

◇ For City Council Adoption by Resolution ◇

07-10-17

City of Concord New Hampshire

Hazard Mitigation Plan Update 2017



Lake View Drive Wildfire, May 2015

Photo from Concord Monitor

Approved Pending Adoption (APA) Notification Issued By NHHSEM ◇ 06-09-17

Adopted by the Concord City Council

July 10, 2017

NHHSEM/FEMA Approved [date], 2017

City of Concord New Hampshire

Hazard Mitigation Plan Update 2017

Adopted **July 10, 2017**

NHHSEM/FEMA Approved [date], 2017



City of Concord, New Hampshire

Fire Department
24 Horseshoe Pond Lane
Concord, New Hampshire 03301
(603) 225-8650
www.concordnh.gov/fire

Central NH Regional Planning Commission

28 Commercial Street, Suite 3
Concord, New Hampshire 03301
(603) 226-6020
www.cnhrpc.org



NH Department of Safety

NH Homeland Security and Emergency Management
33 Hazen Drive
Concord, New Hampshire 03305 (Mailing Address)



Incident Planning and Operations Center

110 Smokey Bear Boulevard
Concord, New Hampshire 03301 (Physical Address)
(800) 852-3792 or (603) 271-2231
www.nh.gov/safety/divisions/hsem
<https://apps.nh.gov/blogs/hsem>



FEMA

US Department of Homeland Security

Federal Emergency Management Agency Region 1
99 High Street, Sixth Floor
Boston, Massachusetts 02110
(617) 223-9540
www.fema.gov

Table of Contents

1 PLANNING PROCESS..... 1

 Certificate of Adoption, 2017 1

 Plan Process Acknowledgements..... 3

 Authority..... 4

 Methodology 5

2 COMMUNITY PROFILE 9

 Geographic Context 9

 Population and Housing Growth..... 12

 Land Use and Zoning 15

3 GOALS AND OBJECTIVES..... 19

 What are Goals, Objectives and Actions 19

 Overall Hazard Mitigation Plan Goals 20

 General Hazard Mitigation Objectives 21

4 HAZARD RISK ASSESSMENT23

 Hazard Risk Assessment Ratings 24

 Central NH Region Major Disaster Declarations, 1973-2016 35

 Recent Disaster Events Summary 37

 Local Climate Changes and Extreme Weather..... 59

 Detailed Hazard Events in Concord 66

 Existing and Potential Future Hazards 117

 Concord’s Built Environment Changes Since the 2012 Plan 127

5 COMMUNITY VULNERABILITY ASSESSMENT AND LOSS ESTIMATION..... 135

 Critical Facilities 136

 Community Facilities 143

 Potential Losses from Natural Disasters..... 152

 National Flood Insurance Program (NFIP)..... 160

6 CAPABILITY ASSESSMENT 165

 City Capabilities..... 166

 Review of Existing Plans 189

7 POTENTIAL ACTION EVALUATION 190
Action Status Determination 191
Review of 2012 Actions 192
New Actions from Community Vulnerability Assessment..... 203
Potential Action Evaluation 204
Natural Hazards Evaluated for Which Specific Actions Were Not Identified 209

8 MITIGATION ACTION PLAN..... 211
Concord’s Mitigation Action Plan 2017 212
Action Evaluation and Prioritization Methods..... 218

9 ANNUAL IMPLEMENTATION AND EVALUATION 222
Annual Monitoring and Update of the Mitigation Action Plan 222
Tasks of the Plan Update 225
Implementing the Plan through Existing Programs 227
Continued Public Involvement..... 231
Implementation and Evaluation of the Plan..... 232

10 APPENDICES 233
A Critical and Community Facility Vulnerability AssessmentA-1
B Annual Interim Plan Evaluation and Implementation Worksheets..... B-1
C Meeting Information..... C-1
D Plan Approval Documentation D-1
E Historical Disaster Event Photos..... E-1
F Lightning Strike and Wildfire Inventory, Jan 2011 – Mar 2017 F-1
G Turkey River Fluvial Geomorphic Assessment Addendum 2015G-1
H Soucook River Fluvial Geomorphic Assessment Addendum 2015H-1

11 MAPS 234
Plan Update 2017 Maps.....234
Map 1 - Potential Hazards 11x17 folded at the end
Map 2 - Past Hazards..... 11x17 folded at the end

Critical and Community Facilities Map Series

Map 3A - Critical Facilities 11x17 folded at the end
Map 3B - Infrastructure 11x17 folded at the end
Map 3C - Vulnerable Populations 11x17 folded at the end
Map 3D - Economic Assets 11x17 folded at the end
Map 3E - Public Gathering Sites 11x17 folded at the end
Map 3F - Historic Resources 11x17 folded at the end
Map 3G - Hazardous Materials Facilities 11x17 folded at the end

Potential Hazards and Losses Series

Map 4A - Critical Facilities 11x17 folded at the end
Map 4B - Infrastructure 11x17 folded at the end
Map 4C - Vulnerable Populations 11x17 folded at the end
Map 4D - Economic Assets 11x17 folded at the end
Map 4E - Public Gathering Sites 11x17 folded at the end
Map 4F - Historic Resources 11x17 folded at the end
Map 4G - Hazardous Materials Facilities 11x17 folded at the end

Fluvial Geomorphic Assessment 2015 Maps 236

Turkey River Map Series

Map 5A - Turkey River Fluvial Geomorphology Features East 11x17 folded at the end
Map 5B - Turkey River Fluvial Geomorphology Features West 11x17 folded at the end
Map 6A - Turkey River Fluvial Erosion Hazard Meander Belts Easts 11x17 folded at the end
Map 6B - Turkey River Fluvial Erosion Hazard Meander Belts West 11x17 folded at the end

Soucook River Map Series

Map 7A – Soucook River Fluvial Geomorphology Features South 11x17 folded at the end
Map 7B - Soucook River Fluvial Geomorphology Features Center 11x17 folded at the end
Map 7C - Soucook River Fluvial Geomorphology Features North 11x17 folded at the end
Map 8A - Soucook River Fluvial Erosion Hazard Meander Belts South 11x17 folded at the end
Map 8B - Soucook River Fluvial Erosion Hazard Meander Belts Center 11x17 folded at the end
Map 8C - Soucook River Fluvial Erosion Hazard Meander Belts North 11x17 folded at the end

1 PLANNING PROCESS

The City’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 City’s newest information since 2012. This Planning Process Chapter contains information previously available in the Introduction Chapter of the **Plan Update 2012**. Expanded public participation steps were taken and a new plan development procedure was used as documented in the Methodology section.

Certificate of Adoption, 2017

Substitute Resolution Here

City of Concord, NH
City Council
41 Green Street
Concord, New Hampshire 03301

A Resolution Adopting the Concord Hazard Mitigation Plan Update 2017

WHEREAS, the City of Concord 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 2017** 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 City of Concord has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its **Hazard Mitigation Plan Update 2017** under the requirements of 44 CFR 201.6; and

WHEREAS, public and Committee meetings were held between **September 2016** through **April 2017** regarding the development and review of the **Hazard Mitigation Plan Update 2017**; and

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

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

City of Concord, NH Hazard Mitigation Plan Update 2017

1 PLANNING PROCESS

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

RESOLVED by City of Concord Council:

The **Hazard Mitigation Plan Update 2017** is hereby adopted as an official plan of the City of Concord; The respective officials identified in the mitigation action plan of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;

Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as a part of this resolution for a period of five (5) years from the date of this resolution; and

An annual report on the progress of the implementation elements of the Plan shall be presented to the City Council by the Emergency Management Director or designee.

IN WITNESS WHEREOF, the undersigned have affixed their signature and the corporate seal of the City of Concord this 10th day of July, 2017.

ATTEST

City Government

SEAL

James Bouley, City Mayor date

City Clerk

Thomas J. Aspell, Jr., City Manager date


Janice Bonenfant, City Clerk date

Plan Process Acknowledgments

The City Council-appointed Hazard Mitigation Committee was comprised of these individuals who met between **September 2016** through **April 2017** to develop the **Concord Hazard Mitigation Plan Update 2017**:

- Daniel Andrus, Concord Fire Chief, Emergency Management Coordinator, and Hazard Mitigation Committee Staff Coordinator
- Michael Pearl, Concord Police Department, Lieutenant
- Heather Shank, AICP, PLA, Concord Community Development, Planning Division, City Planner
- Yingchun Zhou, Phd., Concord Community Development, Engineering Division, GIS Coordinator
- Edward Roberge, P.E., Concord Community Development, Engineering Division, City Engineer
- Philip H. Bilodeau, P.E., Concord General Services Department, Deputy Director of General Services

Central NH Regional Planning Commission (CNHRPC) staff facilitated, developed and compiled the Hazard Mitigation Plan Update with the Hazard Mitigation Committee:

-  Stephanie Alexander, CNHRPC Senior Planner

Members of the public* (0) and other individuals attended one or more Committee meetings and/or contributed information to the content of the Plan:

* member of the public
Definition on Page 6

- Matthew Cashman, Concord School District, Director of Facilities and Planning
- Fred Reagan, Merrimack Valley School District, Facilities Director
- Shawna-Leigh Morton, NH Homeland Security and Emergency Management (NHHSEM), Field Representative

Authority

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 City of Concord 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 *State of New Hampshire Hazard Mitigation Plan 2013* in 2013. 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 City's Hazard Mitigation Plan are noted in the **Final Plan Dates** section.

This **Concord Hazard Mitigation Plan Update 2017** 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 City is a regular process and this Plan is considered to be a "living document."

The 2016 Concord Hazard Mitigation Committee was established by the City Council and guided the development of the Plan. The Committee consisted of the City's Fire Department/ Emergency Management, Planning Department, Engineering Department, Engineering-GIS Department, General Services Department and Police Department.

The attendees of the meeting process are noted in the **Acknowledgements**. The Central NH Regional Planning Commission, of which Concord 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 Homeland Security and Emergency Management and FEMA.

Methodology

The **Concord Hazard Mitigation Plan Update 2017** was developed over a six-month period, with a group of City staff members and volunteers and the CNHRPC comprising the majority of the Hazard Mitigation Committee. The 2017 methodology for Plan development is summarized in this section. The Hazard Mitigation Plan is designed differently from the **2012 Plan** with the intent to shorten the Plan for utility purposes, with 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 **Concord’s Plan Update 2017** begins to follow a standardized approach to Plan construction and content endorsed by FEMA. Many of the vital sections of the **2017 Plan Update** will be contained in the **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 constrains.

Table 1
Meeting Schedule and Agenda Activities

Meeting	Date	Agenda Activities – see APPENDIX C
Meeting 1	09/14/16	Discuss Process and Schedule, Hazard Risk Assessment, Critical and Community Facilities Vulnerability Assessment, Review & Revise Maps 1-2-3, Schedule Meetings
Work Session 1	10/07/16	Hazard Risk Assessment, Critical and Community Facilities Vulnerability Assessment, Review & Revise Maps 1-2-3
Meeting 2	10/21/16	Review & Update Goals and Objectives, Critical and Community Facilities Vulnerability Assessment, Review Former Existing Measures -> Now Capability Assessment, Develop List of Existing Mitigation Plans and Documents
Work Session 2	11/18/16	Finish Critical Facilities Vulnerability Assessment, Capability Assessment, List of Existing Mitigation Plans and Documents
Meeting 3	12/16/16	Review & Revise 2012 Actions, Develop New Actions from Problem Statements (Community Vulnerability Assessment) and Capability Assessment's Future Improvements, Determine 2012 Actions' Status, Determine Action Timeframe
Work Session 3	01/13/17	Work with Actions from Capability Assessment, Finalize List of Actions
Work Session 3.2	01/27/17	Determine Action Timeframe for Each Action, Prioritize Actions using STAPLEE
Work Session 3.3	02/10/17	Finish Action Timeframe for Each Action, Prioritize Actions using STAPLEE

Meeting	Date	Agenda Activities – see APPENDIX C
Meeting 4	03/07/17	Review Draft Hazard Mitigation Plan Components (onscreen), Finish Outstanding Components, Schedule Public Information Meeting, Discuss Completion of Review, Assignments
Work Session 4	03/31/17	Complete Draft Hazard Mitigation Plan Components (onscreen), Finish Outstanding Components, Schedule Public Information Meeting
Work Session 4.2	04/07/17	Review Entire Completed Hazard Mitigation Plan, Appendices, and Maps, Prepare for Public Information Meeting, Review Plan Approval Process
Public Information Meeting	05/10/17	HMC members present sections of the Plan to members of the public in a question and answer format. Describe hazards and mitigation Actions. Maps will be available.

Source: Concord Hazard Mitigation Committee Agendas, 2015-2016

For each meeting, all meeting attendees signed attendance sheets and meeting match timesheets, documenting their time at the meetings. Members of the public assisted with completing the Agendas, including developing the **Hazard Risk Assessment, Critical and Community Facilities Vulnerability Assessment, Capability Assessment, and Mitigation Action Plan**, completing the **STAPLEE Action Prioritization**, etc. along with the Committee members. 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**. 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 **2017 Plan Update** section. Maps were reviewed and updated by the Committee and guests and revised in a GIS by CNHRPC.

In between meetings, City 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.

