2027.

**Figure 29** is a graphic display of the repeating annual interim activities of the Hazard Mitigation Committee to update and implement the **Hazard Mitigation Plan 2022** actions and while preparing for the **2027 Plan Update**.





**Figure 29**  
**Annual Interim Plan Implementation, 2022-2027**








### **ANNUAL INTERIM IMPLEMENTATION FILES 2022-2027**

To get the permanent Hazard Mitigation Committee started on its activities during the Interim Update Meetings, **APPENDIX B Evaluation and Implementation Worksheets** are provided. These example working documents include administrative and organizational Word and Excel format files, draft Agendas, a Mitigation Action Progress Report, a file to track the progress of Actions to completion, and a file to evaluate the effectiveness of the Plan (a way to make notes for future improvement). These documents are only a starting point for Towns to help guide implementation during the interim years of Plan approval (**2022**) through Plan lapse (**2027**). Contact [CNHRPC](https://www.cnhrpc.org) at 603-226-6020 or at [salexander@cnhrpc.org](mailto:salexander@cnhrpc.org) for information about implementation assistance.

### **COMMITTEE ORGANIZATION AND PUBLICITY DOCUMENTS**

-  Board of Selectmen: Motion & [Permanent] Hazard Mitigation Committee Membership
-  Interim Meeting Publicity- Template Press Release and Public Notice Meeting Poster

### **MEETINGS & WORKING WITH THE MITIGATION ACTIONS**

-  Example Agenda for Interim Meeting 1 with recommended task list
-  Example Agenda for Interim Meeting 2 with recommended task list
-  Mitigation Action Status Tracking Sheet
-  Mitigation Action Progress Report for Departments (optional)
-  Annual Hazard Mitigation Plan Evaluation Worksheet

The next **5**-year full Plan update will evaluate the Actions in the same manner, add new Actions, and will fulfill a complete update of the **Hazard Mitigation Plan** according to future's Plan guidelines and standards.

## 10 APPENDICES

The following **APPENDICES A-F** are included under a separate electronic or paper document to maintain the relative brevity of this **Hazard Mitigation Plan Update**.

### Listing of Pembroke Hazard Mitigation Plan Update 2022 Appendices

Some of these documents should be updated annually as part of the interim Action implementation and Plan evaluation process\*. The remaining **APPENDICES** could be amended with the new or revised annual information, but they are optional. It is necessary to establish a Town digital storage location for placing any new or updated hazard, Action, meeting, or Plan data over the **5-year** interim until the Plan is ready to be fully updated again. Systematic organization will facilitate annual updates and prepare for next **5-year** Plan development in **2027**.

- A Critical and Community Facilities Vulnerability Assessment \***
- B Annual Plan Evaluation and Implementation Worksheets \***
- C Meeting Information \***
- D Plan Approval Documentation**
- E Photographic History of Hazard Events \***
- F Hazard Mitigation and Severe Weather Community Survey Results \***

These Appendices should be reviewed and updated minimally each year\*. It is also highly recommended to update **4 HAZARD RISK ASSESSMENT Table 12 Local and Area Hazard Event and Disaster History** to maintain a record of the disasters, hazards, and impacts to Pembroke. See **9 ANNUAL EVALUATION AND IMPLEMENTATION** and **Figure 29** for details.

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## 11 MAPS

Four (4) detailed Maps were fully updated during the development of the **Pembroke Hazard Mitigation Plan Update 2022**. Data from the previous Plan maps were used, new standardized data layers were available, and Hazard Mitigation Committee members added their own knowledge of sites and hazard events.





### Plan Update 2022 Maps

**Map 1 Potential Hazards** illustrates potential hazard event locations in Pembroke that have the possibility of damaging the community in the future. The **Map 1** legend includes (technology) infrastructure hazards such as dams, bridges, electric transmission lines and evacuation routes. Natural hazards are displayed such as Special Flood Hazard Areas (SFHAs), locations of potential flooding/washout, fire/wildfire, bridge washout, ice and snow, steep slopes (>15%) and more.

**Map 2 Past Hazards** illustrates the locations of where hazard events have occurred in Pembroke in the past, including areas of SFHA, flooding/washout, snowmelt, dam breach, fire/wildfire, wind damage, ice damage, and more.

**Map 3 Critical and Community Facilities** includes the infrastructure included in **Map 1 Potential Hazards** on a background of aerial photography and the SFHAs to give viewers a better, real world perspective. The locations of all critical facilities and community facilities as recorded in the **APPENDIX A Critical and Community Facilities Vulnerability Assessment** are displayed on the Map. Each of these sites is numbered on a key listing the names of each facility.

**Map 4 Potential Hazards and Losses** utilizes all the features of **Map 3** on an aerial photography background and includes the **Map 1 Potential Hazards** and any realistic **Map 2 Past Hazards** locations where hazard events can occur again in Pembroke.

-  **Map 1 - Potential Hazards**
-  **Map 2 - Past Hazards**
-  **Map 3 - Critical and Community Facilities**
-  **Map 4 - Potential Hazards and Losses**

## Fluvial Geomorphic Assessment 2015 Maps

As a result of the many flooding events and existing complications of the very dynamic Suncook River and a potential for flooding on the Soucook River the NH Geological Survey (NHGS) at the NH Department of Environmental Services (NHDES) coordinated fluvial geomorphology assessments of both rivers. Conducted by Field Geology Services who collected fluvial geomorphology field data in designated river reaches of the Suncook River in Allenstown/Pembroke and Epsom in **2013** and the Soucook River in Concord/Pembroke and Loudon in **2014**, a suite of data features was collected from the confluence of the Merrimack River to the northern Epsom town line (Suncook River) and into Loudon (Soucook River). The Town of Barnstead's section of the Suncook River was assessed, but the middle communities (Chichester and Pittsfield) opted out.

The NHGS wrote the [Suncook River Fluvial Geomorphology Assessment Discussion Guide](#) in **Spring 2015** to help communities interpret the data that was collected on by river reach. While the full [Suncook River](#) and [Soucook River Fluvial Geomorphic Assessments](#) are located in the **2017 Plan**, just the accompanying maps have been retained for reference in the **Hazard Mitigation Plan Update 2022**.

### 2015 FLUVIAL GEOMORPHIC ASSESSMENT (FGA) MAPS

#### Suncook River

- ✚ Map 5A - Fluvial Geomorphology Features West
- ✚ Map 5B - Fluvial Geomorphology Features Center
- ✚ Map 5C - Fluvial Geomorphology Features East
- ✚ Map 6A - Fluvial Erosion Hazard Meander Belts West
- ✚ Map 6B - Fluvial Erosion Hazard Meander Belts Center
- ✚ Map 6C - Fluvial Erosion Hazard Meander Belts East
- ✚ Map 7A - Large Woody Material Density West
- ✚ Map 7B - Large Woody Material Density Center
- ✚ Map 7C - Large Woody Material Density East

#### Soucook River

- ✚ Map 8A - Fluvial Geomorphology Features West
- ✚ Map 8B - Fluvial Geomorphology Features Center
- ✚ Map 8C - Fluvial Geomorphology Features East
- ✚ Map 9A - Fluvial Erosion Hazard Meander Belts West
- ✚ Map 9B - Fluvial Erosion Hazard Meander Belts Center
- ✚ Map 9C - Fluvial Erosion Hazard Meander Belts East