Opportunity for Public Participation

Public Input from the Hazard Mitigation Committee Meetings

The public notification is described in the Public Outreach Strategy sidebar, although (0) members of the public attended the meetings as indicated in the **Acknowledgements** and by the Attendance Sheets in **APPENDIX C Meeting Information**. The public had

Who is a Member of the Public?

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

Anyone who is not a City of Concord, School District, County, State, or federal government employee; anyone who is not paid for services by City tax dollars; and anyone who is not a current City volunteer.

the opportunity to attend and participate in the 12 posted meetings or to contact the Emergency Management Coordinator for more information.

Public Input from the Public Information

Meeting

The **Public Information Meeting (PIM)** was held on May 10, 2017. The Hazard Mitigation Committee members presented portions of the Plan and had the Maps available for display. The agenda and attendance sheet are included in **APPENDIX C**. Despite the significant publicity, inclusion into the City Manager’s Newsletter and front-page placement on the City’s website, zero (0) members of the public attended the PIM. The Committee members had prepared presentations, were available to answer questions and had displayed the numerous Maps of the Plan. A 14-day public comment period on the Plan was solicited on the City’s website with comments to be sent to hazmitcomments@concord.nh.gov. As of the date of Plan’s submission for APA, no comments had been received.

Public Input from the City Council Adoption

Meeting

The City Council meeting to adopt the **Hazard Mitigation Plan** was held on July 10, 2017. The Plan was adopted by resolution. Although the Plan’s APA had been received, the Council permitted public comment prior to adoption, collecting any Plan changes to be considered during the Plan’s annual update. **More to be included as necessary**

Completion of the Plan Steps and Dates

On May 10, 2017, the Committee held a **Public Information Meeting**. The extensive public notification described above and in the Public

Public Outreach Strategy

The Concord School District and Merrimack Valley School District, Planning Board, Conservation Commission were specifically invited by the City of Concord’s Fire Department to fully participate in the Hazard Mitigation Committee discussions and help guide the Plan’s direction. The NH Homeland Security and Emergency Management (NHHSEM) Field Representative was invited and attended some of the meetings.

The Hazard Mitigation Committee itself was comprised of all primary City Departments, including Emergency Management, Community Development-Planning, CD-Engineering, CD-GIS, Fire, Police, and General Services Departments.

The public process for this Plan included sending out media releases to the Concord Monitor, a regional newspaper serving 39 communities around the Concord area. All interested parties were invited to participate, including media, residents, businesses, organizations, local communities, non-profits, and State agencies. Meeting announcements were posted on the City’s website at www.concordnh.gov, on the City Town Clerk’s bulletin board and at the City Library. All local interests had an opportunity to attend and participate in the meetings. Copies of publicity for the Plan are included in **APPENDIX C**.

The Central NH Regional Planning Commission, a quasi-governmental regional organization of which Concord is a member, contributed to the development of this Plan by facilitating the meetings and guiding the planning process, and preparing the Plan documents, Appendices, and Maps. As a final attempt to obtain additional public input, a specially noticed Public Information Meeting was held on May 10, 2017, with an online public comment solicitation period to hazmitcomments@concordnh.gov.

The attendees and publicity of the public planning process are noted in the **Acknowledgements**.

Outreach Strategy sidebar occurred to obtain review and comment from the public for the Plan.

On May 19, 2017, this Plan, Appendices and Maps were submitted to the NH Homeland Security and Emergency Management (NHHSEM) for compliance review and revision to apply for Approvable Pending Adoption (APA) status, also known as conditional approval.

On June 9, 2017, Concord 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 City Council, is submitted.

On July 10, 2017, the City Council **adopted the Hazard Mitigation Plan Update** by resolution at a duly noticed public meeting. Copies had been made available at the City Hall for public review on June 30. Copies of the public notice and flyers are included in **APPENDIX C**. The signed Certificate of Adoption was sent to NHHSEM/FEMA.

On [Month/day], 2017, Concord 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/day], 2022.

Final Plan Dates

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

**Table 2
Plan Adoption History**

Year of FEMA-Approved Hazard Mitigation Plan	Adoption by Concord City Council	FEMA’s Formal Approval	Plan Expiration
Original 2007	December 11, 2006	April 6, 2007	April 6, 2012
Update 2012	January 9, 2012	April 11, 2012	April 11, 2017
Update 2017	July 10, 2017	date, 2017	date, 2022

2 COMMUNITY PROFILE

It has been over five years since the last Plan was written, with the new decennial Census 2010 having been taken. The best available new data has been used in this Chapter to portray the population, housing, and overall demographic picture of present day Concord. 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 City 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 City'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 City 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 City of Concord is in north-central Merrimack County, bordering on Belknap County in Central New Hampshire. It is bordered by the Towns of Webster, Boscawen, and Canterbury to the north, Loudon, Chichester, and Pembroke to the east, Bow to the south, and Hopkinton the west. The total land area contained within Concord is **64** square miles, one of the largest in the south-central part of the state. In **2010**, about **52%** of Concord was undeveloped land, with **28%** single family/duplex residential and nearly **5%** commercial/industrial. Institutional land, including State and Federal office complexes, was at nearly **4%**. Other land uses comprised the remaining. In **2017**, the land use proportions were undeveloped land **47%**, residential use **41%**, commercial/industrial **9%**, public land **18%** and agriculture **10%**.

The wide, slow and meandering Merrimack River bisects the entire length of City into western and eastern sections. The eastern border of the City is formed by the Soucook River, shared by the Town of Pembroke. The Contoocook River flows through Concord's northwestern corner from Hopkinton to Boscawen. The Turkey River flows from south Concord into Bow. The City has a rich history centering on population centers along these four rivers.

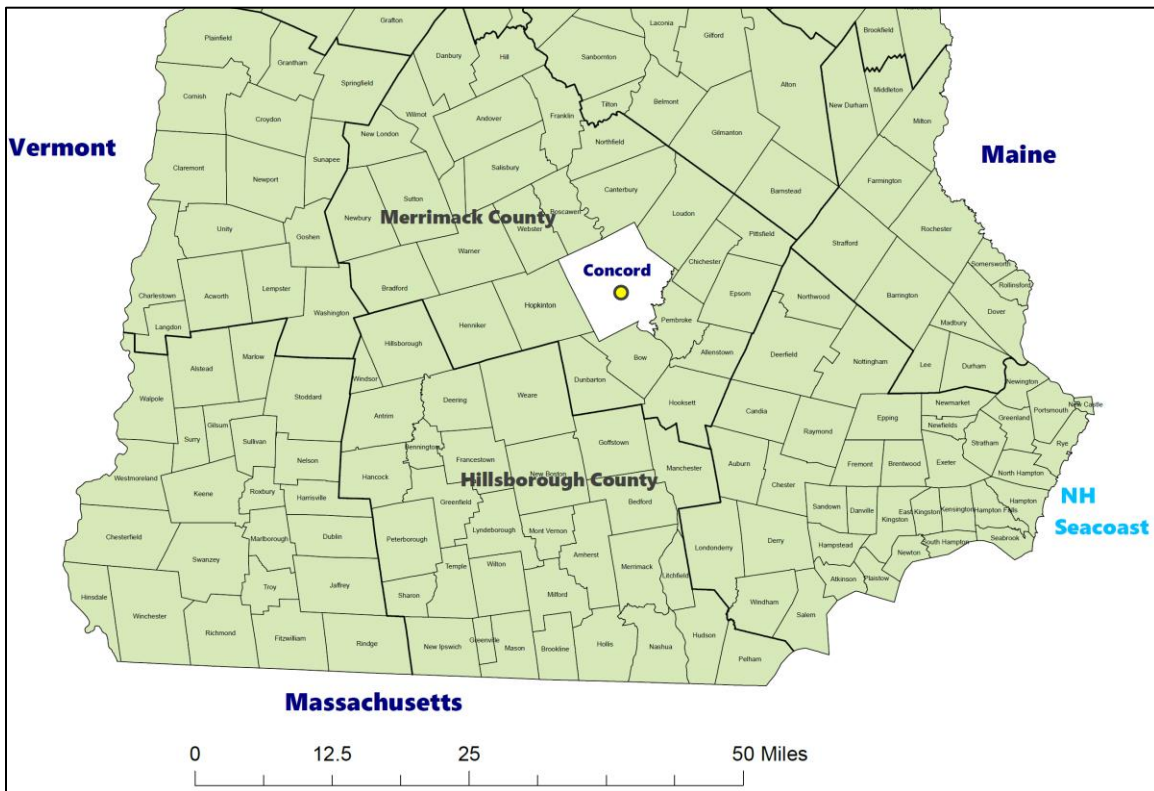
Interstate 93 bisects the length of the City parallel to the Merrimack River. Interstate 89 travels across the southwestern corner of the City from Hopkinton into Bow where it joins with Interstate 93. I-393, a relatively short spur of I-93, begins at the end of North Main Street and continues west through Concord

Heights and joins with Route 106 before traveling into Loudon/Pembroke and with Routes 4/9 into Chichester. I-393 is a heavily traveled route to cross Concord and to reach the seacoast. Other routes in the City include NH 132 which travels into Canterbury and Route 4/202 which travels west to Hillsborough and Keene. These routes are essential travel corridors for commuters traveling through the White Mountain, Lakes, Central, Southern NH region, Seacoast and into Boston. The City is host to an active railroad line running roughly parallel to the Merrimack River into Bow but ending near Horseshoe Pond; this line transports and stores various materials within its railcars.

Merrimack County in which Concord 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 about 50 miles from the Massachusetts state border, the Vermont state border, the Maine state border, and the seacoast traveling along New Hampshire’s Interstates, US Routes, NH Routes, and local roadways. Concord’s context within Merrimack County and the State of New Hampshire are shown in **Figure 1**.

Figure 1
Concord in the State

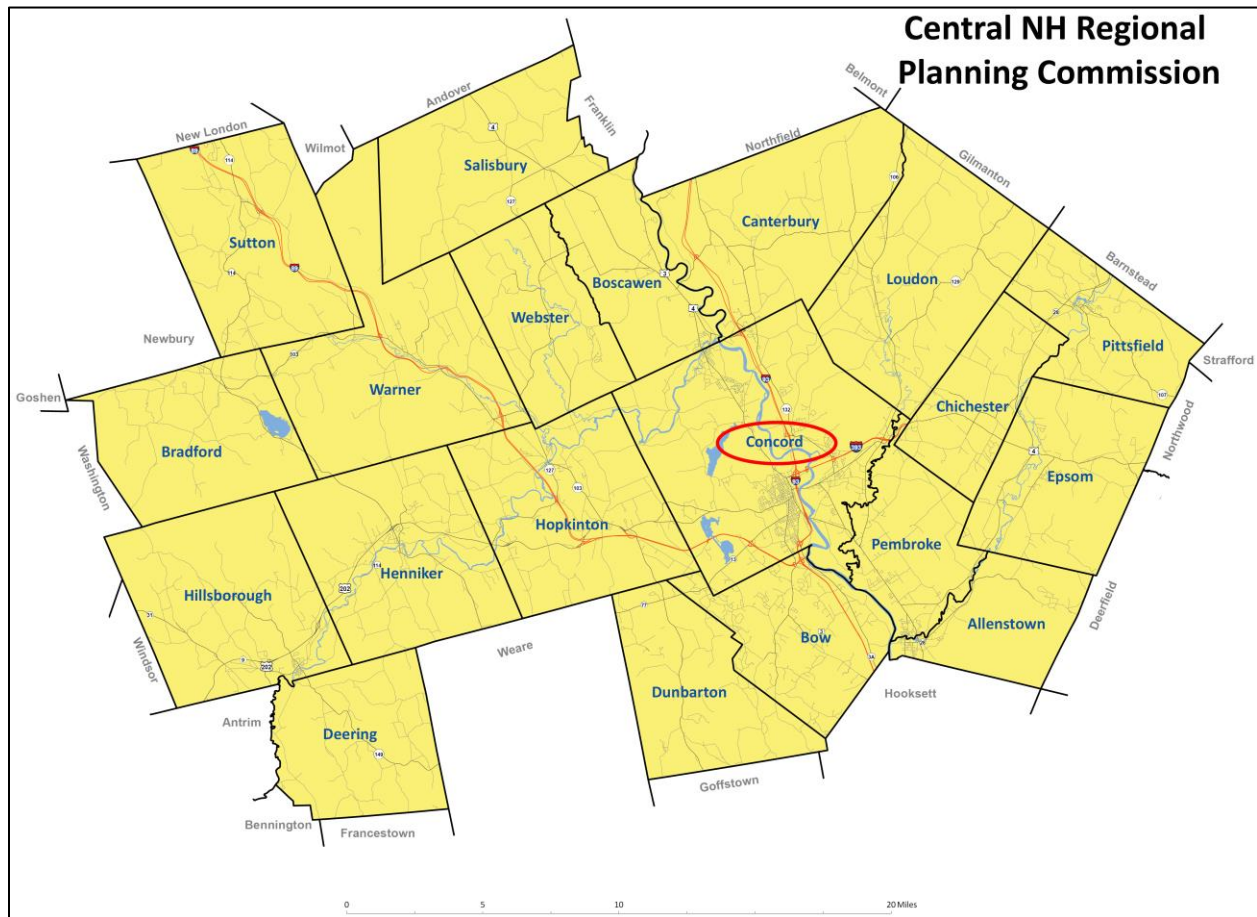


Source: Central NH Regional Planning Commission

The City of Concord is the heart of the Central NH Region, one of the nine legislatively-boundaried planning regions in the State. The City 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 important highways. The Blackwater River and Warner River flow into the Contoocook River which then converges with the Merrimack River in Boscawen and Penacook, which is a northern village of Concord. The Contoocook and the Merrimack Rivers effectively bisect the region into three sections. The Soucook River and Suncook River also converge into the Merrimack. The Contoocook River runs through Hillsborough, Henniker, Hopkinton, Concord, and Boscawen traveling in a north-easterly direction until its confluence with the Merrimack River in Boscawen/Penacook.

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 Route 3 travels north-south and US Routes 9/202 traverses in an east-west direction. Concord hosts Interstate 93 with Exits 12, 13, 14, 15, 16 and 17 as well as Interstate 89 with Exits 2 and 3. Dozens of state highways crisscross the region. A map of the Central NH Region is displayed in Figure 2.

Figure 2
Concord in the Region



Source: Central NH Regional Planning Commission

Population and Housing Growth

Concord adopted its newest, overall Master Plan 2030 in **June 2008**. Chapters include maps, tables and information on Vision, Land Use, Housing, Economic Development, Transportation, Conservation and Open Space, Historic Resources, Recreation, and Implementation. The City had previously adopted other individual Master Plans such as Sewer and Water, Parks, Opportunity Corridor and Airport. Since 2008, other topical Master Plans have been adopted such as the Bicycle Master Plan (2010), Energy Master Plan (2013) and Penacook Vision Plan (2015).

The following data was taken from the most recent sources available during Hazard Mitigation Plan development to portray accurate demographic data of the community.

The following tables in contain the newest available data on housing and population growth which depict development trends over time. Concord’s population and housing increases have remained constant since the 1980-1990 growth pattern was established. The **2010** Census counted **42,695** people and **1,971** housing units in Concord.

Table 3
Overall Population and Housing Growth Trends in Concord, 1970-2015

Growth	Population	Net Change		Housing Units	Net Change	
		#	%		#	%
1970 Census	30,002	N/A	0	9,547	N/A	0
1980 Census	30,400	398	1.3%	12,126	2,579	27.0%
1990 Census	36,006	5,606	18.4%	15,697	3,571	29.4%
2000 Census	40,687	4,681	13.0%	16,881	1,184	7.5%
2010 Census	42,695	2,008	4.9%	18,852	1,971	11.7%
Total Change from 1970 – 2010 Census	---	12,693	42.3%	---	9,305	97.5%
2015 Population & Housing Estimates*	42,390	-305	-1.0%	19,182	+330	+2.0%
45 years of increase		+12,388 Population		+9,635 Housing		

*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, institutional. NH Office of Energy and Planning Population Estimates 2015, NHOEP Housing Trends 2015*

In **Table 3**, Concord’s **2010** Census population of **42,695** shows an overall increase of about **42.3%** in population over the previous four decades, up from **30,002** people in 1970. Between **2000** and **2010**, the City’s population increased by **4.9%** (**2,008** people) and housing by about **12%** (**1,971** units). These numbers trend similarly compared to other moderate-sized communities’ growth in the Central NH region over the **2000-2010** period. The City saw an overall **42.3%** population growth rate (percentage) from **1970-2010**.

The number of housing units in Concord increased by a higher rate than population since 1970, growing from **9,547** units in 1970, doubling that number to total **18,852** in 2010, an overall growth rate of **97.5%**. This housing rate (percentage) is also lower than many medium-sized communities in the Central NH region.

The number of people per housing unit has continued to decline from its high of **3.1** people in 1970 to its low of **2.3** people per housing unit in **2010**. Concord’s overall Census population growth since 1970 increased by **12,693** people and **9,305** homes by 2010.

**Table 4
Population Density in Concord, 1970-2015**

Municipality Size		Persons per Square Mile					
Land Acreage	Land Area in Square Miles	1970	1980	1990	2000	2010	2015
43,000	64.0	469	475	563	636	668	663

Sources: Table 3, Office of Energy and Planning’s GIS acreage calculations, 2013

A good measurement of community population and housing change is population density, or how many people live in a square mile of land area. As displayed in **Table 4**, the overall population density has increased about **41%**, from **469** people per square mile in **1970** to **563** people in 1990 and to **668** people in 2010. Between the 2000-2010 Census, the increase of **32** people per square mile indicates a steady growth trend. Concord is a large community in land area at **64.0** square miles in size. Development opportunities are focused around the existing built environment and new residential communities are drawn to the forested or rural areas. Nearly any location in Concord can access Interstates 93, 393 or 89 within **15** minutes.

**Table 5
New Construction Permits Issued by Building Type, 2011 – 2016**

Building Type	2011	2012	2013	2014	2015	2016	6-Year Totals
Single Family Homes	14	15	40	34	37	38	178
Multi-family Homes	11	0	4	36	2	2	55
Manufactured Homes	6	8	13	7	19	19	72
Manufacturing/ Industrial Business	0	1	1	0	1	1	4
Retail/Commercial/ Non-Profit/Governmental	9	7	5	3	5	7	36
Totals	40	31	63	80	64	67	345

Source: City of Concord City of Concord Permit Tracker System, Report generated 02/10/17

In **Table 5**, Concord’s new construction permits over the last **6** years began low (**15**) but raised to a consistent average of **37** new permits per year. Between 2011 and 2016, a total of **178** single family homes were granted new construction permits. Manufactured homes were the second highest building increase, with **72** permits while new multi-family permits totaled **55**. The non-residential growth was much smaller during this time span, with **36** commercial/non-governmental permits and **4** manufacturing or industrial permits issued. Out of the **345** new permits issued between 2011 and 2015, **305** were for new housing.

School Populations

Two public school districts serve the City’s school children. The following **Table 6** and **Table 7** display the enrollment of Merrimack Valley and Concord School Districts. Concord School District is comprised of over **4,500** students, with **5** Elementary Schools, **1** Middle School and **1** High School; The High School includes Deerfield tuition students. Merrimack Valley School District is comprised of Penacook residents along with Salisbury, Loudon, Boscawen, Webster, each of which have their own elementary school. The MVSD has the **5** elementary schools, **1** Middle School and **1** High School and serves just under **2,500** students.

Table 6

Merrimack Valley School District (MVSD) Enrollment as of October 1, 2016

Grade	BES	LES	PES	SES	WES	MVMS	MVHS	MVSD Total
Pre-School	23		33					56
Kindergarten	27	41	53	7	19			147
1	43	43	50	13	13			162
2	32	44	55	14	14			159
3	44	42	64	15	16			181
4	37	61	65	14	17			194
5	32	52	60	12	16			172
6						181		181
7						190		190
8						202		202
9							205	205
10							226	226
11							196	196
12							212	212
Total Students	238	283	380	75	95	573	839	2,483

Source: Merrimack Valley School District Facilities Director, 12-16

Table 7
Concord School District (MVSD) Enrollment as of December 2016

Grade	Abbott Downing	Beaver Meadow	Christa McAuliffe	Mill Brook	Broken Ground	Total Elementary	Rundlett Middle School	Concord High School	CSD Total
Pre-School									0
Kindergarten	39	56	57	113		265			265
1	70	55	62	103		290			290
2	60	54	72	127		313			313
3	77	57	82		127	343			343
4	61	79	66		129	335			335
5	72	59	72		134	337			337
6							316		316
7							322		322
8							350		350
9								402	402
10								459	459
11								355	355
12								443	443
Total Students	379	360	411	343	390	1,883	988	1,659	4,530

Source: CSD Annual Enrollment Report, Dec 2016

The Concord School District (CSD) Annual Enrollment Report from December 2016 describes an overall decline in High School enrollment since the **2009-2010** school year, from **1,849** students to **1,659** in 2016-2017 (**-190** students, a **10%** decline). The Rundlett Middle School describes a similar enrollment decline from **1,081** students to **988** (**-93** students, a **9%** decline) during this same period. The Elementary Schools describe the largest decline, from **2,082** students in 2009-2010 to **1,883** in 2016-2017 (**-199** students, a **10%** decline). This comparative information was not available for MVSD.

Land Use and Zoning

According to NH Office of Energy and Planning’s 2013 geographic information system (GIS) calculations, Concord has a total land area of **43,000** acres, or **64.0** square land miles. An additional **2,066** acres (about **3.2** square miles) is water. The acreage figure is moderately comparable to the City’s tax accessing system calculation of **43,062** acres for the City. Differences between the assessed taxable land calculations from the assessing records and the perambulation acreage from the basic GIS calculations is not unusual.

For New Hampshire and specifically the Central NH Region, Concord is a very large-sized community in terms of population as well as in terms of land area. However, the proportion of residential to forested to commercial land remains about the same as any Town in the region, but with a heavier emphasis on the forested land.

From **Table 8**, vacant (forested) land is the dominant land use type, comprising over **33%** of the City’s land area. Although single family residential land (**26%**) follows as the next highest acreage of land use, when adding the other categories of housing (manufactured and multi-family), all residential usage tops **41%** of all land use. Public land (parks and cemeteries, transportation, utilities, roads) comprises **18%** of the City. Surprisingly, agriculture is **10%**, higher than the **9%** commercial, industrial and mixed land use. The remaining land use of water (**8%**) rounds out the categories of assessed land in City.

**Table 8
Land Use, 2017**

Land Use Category	Acres	% of City
Single Family & Two Family	11,138.6	25.9%
Manufactured Housing	294.4	0.7%
Multi-Family Residential	1,088.1	2.5%
Commercial	1,381.5	3.2%
Industrial	957.7	2.2%
Mixed Use	458.8	1.1%
Institutional (Governmental, Schools, Churches)	2,175.7	5.1%
Parks and Cemeteries	890.6	2.1%
Transportation and Utilities	2,161.4	5.0%
Roads and Highway ROW	2,543.1	5.9%
Agricultural	3,117.7	7.2%
Vacant (Open Space)	14,383.5	33.4%
Water	2,470.5	5.7%
Total	43,061.7	100.00%

Source: City of Concord Digital Parcel Map and Assessing Database, February 2017

The perspective of the City’s Zoning Districts offers another way to view how the land is utilized within Concord in **Table 9**. A full table of uses is available within the Zoning Ordinance which states which uses are allowed within each district. A table of dimensional and density regulations pertaining to water and sewer, lot frontages and lot sizes, and minimum pervious surfaces complement the table of uses. The City has **17** main zoning districts and **7** overlay districts which guide development to the appropriate areas of the City.

**Table 9
Zoning Districts, 2016**

Zoning District	Abbreviation
Open Space Residential	RO
Medium Density Residential	RM
Single Family Residential	RS
Neighborhood Residential	RN
Downtown Residential	RD
High Density Residential	RH
Institutional	IS
Urban Commercial	CU
Urban Transitional	UT
General Commercial	GC
Highway Commercial	HC
Industrial	IN
Central Business Performance	CBP
Civic Performance	CVP
Gateway Performance	GWP
Opportunity Corridor Performance	OCP
Office Park Performance	OFP
Zoning Overlay District	Abbreviation
Shoreland Protection	SP
Aquifer Protection	AP
Historic	HI
Penacook Lake Watershed Protection	WS
Flood Hazard	FH

Source: City of Concord Zoning Ordinance 2016

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 contains sections amended as needed at special City Council Meetings and is vigorously used and applied by the Community Development Department.

The community's **Built Environment Changes** describe how and where the community has grown, to which hazards vulnerable areas are susceptible, and states the overall change in hazard vulnerability in **4 HAZARD RISK ASSESSMENT**.

Master Plan 2030

The Master Plan 2030 was prepared by the Concord Planning Board and adopted in **June 2008**. The Plan contains sections on the required Vision and Land Use elements and also contains sections on Housing, Economic Development, Conservation and Open Space, Historic Resources, Recreation, and Implementation. The Community Facilities and Public Utilities sections are forthcoming.

The Master Plan divides the City into different districts: Penacook Village, West Concord, East Concord Village, Concord Heights, Downtown Concord/Opportunity Corridor, North/West End, and the South End. Each has its own unique attributes which contributes to the diversity of the City. A series of Maps illustrates the key features in the community.

One of the vision statements for Concord is:

- “Concord’s natural resources are appropriately protected, and natural hazards are identified and addressed.”

The residents of Concord had opportunities to participate in the Master Plan’s development. A community survey was mailed and public meetings were held. A series of recommendations were the result of the Master Plan’s data collection and analysis. Land use policies to limit the risk of natural, technological, and human hazards include:

- “Revise and amend existing development regulations to protect the health and safety of residents; to manage nuisances; and to protect against hazards to life and property from natural and man-made disasters.”
- “Maintain and enforce land use regulatory provisions which prohibit new residential development in the floodplains and floodways, on steep erodible slopes, shorelands, or wetlands, and to cooperate with State and federal regulatory agencies to protect residential areas from exposure to risk from toxic, explosive or other hazardous materials.”
- “Floodplain:
 - Use the best available information to establish the regulatory flood elevations and limits of flood hazard areas and to continue participation in the Federal Flood Insurance Program.
 - Continue to restrict development in the floodplain outside of existing urbanized areas to agricultural and recreational uses.
 - Prohibit new residential uses within the floodplain and encourage the removal of existing residences.”

There is a clear tie between the Master Plan and this Hazard Mitigation Plan. Protection of the water resources, including wetlands and floodplains, is critical, and these resources were identified as having potential to cause flooding. Stormwater management in the form of low impact design for drainage facilities was identified to mitigate hazards from flooding and stormwater runoff. Several Actions relating to stormwater management improvements are located in **8 MITIGATION ACTION PLAN**.

3 GOALS AND OBJECTIVES

The overall purpose of this Plan is to reduce future life and property losses caused by hazard events before they occur by the identification of appropriate **Actions** that are implemented during the five-year duration of this Plan.

Inspired by the *State of New Hampshire Hazard Mitigation Plan*, the following **Goals** were initially developed in a previous Plan version and thus were reviewed and updated as applicable by the Hazard Mitigation Committee during a public meeting. While the hazard incidents have remained essentially the same as from the **2012 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**.

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** of this Hazard Mitigation Plan provide a macro-level view of what emergency managers want to accomplish to keep the City’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**.



Objectives begin to narrow down the focus of the overall **Goals** into hazard minimization statements. Main hazard categories of **Flood, Fire, Severe Wind, Extreme Temperature (Cold-Hot), Human,** and **Technological** guide the direction of mitigation efforts. These hazard **Objective** statements, beginning with “Minimize”, state City’s desired outcome for each hazard category. The **Objectives** support the overall **Goals** by placing a focus on hazard mitigation or minimization.

Finally, **Actions** are the specific activities or projects which can be undertaken to accomplish an **Objective**. **Actions** begin with a verb to portray a direction for accomplishment. The **Action** is the target to reach to help mitigate hazards in the community. The completed **Action** fulfills the associated **Objectives**. The Actions will be listed and reviewed later in the **Potential Action Evaluation** and **Mitigation Action Plan** tables.

Overall Hazard Mitigation Plan Goals

The following **2** Goals for the **Hazard Mitigation Plan 2017** 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 **2012 Plan** to emphasize hazard mitigation instead of preparedness, response and recovery which are covered in the **Emergency Operations Plan**.

Overall Hazard Mitigation Plan Goals

1. To reduce the loss of life and the risk of injuries in the City from all natural hazards and disasters and impacts from secondary hazards.
2. To reduce the potential damages in Concord to public and private property, infrastructure, historic resources and the natural environment by natural hazards and disasters.

General Hazard Mitigation Objectives

Main hazard event categories, such as **Flooding**, are intended to encompass the full sub-hazards range described in this Plan. The general Objectives are developed by addressing the primary hazard events that could impact Concord. 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 in particular are secondary to (caused by) natural hazards. One such example is **Thunderstorms**, **Downbursts** or **Severe Winter Weather** causing **Power Failure**. As a result, **5** additional human and technological hazards Objectives are identified, totaling **11 General Hazard Mitigation Objectives**.

General Hazard Mitigation Objectives

FLOOD HAZARDS

1. Minimize the damages from floodwaters of the Merrimack, Contoocook, Turkey, and Soucook Rivers, Rattlesnake Brook, Beaver Meadow Brook, Mill Stream, Woods Brook, Bela Brook, Bow Brook and other brooks, and Snow Pond, Penacook Lake, Turkey Ponds, Turtletown Pond and other water bodies to life, property, and infrastructure.
2. Minimize the damages caused by flooded roads, culvert washouts, erosion, dam failures, or debris impacted infrastructure.

FIRE HAZARDS

3. Minimize the damages from fire, lightning, and wildfire to life, property, and infrastructure, including the rural/country road areas, the Downtown conflagration area, Garvins Falls, Broken Ground, and Mast Yard, Hazardous Abandoned Vacant (HAV) buildings, and suburban areas adjacent to these rural areas.

SEVERE WIND HAZARDS

4. Minimize the damages from severe wind events, including thunderstorms, downbursts, hurricanes and tropical storms, and tornadoes, to life, property, and infrastructure including Concord Municipal Airport and transportation systems in both urban areas and in rural areas.

General Hazard Mitigation Objectives

EXTREME TEMPERATURE (COLD-HOT) HAZARDS

5. Minimize the damages from both severe winter weather events (including storms, snow, ice, wind chill events and snow load/building collapse) and from excessive heat events (such as heat waves, drought, declining air and water quality and climate warming) to life, property and infrastructure.
6. Minimize the threat of public health events from the cold and warm weather seasons (influenza, communicable illnesses, Lyme disease, hypothermia, heat exhaustion, asthma, etc) to the public, especially those in close quarters.

HUMAN HAZARDS

7. Minimize the damages from human threats such as sabotage/vandalism, terrorism, hostage situations, and civil disturbance (including incidents at the schools, City buildings, the State Offices, the Federal Building, and Concord Hospital), to life, property and infrastructure.

**TECHNOLOGICAL HAZARDS
(Infrastructure and Secondary)**

8. Minimize the impact of blocked transportation systems, including the US Route 202/9, I-93, I-89, I-393, NH Route 132, NH Route 106, US Route 3, and Main Street, to travelers from any natural hazard event.
9. Minimize the damages from multiple hazards to the operational efficiency of all City communications systems, information technology, underground water and sewer utilities, dams, bridges, and transportation roadways.
10. Minimize the damages from electrical power failure to life, property, and infrastructure, in both rural and urban environments.
11. Minimize the damages from hazardous materials exposure, chemical spills, or radiological materials exposure to life, property, and infrastructure.

4 HAZARD RISK ASSESSMENT

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

The *State of New Hampshire Hazard Mitigation Plan, 2013* recommends that municipalities examine multiple natural hazards. Two hazards, coastal flooding and snow avalanche, are not discussed in Concord's Plan because they have no relevance. Within the **Hazard Mitigation Plan 2017**, natural hazards under these basic categories have been incorporated:

- **Flooding Hazards**
- **Wind Hazards**
- **Fire Hazards**
- **Extreme Temperature (Cold-Hot) Hazards**
- **Earth Hazards**
- **Technological (Secondary) Hazards**
- **Human Hazards**

Within these basic hazard categories are numerous related subcategories, all of which are detailed in a **Hazard Risk Assessment**. This Assessment provides a measure of **Frequency**, **Location Area**, **Impact to the City**, **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 City. 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 Concord 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 Risk Assessment Rankings

Twenty-seven (27) natural, technological, and human hazards are evaluated within this Plan. The 16 natural hazards (including the technological hazard **Dam Failure** because of its close association with flooding) are ranked within in a **Hazard 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 Concord 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 City** column.

Knowing where events may be likely to occur, the 2017 Hazard Mitigation Committee examined each potential hazard for its **Probability of Occurrence** and its potential **Impact to the City** affecting people, services/infrastructure and property based on past personal recollections and community hazard trends to determine the **Overall Risk** to the community.

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

Probability of Occurrence

1	Unlikely=	0 - 25% chance	in 10 years
2	Possible=	25 - 50% chance	in 10 years
3	Likely=	51 - 75% chance	in 10 years
4	Highly Likely=	76 - 100% chance	in 10 years

The Committee determined the likely **Impact to the City** of an event based on a **1-2-3-4** scale for **3 Impact** characteristics – Human injuries, the length of time Critical Services/Infrastructure are shut down, and Property damage. Not all of these characteristics have to 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** score was multiplied by the average of each **Impact to the City** (Human, Critical Services/Infrastructure and Property) 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 2017**. However, **Dam Failure** was rated because of its close correlation to **Flooding**.

Impact to the City: Human, Critical Facilities/Infrastructure/Services, Property

1	Limited=	<p>Human: Injuries treatable with first aid.</p> <p>Critical Facilities/Infrastructure/Services: Minor inconvenience; Shutdown for 3 days or less.</p> <p>Property: Damaged less than 10%.</p>
2	Significant=	<p>Human: Significant injuries or illnesses result in no permanent disability.</p> <p>Critical Facilities/Infrastructure/Services: Shutdown for up to 2 weeks.</p> <p>Property: Damaged 10% to 25%.</p>
3	Critical=	<p>Human: Significant injuries or illnesses result in permanent disability.</p> <p>Critical Facilities/Infrastructure/Services: Complete shutdown for at least 2 weeks.</p> <p>Property: Damaged 25% to 50%.</p>
4	Catastrophic=	<p>Human: At least 1 to multiple deaths.</p> <p>Critical Facilities/Infrastructure/Services: Complete shutdown for 30 days or more.</p> <p>Property: Damaged greater than 50%.</p>

The highest possible **Overall Risk** score a natural hazard could be ranked using this **Hazard Risk Assessment** 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** and **Impact to the City**. The full results of the **Hazard Risk Assessment** are displayed in **Table 10**.

Out of the **16** ranked hazards, Concord’s **4** highest ranking hazards scored an **Overall Risk** between a rounded **7** and **8** (out of a possible score of **16**):

Highest Overall Risk 7-8

-  **Downburst (8)**
-  **Floods and Flash Floods (7)**
-  **Severe Winter Weather, Wind Chill and Ice Storms (7)**
-  **Drought (7)**

Next Highest Overall Risk 5:






-  **Riverine (Merrimack, Contoocook, Soucook, Turkey) Scouring, Erosion, Channel Movement (5)**
-  **Severe Winds, Rain Storms and Thunder Storms (5)**
-  **Lightning (5)**
-  **Wildfire (5)**
-  **Hurricanes and Tropical Storms (5)**

Table 10
Hazard Risk Assessment 2017

Natural, Technological, Human Hazard Events		Susceptible (Existing) Hazard Locations in the City	Probability of Occurrence	Human Injury Impact	Critical Services and Infrastructure Impact	Property Damage Impact	Severity of Impact	OVERALL RISK
Flooding	Floods and Flash Floods	Floodplains of Turkey River, Soucook River, Merrimack River and the Contoocook River and Rattlesnake Brook. These watercourses result in expanded flooding. The City is susceptible to flooding because of the close proximity of these rivers. Homes near the Merrimack and Contoocook Rivers, especially in low-lying areas, are at risk. Other water systems, such as the Turkey River, Turkey Pond, Little Turkey Pond, Burnham Brook, Hayward Brook, Woods Brook, Snow's Brook, Hackett Brook, Hoyt Road Marsh, Mill Brook, Bela Brook, Turree Brook, Bow Brook (May 2006), Millstream Brook (May 2006), and Rattlesnake Brook (May 2006) are also prone to flooding. Areas which are susceptible to regular flooding include the Merrimack River's edge at the former Christian Mutual Building, along Shaw's Fort Eddy Road, the NH Technical College fields, at Hall Street in the Amoskeag Beverages area, and Long Meadow Drive manufactured housing park. Runoff from roadways or heavy rain can cause floods over the Entire City. Lincoln Street, low catchment area catch basin & hydraulic capacity of area is deficient, floods during flash storm. Kimball Jenkins Estate - water from I-393 and Main Street cascades down over retaining wall (waterfall). Velocity eroded the north side of the pavement and washes out the area. Driveway and foundation near building keep eroding. A lot of 1800s vintage brick pipe and clay pipe, susceptible to high velocity and heavy scour flooding, supporting the most unpredictable. South end trunkline stormwater system under existing homes, not an ideal situation when waterline is at the basin height.	4	1	2	2	2	6.7
	Rapid Snow Pack Melt	Entire City. Melt runoff from impervious surfaces and roadways or from tree cover and fields can cause floods over the entire City. Most of the melt water flooding is away from residential areas except for Fort Eddy Road and any facilities along the bank of the Merrimack River. The Soucook River on North Pembroke Road may be susceptible to rapid snow pack flooding on the west side of the river.	1	1	1	1	1	1.0

Natural, Technological, Human Hazard Events		Susceptible (Existing) Hazard Locations in the City	Probability of Occurrence	Human Injury Impact	Critical Services and Infrastructure Impact	Property Damage Impact	Severity of Impact	OVERALL RISK
Flooding	River Ice Jams	Turkey River, Soucook River, Merrimack River and the Contoocook River and Rattlesnake Brook would be at greatest risk for flooding due to ice jams. The Soucook River has had ice jams in the past and could endanger the North Pembroke Road bridge. River ice jams cause debris impacted infrastructure - sites susceptible to ice jam debris impacted infrastructure (bridges and dams) include St. Paul's, which could sustain significant building damage from the Turkey River because of the dam's open spillway.	3	1	1	1	1	3.0
	Riverine (Merrimack, Contoocook, Soucook, Turkey) Scouring, Erosion, Channel Movement	Floodplains of Turkey River, Soucook River, Merrimack River and the Contoocook River and Rattlesnake Brook. These are the largest watercourses in the City and run through urban and rural locations alike. Bank erosion and scouring is most prevalent on the banks of the four Rivers. Soucook River off of Route 106 (near the mall), experiencing large slope erosion at one of the meander curves owned by the City. Nearby house owned by on a bluff behind the mall, nearby Continental Paving blasting is also felt there. Sinkholes around the property occurring.	4	1	1	2	1	5.3
Wind	Tornadoes	Entire City. Areas of particular concern include dams, bridges, vulnerable populations, Schools, manufactured housing parks as listed in Appendix A. Roadways (fallen trees), electrical power utilities, communications network, local government operations are susceptible to damage from trees and power lines down because of tornadoes. Rollins Park contains legacy pine trees. Rural roads - Shaker Road, Snow Pond Road, Oak Hill Road, Dunbarton Road (private St. Paul's), Fisk Road, Carter Hill Road, West Parish Road, Broad Cove Road, River Road, Bog Road, Elm Street, Horsehill Road, Iron Works Road, Currier Road, Silk Farm Road, Long Pond Road, Hoit Road, Mountain Road (Route 132), Graham Road, District Five Road, Runnells Road, Weir Road, Blackwater Road, Warner Road, Garvins Falls Road, Portsmouth Street.	2	2	2	2	2	4.0

Natural, Technological, Human Hazard Events		Susceptible (Existing) Hazard Locations in the City	Probability of Occurrence	Human Injury Impact	Critical Services and Infrastructure Impact	Property Damage Impact	Severity of Impact	OVERALL RISK
Wind	Downbursts	Entire City. The rural road areas, Schools and populated areas with trees would be most vulnerable to downburst. Vulnerable populations include manufactured housing parks from Appendix A. Wooded and forested sections of City: Rollins Park contains legacy pine trees; rural roads - Shaker Road, Snow Pond Road, Oak Hill Road, Dunbarton Road (private St. Paul's), Fisk Road, Carter Hill Road, West Parish Road, Broad Cove Road, River Road, Bog Road, Elm Street, Horsehill Road, Iron Works Road, Currier Road, Silk Farm Road, Long Pond Road, Hoit Road, Mountain Road (Route 132), Graham Road, District Five Road, Runnells Road, Weir Road, Blackwater Road, Warner Road, Garvins Falls Road, Portsmouth Street. would be most subject to tree and home damage from downbursts. Taller buildings, telecommunications towers, and aboveground utilities are particularly vulnerable (see Appendix A).	4	3	2	1	2	8.0
	Hurricanes and Tropical Storms	Entire City. Areas of particular concern include dams, bridges, vulnerable populations, schools, manufactured housing parks, hotels. Roadways (fallen trees), electrical power utilities, communications network, local government operations are susceptible to damage to trees and power lines down because of hurricanes. Rollins Park contains legacy pine trees. Rural roads - Shaker Road, Snow Pond Road, Oak Hill Road, Dunbarton Road (private St. Paul's), Fisk Road, Carter Hill Road, West Parish Road, Broad Cove Road, River Road, Bog Road, Elm Street, Horsehill Road, Iron Works Road, Currier Road, Silk Farm Road, Long Pond Road, Hoit Road, Mountain Road (Route 132), Graham Road, District Five Road, Runnells Road, Weir Road, Blackwater Road, Warner Road, Garvins Falls Road, Portsmouth Street.	3	1	2	2	2	5.0
	Severe Winds, Rainstorms and Thunder Storms	Entire City. Areas of particular concern include dams, bridges, vulnerable populations, schools, manufactured housing parks. The rural roadways (fallen trees), electrical power utilities, communications network, local government operations are susceptible to damage from debris impacted infrastructure. The close proximity to the Merrimack River, Contoocook River, and Soucook River and Turkey River makes areas of the City susceptible to flooding during heavy rain storms. The storm drain system is the oldest infrastructure in the City.	4	1	2	1	1	5.3

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Natural, Technological, Human Hazard Events		Susceptible (Existing) Hazard Locations in the City	Probability of Occurrence	Human Injury Impact	Critical Services and Infrastructure Impact	Property Damage Impact	Severity of Impact	OVERALL RISK
Fire	Lightning	Entire City. Areas most susceptible to lightning include areas with higher elevation (such as Concord Heights, Penacook Street, West Parish Road, Carter Hill), forested and conservation areas, open recreation fields, locations difficult to access by vehicle. Susceptible structures to lightning include aboveground utilities, transformers, telecommunications towers, churches and tall buildings.	4	2	1	1	1	5.3
	Wildfire	Rural Areas. Areas most susceptible include areas with higher elevation (such as Concord Heights, Penacook Street, West Parish Road, Carter Hill), forested and conservation areas, open recreation fields, and remote locations: Garvins Falls Road, Shaker Road, Hoit Road, District 5 Road, Lakeview Road, Little Pond Road, Carter Hill Road, Fiske Road, Whitney Road, Curtisville Road, Elm Street in Penacook, and many others are rural roads with many homes set in the trees and have greater susceptibility to wildfire. Susceptible structures to fire include aboveground utilities, transformers, telecommunications towers, churches and tall buildings.	4	1	1	2	1	5.3
Extreme Temp	Severe Winter Weather, Cold and Ice Storms	Entire City. Areas of particular concern include the dams, bridges, vulnerable populations, schools, manufactured housing parks listed in Appendix A. Roadways (fallen trees), electrical power utilities, communications network, local government operations are susceptible to damage. Particular roof collapse concerns include the Gas House. Rural roads in the City include: Shaker Road, Snow Pond Road, Oak Hill Road, Dunbarton Road (private St. Paul's), Fisk Road, Carter Hill Road, West Parish Road, Broad Cove Road, River Road, Bog Road, Elm Street, Horsehill Road, Iron Works Road, Currier Road, Silk Farm Road, Long Pond Road, Hoit Road, Mountain Road (Route 132), Graham Road, District Five Road, Runnells Road, Weir Road, Blackwater Road, Warner Road, Garvins Falls Road, Portsmouth Street and many others are rural roads with homes set in the trees, resulting in greater susceptibility to severe winter weather conditions and may be more difficult to access and/or be without power (including heat) for a longer period of time. Most vulnerable populations include assisted living facilities, 55+ older residential communities and others in Appendix A may be subject to cold temperature, snow isolation, transportation accidents, power failure and communications failure.	4	2	2	1	2	6.7

Natural, Technological, Human Hazard Events		Susceptible (Existing) Hazard Locations in the City	Probability of Occurrence	Human Injury Impact	Critical Services and Infrastructure Impact	Property Damage Impact	Severity of Impact	OVERALL RISK
Extreme Temp	Drought	Entire City / Region. Areas susceptible include farms, orchards: Dimond Hill Farm, Rossview Farm, Carter Hill Orchard and others. Also vulnerable are those residences with private dug wells outside of the City water supply. The City water supply at Penacook Lake has been fluctuating, but the City has a backup drinking water source (Contoocook River) so low levels are not considered an issue. Drought means increased risk of brush fire with dry vegetation (see Wildfire for areas). No drought was declared in 2010 despite the dry weather. Current 10-16 reports of severe drought from NHDES.	4	1	2	2	2	6.7
	Excessive Heat	Entire City. Vulnerable populations most susceptible to extreme heat include the assisted living facilities, 55+ older residential communities and schools. Shelters will need to be opened for cooling centers during extended heat conditions. Transportation to cooling center may be a limiting factor to people being able to use them.	4	1	1	1	1	4.0
Earth	Earthquake	Entire City. The Central NH Region is seismically active and earthquakes are regularly felt from area epicenters. Damage to utility poles and wires, major roadways, the underground aged waterlines and sewer lines, Waste Water Treatment Facility, bridges and dams can be significant. The Downtown conflagration area contains older, taller buildings could likely be the most vulnerable for building collapse as they were not built to earthquake standards.	3	1	1	2	1	4.0
Earth	Landslide	Along the Merrimack, Soucook and Turkey Rivers. Slopes greater than 15%, including roads with steep ditching or embankments are most vulnerable to landslide. River and brook banks can also slide, usually known as erosion, such as Broad Cove Road along the Contoocook River. The Soucook River maps indicate fluvial geomorphic features that include areas of erosion along the banks. Unique soil conditions on Concord Heights and sandy banks of the plateau are susceptible to landslide. NHDOT (Merrimack River) is at the top of one of these plateaus. Concord Airport (Merrimack & Soucook) facilities are located on slopes steep and sandy; the airport has an active drainage failure as of 10-16, a grant is being sought to correct.	2	1	2	2	2	3.3

Natural, Technological, Human Hazard Events		Susceptible (Existing) Hazard Locations in the City	Probability of Occurrence	Human Injury Impact	Critical Services and Infrastructure Impact	Property Damage Impact	Severity of Impact	OVERALL RISK
Technological	Dam Failure	Dams on the Turkey River, Soucook River, Merrimack River and the Contoocook River. Some dams in the City have been breached, such as Sewell’s Falls, but were not large enough to have caused a problem. Other dams have a High hazard classification that if failed, could present a problem to those downstream or directly nearby: Penacook Lake Dam (fed by Rattlesnake Brook) could flow over North State Street and residences, Turkey Pond Dam at St. Paul's has an open spillway. The City's 2 Significant Hazard dams are located on the Contoocook River: York Dam (NHDES) and Penacook Upper Falls Dam (Briar Hydro Association).	2	2	2	2	2	4.0
	Power/Utility Failure	Entire City. Utilities and vulnerable populations could be at greatest risk (see Appendix A). The wooded, rural roads in the City include: Shaker Road, Snow Pond Road, Oak Hill Road, Dunbarton Road (private St. Paul's), Fisk Road, Carter Hill Road, West Parish Road, Broad Cove Road, River Road, Bog Road, Elm Street, Horsehill Road, Iron Works Road, Currier Road, Silk Farm Road, Long Pond Road, Hoit Road, Mountain Road (Route 132), Graham Road, District Five Road, Runnells Road, Weir Road, Blackwater Road, Warner Road, Garvins Falls Road, Portsmouth Street and many others are rural roads with homes set in the trees, resulting in greater susceptibility to power failure from any natural hazard, may be more difficult to access, and/or may be without power (including heat) for a longer period of time.	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated
	Communications Systems Failure	Entire City, Telecommunications Towers. Telephone lines often go down with power. Communications are detailed in Appendix A. Communications failure would be worse if it occurred at the Fire and Police Depts, Highway Department or City Offices, especially during a holiday, or inhibited emergency dispatch and EOC operations.	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated

Natural, Technological, Human Hazard Events		Susceptible (Existing) Hazard Locations in the City	Probability of Occurrence	Human Injury Impact	Critical Services and Infrastructure Impact	Property Damage Impact	Severity of Impact	OVERALL RISK
Technological	Debris Impacted Infrastructure	Entire City. Most dams, bridges, culverts, drainage structures, roadways and overhead powerlines could experience debris impacted infrastructure. Culverts that regularly washout (including those in need of upgrade) include: School Street, Warren Street, Pleasant, State Hospital, Clinton Street, South Street, Rockingham Street. The City received federal money to repair Pleasant and Warren Street drainage. Bow Brook originates at Thayer Pond has the potential to overflow because of debris. Soucook River Bridges on North Pembroke Road could be overtopped and the roadway made impassible. Prominent state routes, commuter roadways or residential roads that are commonly blocked or that would impact the greatest number of people if blocked by downed trees or power/utility lines: Route 106, Route 9, US Route 4/202, US Route 3, and the interstates I-89, I-93 and I-393.	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated
	Transportation Accidents	Entire City. I-89, I-93, I-393, US Route 202/9, interchanges and exit ramps, US Route 3, US Route 4, NH Route 9, NH Route 106, NH Route 132. Railroad accidents can occur as well as plane or helicopter crashes in the vicinity of Concord Airport. See Map 4 for regular accident locations - at certain intersections (W Main & School Street), curves, straightaways, hills.	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated
	Fire (Vehicle, Structure, Arson)	Entire City. Areas most susceptible include: multi-unit housing, rural subdivisions, vacant or foreclosed homes in the City and buildings in densely populated areas or residential manufactured home parks. Vehicle fires could occur anywhere, parking lots, driveways, roadways.	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated

Natural, Technological, Human Hazard Events		Susceptible (Existing) Hazard Locations in the City	Probability of Occurrence	Human Injury Impact	Critical Services and Infrastructure Impact	Property Damage Impact	Severity of Impact	OVERALL RISK
Technological	Hazardous Materials Spills	Entire City - transportation routes and occupational facilities. Major transportation routes convey trucking carrying radioactive materials through the City. No accidents to date are known: Route 106, Route 9, US Route 4/202, US Route 3, and the interstates I-89, I-93 and I-393. The railroad also transports materials that could be hazardous. Largest or most dangerous stationary sites that store and/or handle haz mat on site include those listed in Appendix A, locations that store or use fertilizer, pesticides, fuel, etc. Occupational haz mat /radiological sites where spills could occur include: Concord Hospitals, health clinics, Concord Schools, manufacturing sites, etc. Concord is not in either the evacuation area or the plume area of the Seabrook and Vermont Yankee facilities. Construction waste and medical community (low) waste are considered low risk. The Wheelabrator MSW Incinerator likely scans materials incoming, as does Advanced Recycling and other metal recycling facilities.	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated
	Public Health Epidemics	Close Quarters Throughout City. Schools, health clinics, eating establishments, populated areas, large employers, senior apartments, stores and public assembly venues - all of these locations increase the risk of exposure to and transfer of illness. In the City, these vulnerable populations include Appendix A facilities. Also, programs with public outreach such as: recreation, after school, Meals-on-Wheels, VNA, Seniors-Helping-Seniors enable incubation and/or transmission of illness. The City is an active member of the Capital Area Public Health Network, and the NH Technical College (NHTC) was named a Point of Dispensing (POD). The City is prepared to enact pandemic flu protocols. In 2009, Unital filed a pandemic plan with the Public Utilities Commission (PUC). The City's conservation land and recreation land holdings are growing and could lead to the public being more exposed to more EEE and West Nile. The most vulnerable populations include residents of retirement communities and school populations.	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated
Human								

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Natural, Technological, Human Hazard Events		Susceptible (Existing) Hazard Locations in the City	Probability of Occurrence	Human Injury Impact	Critical Services and Infrastructure Impact	Property Damage Impact	Severity of Impact	OVERALL RISK
Human	Terrorism	Downtown (compact area). Most susceptible sites could include: Downtown area, Statehouse, Courthouses, Schools, major employers (especially those large quantities of haz materials), certain health clinics, high volume roadways, water supply infrastructure or dams, City Office, all Schools, Post Office, all governmental facilities, state facilities, locations of political offices or rallies, Churches, etc. First Night (Dec 31) activities have been cancelled as a result of terrorism following an event, such as the 1998 bombs. Chemical, biological, explosive, radiological events are possible terrorist tactics.	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated
	Sabotage/Vandalism	City Facilities. Sabotage would be most likely to occur to: City Hall, City computer systems & website, City, County, State or Federal buildings, water supplies, Waste Water Treatment Facility, Cemeteries, Schools and gathering places, vacant buildings, under bridges. Facilities are located in Appendix A.	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated
	Hostage Situation	Unlikely, Isolated Events. Hostage situations could occur at the Concord Elementary Schools, Middle School and High School, Bishop Brady School, NH Technical College, St. Paul's School and daycares. They could also occur at City Hall, the Federal Building, Banks, Post Office, Merrimack County Courthouse, Concord District Courthouse, workplaces, and other state, federal and county facilities. Hostage situations could also occur in high density residential areas as noted in Appendix A or in a single family home as domestic home hostage situations.	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated
	Civil Disturbance / Public Unrest	Downtown (compact area). Locations where civil disturbance could occur should be limited, however more likely in the compact area of the city. Occasions include: City Meetings, voting day, during visits from political candidates, at large events such as High School, St. Paul's or NH Technical College graduations. sporting events, Locations include: Concord Schools, City Hall, stores, restaurants, establishments serving alcohol, high density population areas (Main Street, Downtown, manufactured housing parks, neighborhoods), Police/Fire Stations, Courthouses, health clinics, State House.	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated

Source: Concord Hazard Mitigation Committee

Central NH Region Major Disaster Declarations, 1973-2016

The Central NH region, which encompasses parts of Merrimack County (**18** communities) and Hillsborough County (**2** communities), has been damaged by **21** multiple presidentially-declared major disasters in the last **43** years, between **1973-2016**.

While a natural disaster typically befalls multiple counties in New Hampshire, only those damaging either Merrimack County or Hillsborough County were identified in this section. Over the last **11** years (**2005-2016**), the number of presidentially-declared natural major disasters have increased significantly compared to the first severe storm and floods of **1973** to the **1998** ice storm (**25** years).

Between **2005-2016**, the most recent round of major disasters afflicting the Central NH Region, **12** natural disasters within **11** years were declared for Merrimack and/or Hillsborough Counties, **5** of which were floods, **5** snow/ice storms, and **2** rain/wind storms. No other major disasters were declared between **1998-2005** in the Central NH Region, bringing the total number of disaster declarations to **12** disasters within **18** years (**1998-2016**).

Emergency declarations 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 counties or states. Emergency declarations that occurred between **2005-2016** are not counted within the **12** declared disasters and were not recognized unless the community applied for and received FEMA Public Assistance funding, such as Hurricane Sandy in 2012. Snow emergencies from the early 2000s are not included here.

However, the last declared disaster in Merrimack County, in which Concord is located, was in **February 2013**; as of **February 2017**, no new major disasters have been declared here. These details are displayed in **Table 11**. Most of these disasters will be described within the following [Recent Disaster Events Summary](#) section.

Table 11
Central NH Region Major Disaster Declarations, 1973 to 2017

FEMA DR-	Local Disaster Name	Incident Period	FEMA Disaster Name	Includes County*		FEMA Public Assistance Funding to Concord**
				Merr	Hill	
4209	2015 January Blizzard	Jan 26-28, 2015	Severe Winter Storm and Snowstorm	---	H	N/A
4105	2013 Snowstorm NEMO	Feb 8-10, 2013	Severe Winter Storm and Snowstorm	M	H	\$127,200
4095 EM-3360	2012 Hurricane Sandy	Oct 26-Nov 8, 2012	Hurricane Sandy <i>emergency declaration only for Merr and Hill Cty</i>	EM- M	EM- H	\$26,300
4049	2011 Halloween Snow Storm	Oct 29-30, 2011	Severe Storm and Snowstorm	---	H	N/A
4026	2011 Tropical Storm Irene	Aug 26-Sep 6, 2011	Tropical Storm Irene	M	---	\$19,500
1913	2010 March Flooding & Winds	Mar 14-31, 2010	Severe Storms and Flooding	M	H	\$0
1892	2010 Winter Storm	Feb 23-Mar 3, 2010	High Winds, Rain, Snow	M	H	\$88,700
1812	2008 December Ice Storm	Dec 11-23, 2008	Severe Winter Storm	M	H	\$87,400
1799	2008 Patriot's Day Flood	Sep 6-7, 2008	Heavy Rains and Floods	M	H	\$0
1782	2008 July Tornado	Jul 24, 2008	Tornado, Severe Winds, Heavy Rains	M	---	\$0
1695	2007 April Spring Flood	Apr 15-23, 2007	Severe Storms and Flooding	M	H	\$29,600
1643	2006 Mother's Day Flood	May 12-23, 2006	Severe Storms and Flooding	M	H	\$222,100
1610	2005 Columbus Day Flood	Oct 7-18, 2005	Severe Storms and Flooding	M	H	\$29,300
EM-3207	2005 Snow Emergency	Jan 22-23, 2005	Snowstorm	M	H	\$84,500
EM-3193	2003 Snow Emergency	Dec 6-7, 2003	Snowstorm	M	H	\$75,900
EM-3177	2003 Snow Emergency	Feb 17-18, 2003	Snowstorm	M	H	\$58,700
EM-3166	2001 Snow Emergency	Mar 5-7, 2001	Snowstorm	M	H	\$59,600
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 Severe 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
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 Severe Storms and Flooding	Mar 30-Apr 11, 1987	Severe Storms and Flooding	M	H	No data
771	1986 Severe Storms and Flooding	Jul 29-Aug 10, 1986	Severe Storms and Flooding	---	H	N/A
399	1973 Severe Storms and Flooding	Jul 11, 1973	Severe Storms and Flooding	M	H	No data
Total Public Assistance (PA) FEMA Funding to Concord, 1993-2017**						\$908,800

Source: http://www.fema.gov/disasters/grid/state/33?field_disaster_type_term_tid_1=All

*M = Merrimack County (18 Towns in CNH region) H = Concord County (2 Towns in CNH region)

** Dollar figures are rounded to the nearest \$100

Recent Disaster Events Summary

The City of Concord 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 City 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 Concord and its residents. Public Assistance disaster funding opportunities open to communities when a disaster is declared within a county. The City of Concord applied for and received this funding for several recently declared disasters. Also identified were numerous hazard events that occurred locally in the community and within the area. The disaster event listing dates from the 1936 floods to present day.

PUBLIC ASSISTANCE GRANT FUNDING

To help reclaim some of the costs these disasters wrought on City property and infrastructure, Concord 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 City 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 (**2016**). The funding was sought for and received by Concord for **8** of the **15** declared disasters (including Hurricane Sandy, which was an emergency declaration) in Merrimack County during this timeframe. In addition, Emergency Management declarations provided funding to Concord for **4** snowstorm emergencies declared between **2001-2005**. This data is available through FEMA at <https://www.fema.gov/openfema-dataset-public-assistance-funded-projects-details-v1>.

The most expensive disaster for Concord in terms of FEMA Public Assistance funds received for recovery was the **May 2006 Mother's Day Flood** for which Concord received about **\$222,000** for **29** individual projects. Over time, Public Assistance funding has been used for repairing the rural roads, bridges and culverts, railroad bed washouts, wastewater treatment plant services, erosion, for traffic control, debris removal and protective measures. The last time the City was awarded funding was for Protective Measures for snow removal during the **February 2013 Blizzard (\$127,200)**. This was also the last major disaster declaration for Merrimack County as of October 2016 in which funds were eligible for application. All funding provided to Concord to date, from **1993** to **February 2017**, totals **\$908,800**. This detail, along with a chronological history of natural disasters and hazard events, is displayed in **Table 12**.

COLOR KEY for Table 12:

Declared Disasters in Merrimack County or Hillsborough County (Central NH Region)	PA Funding \$ Received by Concord	Other Concord Local Hazard Event
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Table 12

Local and Area Hazard Event and Disaster History

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
Concord/Merrimack County Drought Severe Emergency 2016-2017	No	2017	Feb 21	N/A	Extreme Drought (D3) intensities are found in northern Hillsborough and southern Merrimack Counties. Some of the communities in the Central NH Region are experiencing Severe Drought (D2) or Moderate Drought (D1) conditions. The NH DES has issued a series of statements and tips for homeowner water conservation. As of September 2016, residents and municipalities are requested to voluntarily conserve water. Some communities or water precincts have enacted water restrictions or bans for certain water usage. More restrictions may be enacted or may eventually be required by the State if conditions remain the same or worsen.	The Severe Drought (D2) conditions as of 02/17 continue to cover the entire community of Concord. The City Manager’s 01/17 newsletter reminded residents about the severity of the drought and suggested wise water usages. General Services developed an informational video about the drought conditions and offered tips on how to conserve water and request voluntary water restrictions. Summer 2016- water supplies are lower than usual, dug wells have reported going dry.	Earth, Drought	US Drought Monitor NH, NH DES, Concord General Services – see video hyperlink
Concord Floods and Flash Floods 2013-2016	No	2013-2016	Sep 20	N/A	It’s likely the region experienced some flooding events during times of heavy rain	Issues to be resolved in 2016- Lincoln Street, low catchment areal catch basin & hydraulic capacity of area is deficient, floods during flash storm. Kimball Jenkins Estate - water from I-393 and Main Street cascades down over retaining wall (waterfall). Velocity eroded the north side of the pavement and washes out the area. Driveway and foundation near building keep eroding. Currently (10-16) working on a solution for placement of new pipe system into Horseshoe Pond to divert water. Allison Street culvert failure in 2013, Main Street spring 2014 at Warren Street, 2015 I-93.	Floods and Flash Floods, Severe Rain Storms	Concord Hazard Mitigation Committee

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
Concord Invasive Insects 2016	No	2016	April	N/A	The Emerald Ash Borer (EAB) is found in Merrimack County. Other surrounding counties are vulnerable or also infected (Belknap, Hillsborough, and Rockingham). The EAB was found in New Hampshire in Concord on March 2013. EAB attacks ash trees and is responsible for the death of millions of ash trees in the Midwest. A quarantine of all hardwood firewood, ash wood-products and all ash nursery stock is in effect for the above 4 counties.	Concord-owned conservation land is infested with Emerald Ash Borer (EAB), known as ground-zero for the infestation in NH. Red Pine Scale is also seen at many parks and the woolly adelgid made an appearance. Measures for the EAB include pesticide, cutting down trees and a parasitic wasp release in Concord and abutting Canterbury. Concord is within the quarantine area and	Biological, Invasive Species Infestation	Concord Monitor, UNH Cooperative Extension Merrimack County website, report sightings to nhbugs.org, NH DRED
Earthquake 2.9M Warner Epicenter 2016	No	2016	21-Mar	N/A	Epicenter in Warner/Hopkinton area, 2.8 magnitude. Felt in the Central NH Region/most of Merrimack County, light in Hillsborough County. Felt most strongly in Hopkinton, Henniker, Warner, Webster, Salisbury, Franklin, Concord, Concord, and Hillsborough	Reports were made to the USGS from Concord residents feeling the earthquake as a loud noise. Phone calls were received by Police Department reporting explosions, but no damage occurred.	Earth, Earthquake	USGS, Concord Hazard Mitigation Committee
Concord Areas of Soucook and Turkey Fluvial River Erosion, Landslide 2015	No	2015		N/A	The Turkey River begins in Concord at the Turkey Ponds and flows southeast into Bow. The Soucook River begins in Loudon and flows south forming the Concord/Pembroke boundary into Bow where it empties into the Merrimack River. The Merrimack travels through many Central NH Region communities then flows south to southern NH, and flows south east into Massachusetts with its mouth at Newburyport.	Based on the Turkey and Soucook Fluvial Geomorphic Assessments and associated maps, there are many locations along these rivers that are currently eroding or have features that will encourage flooding under heavy flow conditions.	Fluvial Erosion, Landslide, Flooding	Concord Hazard Mitigation Committee, NHGS Fluvial Geomorphic Assessments, CNHRPC (Assessments & Maps are part of this Haz Mit Plan)
Earthquake 2.2M Epsom Epicenter 2015	No	2015	2-Aug	N/A	Epicenter around Epsom in the Central NH Region in Merrimack County, felt in nearby locations including Concord, Hopkinton, Allenstown, Loudon Chichester and Pittsfield	Reports were also likely made to the USGS from Concord residents feeling the earthquake.	Earth, Earthquake	Earthquake track.com
Tornado, Severe Thunderstorms 2015	No	2015	31-Jul	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. City officials said the tornado ripped the roof off a barn, but there were no injuries reported.	N/A, although Warner is 2 communities to the west of Concord	Wind, Tornado	WMUR

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
Concord Wildfire at Long Pond Road 2015	No	2015	May 4	N/A	N/A	May 4, 2015 - 6 alarm wildfire on hill at Long Pond Road by Lake View Drive, 70 firefighters and about 60 acres of damage. Helicopter assistance was needed.	Wildfire	Concord Hazard Mitigation Committee, Concord Monitor
Concord Wildfire at Rattlesnake Hill 2015	No	2015	Apr 25	N/A	N/A	April 25, 2015 – Rattlesnake Hill at Little Pond Road was covered with 3 forest fires, from ½ acre to 2 acres in size. Human causation was suspected.	Wildfire	Concord Hazard Mitigation Committee, Concord Patch
Severe Winter Storm and Snowstorm - January Blizzard 2015	4209	2015	Jan 26-28	N/A for Concord	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. There was no declaration for Merrimack County The closest reporting weather station, Concord Airport (CON), had accumulated 29" of heavy snow, 50 mph whiteout wind conditions in the region. <u>Not declared in Merrimack County.</u>	During this blizzard, a homeless person in a wheelchair died because the state sidewalk on I-393/Commercial Street had not been plowed and he was in the road, trying to get to the Friendly Kitchen.	Extreme Temp, Snow, Power Failure, Severe Winds	Concord Hazard Mitigation Committee, fema.gov, Boston Globe
Concord Ice Jam on Contoocook River 2014	No	2014	---	N/A	Contoocook River flows through Boscawen and into Concord as it empties into the Merrimack River.	Contoocook River ice jam in 2014 upstream of the Penacock Dam.	Ice Jam	Concord Hazard Mitigation Committee
Concord Thanksgiving Day Snowstorm 2014	No	2014	27-Nov	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.	Overnight storm, power outages lasting up to 3 days, trees down. Significant amount of work clearing roads and utility companies came in from Canada and Northeast. Power and access were disrupted. Turkeys were substituted by rotisserie chicken from grocery stores and had roast beef and turkeys on the grill. Roof slid off due to snow load and improper construction.	Extreme Temp, Snow, Power Failure	Concord Hazard Mitigation Committee, Concord Monitor

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
Earthquake 2.6M Warner Epicenter 2013	No	2013	11-Oct	N/A	Epicenter in Warner, 2.6 magnitude. Felt in the Central NH Region/northern Merrimack County, most strongly in Hopkinton, Henniker, Warner, Webster, Concord, Salisbury, Franklin	Reports were made to the USGS from Concord residents feeling the earthquake as a rumble or loud noise. Warner is 2 communities to the west	Earthquake	USGS
Concord Civil Disturbance 2013	No	2013	Jun 18	N/A	N/A. Concord is the seat of NH government	On the City Hall Plaza in front of the NH State House, two groups clashed relative to gun control demonstration. Officers were assaulted and fights broke out in the crowd. One subject arrested for simple assault on Police Officer, Resisting Arrest and Disorderly Conduct.	Human, Civil Disturbance	Concord Hazard Mitigation Committee
Severe Winter Storm and Snowstorm - Winter Storm NEMO 2013	4105	2013	Feb 8-10	\$127,200	Winter Storm "Nemo". FEMA-3360-DR. Blizzard conditions with winds gust of 50-60 MPH and over 20 inches snow hit New Hampshire and the New England area. Disaster declaration received for emergency protective measures in eight counties of the State.	Concord received \$127,200 in FEMA Public Assistance funding for protective measures (snow removal). The storm needed plowing, salt and sand and overtime. The City had a difficult time relocating snow after receiving nearly 24"	Severe Winter Weather, Extreme Temp, Snow, Ice, Wind	FEMA, Concord Hazard Mitigation Committee, Concord Monitor
Hurricane - Hurricane Sandy 2012	4095 EM-3360	2012	Oct 26-Nov 8	\$26,300	Merrimack County and Hillsborough 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.	Concord received \$26,300 in FEMA Public Assistance funding for debris removal of fallen trees and limbs, protective measures, and roads and bridges. Power was not lost in Concord.	Wind, Flood, Severe Storm, Hurricane, Debris Impacted Infrastructure	Concord Hazard Mitigation Committee, FEMA, Nashua Telegraph
Earthquake 4.0M Hollis ME Epicenter 2012	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 Concord with an earthquake of this magnitude as it was felt around the Central NH Region.	Earthquake	Concord Monitor, Earthquake track.com
Concord Excessive Heat Wave 2012	No	2012	Jul 4	N/A	N/A	Capital Area Public Health Network opened cooling center at Fire Department administration headquarters with cold drinks available - little response despite calls	Extreme Temp, Extreme Heat	Concord Hazard Mitigation Committee

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
						from Fire Department to senior housing residents.		
Concord Hostage Situation 2012	No	2012	Apr 29	N/A	N/A	On Laurel Street a male subject took his ex-girlfriend and 3 year old daughter hostage in her apartment for a period time however the two were able to escape on their own prior to SWAT response. Suspect later arrested on several charges including False Imprisonment x2	Human, Hostage Situation	Concord Hazard Mitigation Committee
April Fool's Snowstorm 2012	No	2012	1-Apr	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.	Concord experienced some snow and inconvenience. The Parks and Recreation Dept had been readying its tennis courts ready for spring. The Dept challenged followers of its Facebook page to submit pictures of snowmen in the parks.	Extreme Temp, Snow	wmur.com, USA Today
Snowstorm-Halloween Snow Storm 2011	4049	2011	Oct 29-30	N/A for Concord	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.	Concord did not apply for/receive funding. Trees down on power lines and roads, power companies Unutil & Eversource & NH Coop had to come into City to fix. This major snowstorm brought over 13" to Concord.	Extreme Temp, Snow Storm	FEMA, Concord Hazard Mitigation Committee
Tropical Storm-Tropical Storm Irene 2011	4026	2011	Aug 26-Sep 6	\$19,500	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. Merrimack County reimbursement to Towns was \$4.29 per capita (146,455 people in 2010), a total of \$11m was allocated. Disaster was not declared for Hillsborough County.	Concord received \$19,500 in FEMA Public Assistance funding for debris removal of fallen trees and limbs, protective measures, and roads and bridges.	Wind, Flood, Severe Storm, Rainstorm, Tropical Storm, Debris Impacted Infrastructure	FEMA, Concord Hazard Mitigation Committee
Concord Friendly Kitchen Fire 2011	No	2011	Apr 30	N/A	N/A	The fire at the Friendly Kitchen at 14 Montgomery Street destroyed the facility which provides meals to several thousand low income people annually. They relocated to a temporary facility but it will took many months and donations rebuild a	Fire	Concord Hazard Mitigation Committee

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
						permanent facility on Constitution Ave.		
Concord Rail & Air Transportation Accidents 2011	No	2011	Feb-May	N/A	N/A	In Feb 2011, a train rolled over at the Grappone Conference Center (on Constitution Avenue) injuring two occupants. In May 2011, a light plane crashed on arrival at Concord Airport, injuring the pilot. The pilot was transported to Concord Hospital.	Transportation Accident	Concord Hazard Mitigation Committee
Concord Hospital Bomb Threats 2010	No	2010	1-Oct	N/A	N/A, although Concord Hospital was the main health center in the region in 2010. People from all over Central NH use Concord Hospital for services.	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.	Human, Terrorism	Concord Hazard Mitigation Task Force 2012
Concord Communications Systems Failure 2010	No	2010	Oct	N/A	N/A	The City facilities experienced communications failure when the City's dispatch unit had a power failure at 24 Horseshoe Pond. The City's internet and phone went down as well as most Police, EMS, and Fire communications. The cause was oversight in power where the transformer was lost. The Fire Department began working on alternate dispatch site.	Communications Failure, Sabotage	Concord Hazard Mitigation Committee
Earthquake 3.4M Boscawen Epicenter 2010	No	2010	26-Sep	N/A	"A magnitude 3.4 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, Henniker, Penacook and Raymond. There were no reports of damage." The quake was felt all over the state, Southern Maine and Massachusetts, but most	Reports may have been made to the USGS from Concord with the epicenter less than 5 miles to the northeast in Boscawen. Boscawen abuts Concord to the west sharing the Merrimack River boundary. Two service calls were received related to building assessments. No damages were reported (people called PD stating Wheelabrator exploded (was not the case, was earthquake).	Earth, Earthquake	Union Leader, USGS, Concord Hazard Mitigation Committee

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
					reports were received from the Central NH region.			
Concord Wildfire 2010	No	2010	Sep 22	N/A	N/A	St. Paul's Island in Turkey Pond is uninhabited with mature trees. A brush fire was burning for days before it was reported to the Fire Department. The fire was put out with no injuries.	Wildfire	Concord Hazard Mitigation Committee
Loudon Pleasant View Greenhouse Fire 2010	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 Concord to the northwest. Concord has several greenhouses in the City.	Fire	Loudon Hazard Mitigation Committee
Severe Storms and Flooding March 2010	1913	2010	Mar 14-31	No	Severe storms and flooding occurred over two weeks and damaged roads and bridges. Merrimack County reimbursement to Towns for repair was \$0.28 per capita (146,455 people in 2010), and in Hillsborough County reimbursements were \$1.80 per capita (400,721 people in 2010)	The City of Concord sustained damaging winds up to 68 miles per hour and a 1.7 inches rain fall. The impacts of the weather caused Operational and Communications units of the Concord Fire Department to be pushed to the maximum of their capabilities. Over 136 calls for service for Concord Fire Department and 578 runs throughout the Capital Area Mutual Aid Compact were received. Multiple calls for downed power lines and trees into structures were received. An audible alarm was transmitted to call back off duty members to assist with emergency response. The City EOC was activated to support the event. Costs included removing trees and limbs off streets immediately after the wind storm to open streets up and placing barricades to close streets when power lines were down on them until the power company was able to take care of the downed power lines. The costs are also for picking up debris from streets, sidewalks, parks, cemeteries and the public golf course for several weeks after the storm came through.	Severe Wind, Microburst, Flood, Debris Impacted Infrastructure, Power Failure	Concord Hazard Mitigation Committee, FEMA, Concord Fire Department After Action Report, 2/25/10 and General Services Letter to FEMA 5/12/10
Severe Winter Storm Feb-March Storm and Flooding 2010	1892	2010	Feb 23-Mar 3	\$88,700	FEMA-1892-DR. 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	Concord received \$88,700 in FEMA Public Assistance funding for protective measures and debris removal. In Concord, 2,000 Unutil customers were out of power at the peak outage period. Unutil opened their emergency	Extreme Temp, Snow, Wind, Flood, Wind Chill, Dam Failure	Concord Hazard Mitigation Committee, FEMA, Unutil

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
					Merrimack County, the reimbursement to communities was the equivalent of \$10.39 per capita (146,455 people in 2010), with Hillsborough County at \$3.68 per capita (400,721 people in 2010). In the Concord area, 21,000 Unutil customers were out of power at the peak outage period.	operations center, and the City opened their EOC for a few hours. Problems included Interference with electrical lines, trees down, and road blockages. Crews were out clearing the entire period. The Green Street community center shelter opened, hosting over 15 people at peak who were mostly from Canterbury. Multiple carbon monoxide issues from people using generators too close to their homes. Response time was 4-5 times what it normally was because of call volume and road closures. A large amount of FEMA funds were received for removing trees and limbs off streets immediately after the wind storm to open streets up and placing barricades to close streets when power lines were down on them until the power company was able to take care of the downed lines. The costs are also from picking up debris from streets, sidewalks, parks, cemeteries, and the public golf course for several weeks after the storm. Some resident's homes were without power for several days		
Concord Bedbug Infestation 2010	No	2010	---	N/A	N/A	The City saw an increase in bedbug activity in 2010. The infestations have been reported in Meadow Brook, the Kennedy Apartments, the Endicott Hotel, and Capital Towers.	Biological, Public Health	Concord Hazard Mitigation Committee
Severe Winter Storm - December 2008 Ice Storm	1812	2008	Dec 11-23	\$87,400	FEMA-1812-DR. Accumulating ice, snow, rain, and strong winds caused downed trees and power lines, with power outages and traffic accidents resulting. In Merrimack 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	Concord received \$87,400 in FEMA Public Assistance funding for debris removal and protective measures. Hundreds of thousands of home and business owners in the State were without heat or electricity after an ice storm moved through the State causing the largest power outage in New Hampshire's history. Unutil had 5,000 customers out in Concord. A large amount of FEMA funds were received for snow and ice removal from streets and sidewalks as well as removing trees and limbs off streets	Extreme Temp, Ice, Wind, Technological, Power Failure, Debris Impacted Infrastructure	Concord Hazard Mitigation Committee, FEMA, Unutil

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
					blanketed with ice and snow during the winter storm. The weight of the ice caused branches to snap, and trees to either snap or uproot, and brought down power lines and poles across the region. About 400 thousand utility customers lost power during the event, with some customers without power for two weeks. Property damage across northern, central and southeastern New Hampshire was estimated at over \$5 million. Event was the largest power outage in New Hampshire's history.	when they came down with ice on them.		
Severe Storms and Flooding – September 2008	1799	2008	Sep 6-7	No	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 Hampshire in about 8 hours causing rapid rises on area streams. In Merrimack County, damage to road systems totaled the equivalent of \$1.48 per capita (146,455 people in 2010) for City reimbursement. Hillsborough County's damage was much higher at \$6.90 per capita (400,721 people in 2010)	Concord did not apply for/receive funding. Likely Concord experienced drainage system flooding and watercourse overflow	Flood, Debris Impacted Infrastructure	FEMA, CNHRPC
Severe Winds, Heavy Rains July Tornado 2008	1782	2008	Jul 24	No	An F2-F1 tornado touched down in Rockingham County then proceeded into another county. Then in Merrimack County, 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. Hillsborough County	Concord did not apply for/receive funding. The path of the tornado did not travel through Concord, although it was only about 2-3 towns to the east. In Epsom, 84,000 acres were destroyed and there was significant damage to personal property, destroying or damaging 9 homes.	Wind, Tornado, Downburst, Severe Storm, Debris Impacted Infrastructure	FEMA, Epsom Hazard Mitigation Committee, CNHRPC

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
Concord Friendly's Heights Business Fire 2009	No	2009	Oct 3	N/A	N/A	Friendly's Restaurant on Loudon Road was closed for nearly 9 months, which impacted many employees. A photo of the fire is provided in the APPENDIX of Historical Photos.	Fire	Concord Hazard Mitigation Committee
Concord Heavy Snowload Roof Collapses 2008	No	2008	Feb	N/A	N/A	Heavy snowloads caused multiple building collapses, including Oak Bridge Condominium Pool Building, Beede Electric, Hall Street Capitol Distributors loading dock.	Severe Winter Weather, Snow and Ice	Concord Hazard Mitigation Committee
Severe Storms and Flooding - April Spring Flood 2007	1695	2007	Apr 15-23	\$29,600	Extensive flooding caused by severe storms impacted seven counties. Indirect peak discharge measurements on stream gages on the Suncook River at Short Falls Road in Epsom were 14,100 ft ³ , which was determined to be greater than 100-year flood discharge levels. Rain developed across New Hampshire Sunday morning and spread northward. The rain became heavy during the afternoon and overnight. By morning, 3 to 5 inches of rain had fallen over much of southeastern New Hampshire and 1 to 3 inches across much of the remainder of the state. In the mountains of New Hampshire, 3 to 11 inches of snow had fallen. Although the heaviest precipitation fell from Sunday afternoon into Monday afternoon, precipitation persisted into Tuesday. Flooding: 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. Power outages persisted, and stream and	Concord received \$29,600 in FEMA Public Assistance funding for FEMA funds were obtained for plowing and salting streets, and then repairs to roads and shoulders that had been washed out by the rains.	Flood, Wind, Debris Impacted Infrastructure, Rapid Snow Pack Melt	FEMA, USGS Flood of 2007, Concord Hazard Mitigation Committee

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
					river flooding continued across the region.			
Concord Lightning Strikes 2004-2007	No	2004-2007	---	N/A	N/A	An inventory of lightning strikes is available. Highlights- 2007- A tree near 74 Weir Road was struck by lightning. 2007- Lightning hit a tree at 8 Crestwood Drive and sent a surge into the adjoining mobile home, igniting an electrical panel in a closet. 2006- Lightning ignited a brush fire at Oak Hill Road near Tuttle Town Pond. 2005- Lightning struck at 4 Deer Track Lane destroyed a transformer plugged into a wall outlet in a garage. 2004- Lightning struck a shed at 30 Fairfield Drive. The shed was destroyed by the resulting fire	Lightning, Thunderstorms, Wildfire	Concord Hazard Mitigation Committee
Suncook River Avulsion in Epsom 2006	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 Pembroke later dealt with siltation and erosion issues from the new river course	Area event N/A to Concord, see storm effects on Concord below	Flood, Earth, Landslide, Erosion, Debris Impacted Infrastructure, Channel Movement	Concord Monitor
Severe Storms and Flooding – Mother’s Day Flood 2006	1643	2006	May 12-23	\$222,100	Extensive flooding caused by severe storms impacted seven counties including Merrimack and Hillsborough. The USGS recorded the highest flows on record for several rivers including the Contoocook River in Davisville village, Soucook in Concord, and Piscataquog in Goffstown. The City and surrounding area experienced record rainfall within a 72 hour period. This caused local streams and rivers to overflow their banks resulting in localized and area flooding.	Concord received \$222,100 in FEMA Public Assistance funding for extreme flooding and washout damage to roads, culverts, ditches, and embankments. 2006- St. Paul’s School suffered tremendous flooding damage during the Mother’s Day flood from the Turkey River. The School has undertaken measures to lessen future damage. Concord Steam, a locally owned public utility, was forced to shut down its operations for the first time. It reopened within 48 hours. FEMA funds were obtained by the City for repairs to roads	Flood, Wind, Debris Impacted Infrastructure, Erosion, Scouring, Landslide	Concord Hazard Mitigation Committee, FEMA, USGS

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
						and shoulders washed out by the rains. During the Mother's Day flood, flooding on Iron Works Road washed the bridge out. Rattlesnake Brook leaves the City's water supply and travels through a residential zone, spilling out into the floodplain. The Mother's Day storm had blowdown which had an impact on some of the older culverts.		
Concord Dunkin Donuts Downtown Business Fire 2006	No	2006	May 12	N/A	N/A	A late night fire at the Dunkin Donuts at 121 South Main Street resulted in the complete destruction of the facility. This accidental fire originated within the restaurant and placed the business out of service for 5 months until a new facility could be rebuilt. Most employees were absorbed into other shops operated by the same owner.	Fire	Concord Hazard Mitigation Committee
Concord Statehouse Iraq Public Unrest 2006	No	2006	18-Mar	N/A	N/A, although Concord is the seat of the region	A reported 400 citizens marched in Concord to recognize the 3 year anniversary of the beginning of the war in Iraq. The protestors marched around downtown Concord and finished in front of the statehouse.	Human, Public Unrest, Civil Disturbance	NH Independent Media Center
Severe Storms and Flooding - Columbus Day Flood 2005	1610	2005	Oct 7-18	\$29,300	Extensive flooding caused by severe storms impacted five counties, including Merrimack and Hillsborough. Alstead experienced several fatalities as the result of dam failure.	Concord received \$29,300 in FEMA Public Assistance funding for the Columbus Day Flood. Roads and bridges were damaged by flooding and washouts, debris clogged culverts, roads were washed out and slopes were eroded. The EOC was activated. FEMA funds were obtained to pump waste water from storage tanks. FEMA funds were also obtained to repair roads and shoulders of Elm Street and Farmwood Road that had been washed out by the rains.	Flood, Wind, Debris Impacted Infrastructure, Erosion	Concord Hazard Mitigation Committee, FEMA
Concord Microburst 2005	No	2005	12-Jun	N/A	During a severe regional thunderstorm, lightning struck and severely damaged the historic Loudon City Hall on Clough Hill Road. Winds from a severe thunderstorm knocked down trees and power lines down in the Towns of Warner,	A microburst hit the Concord Country Club, which caused downed trees and loss of power. No injuries were reported.	Microburst, Thunderstorm, Lightning, Severe Winds	CNHRPC, Concord Hazard Mitigation Committee, Area Hazard Mitigation Committees

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
					Hopkinton, Concord, Bow, Loudon, and Hopkinton in Merrimack County.			
Canterbury Explosion at Gold Star Sod Farm 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. Gold Star Sod Farm is no longer in business	N/A, but the property lies along the Merrimack River near Concord	Fire, Explosion, Technological, Hazardous Materials	Concord Monitor, Canterbury Hazard Mitigation Committee
Snow Emergency 2005	EM-3207	2005	Jan 22-23	\$84,500	Record and near record snowstorm for 8 NH counties including Merrimack and Hillsborough. Emergency protective measures declared for reimbursement.	Concord received \$84,500 in FEMA Public Assistance funding for protective measures (snow clearing, sanding, salting).	Extreme Temp, Snow	FEMA
Concord Hazardous Materials Spill 2004	No	2004	May 27	N/A	N/A, although regional commuters traveling through this area might have experienced local air pollution	In May 2004, 53 businesses were forced to close at the Concord Center on Ferry Street when state officials discovered more than 70 buckets of formaldehyde, motor oil, roofing tar and cleaning solvents in the flooded basement. There were no reported injuries but some workers complained of headaches and dizziness.	Hazardous Materials Spill	Concord Hazard Mitigation Committee
Concord French's Downtown Business Fire 2004	No	2004	Apr 13	N/A	N/A	French's Toy Shoppe, an established downtown business, was damaged by fire. A neighboring business and 3 abutting apartments were also damaged. The building was 230 years old. No injuries were reported, however, business was forecasted to be shut for one month for repairs.	Fire	Concord Monitor
Earthquake 2.2M Henniker-Hopkinton Epicenter 2004	No	2004	20-Jan	N/A	An earthquake measuring 2.2 on the Richter Scale was centered in the Henniker-Hopkinton area. Shaking and noise were reported, but no damage occurred.	Reports were likely made to the USGS from Concord residents feeling the earthquake as a rumble or loud noise. The epicenter was only 1-2 communities away from Concord, to the west	Earth, Earthquake	Concord Monitor, January 2004, USGS, Earthquake Monitor

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
Snow Emergency Dec 2003	EM-3193	2003	Dec 6-7	\$75,900	Record snow fall event impacting much of New England. In NH, 8 counties received emergency protective measures, including Merrimack and Hillsborough.	Concord received \$75,900 in FEMA Public Assistance funding for (snow clearing, sanding, salting).	Extreme Temp, Snow	FEMA
Snow Emergency Feb 2003	EM-3177	2003	Feb 17-18	\$58,700	Record and near record snowstorm for 5 NH counties including Merrimack and Hillsborough. Emergency protective measures declared for reimbursement.	Concord received \$58,700 in FEMA Public Assistance funding for (snow clearing, sanding, salting).	Extreme Temp, Snow	FEMA
Concord Flooding Event 2003	No	2003	Aug 12	N/A	Likely the region experienced flooding during heavy rain event.	Thirty residential properties were damaged by flooding in the Penacook, West Concord, and Riverhill sections of the City. Damages included flooded basements and washed-out driveways.	Floods and Flash Floods, Severe Rain Storms	Concord Hazard Mitigation Committee
NH Drought Emergency 2002	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.	The City of Concord pumped extra water from the Contoocook River into Penacook Lake. The City also approved \$55,000 for emergency river water pumping	Drought, Extreme Temperatures, Earth, Fire	Concord Monitor 8/20/02, NHDES
Concord & Hopkinton Suspicious Powder Mailings 2001-2002	No	Oct 2001 – Feb 2002	---	N/A	There were several reports of a powder substance being mailed to prominent State and/or Federal officials living in Hopkinton. Due to the heightened level of security for the US, the substances were tested for biological or chemical substances and the results were negative.	The Concord community responded to many suspicious package and substance calls as a result of the introduction of anthrax spores into US Postal facilities elsewhere in the country.	Sabotage, Terrorism, Biological, Public Health	Hopkinton Hazard Mitigation Committee, Concord Hazard Mitigation Committee
Snow Emergency 2001	EM-3166	2001	Mar 5-7	\$59,600	Record and near-record snowfall from late winter storm, emergency declaration was issued for protective measures. Merrimack, Hillsborough and 5 other counties were declared eligible.	Concord received \$59,600 in FEMA Public Assistance funding for protective measures, plowing, sanding & salting.	Extreme Temp, Snow	FEMA
Concord Downbursts 1999	No	1999	6-Jul	N/A	Other communities in the Central NH Region experienced damages, including Hopkinton, from high winds and downbursts during this event	Severe storms in July 1999 bring strong damaging winds and 3 downbursts. Two deaths occurred. The roof of the Pill building in Concord is blown off during a storm. The downburst was designated a macroburst (at least 2.5 miles in diameter).	Wind, Downburst	Concord Monitor, NH HSEM

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
Concord Drought 1999	No	1999	Apr	N/A	N/A, although a drought is usually experienced regionally	There was concern for crops and domestic water supplies in Concord. It was the third driest April ever recorded with 0.83 inches of precipitation. Normal precipitation for the month of April is 2.91 inches.	Drought	NH HSEM
Concord Library and NHTI Bombs 1998	No	1998	Oct	N/A	N/A, although Concord is the seat of the region and NHTI students live both on campus and around NH	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 second bomb was later found on the State Library steps 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.	Human, Terrorism	AP Online 11/01/98, NH Homeland Security and Emergency Management
Severe Storms and Flooding Summer 1998	1231	1998	Jun 12-Jul 2	No	Heavy flooding in six counties, including Merrimack and Hillsborough Counties. Damages of \$3.4m for all counties.	Concord did not apply for/receive funding. The City likely experienced heavy rains and possibly some flooding.	Flood, Wind, Debris Impacted Infrastructure	FEMA
Ice Storm of 1998	1199	1998	Jan 7-25	No	This ice storm was the first to test our statewide and local 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.	Concord did not apply for/receive funding. As the entire state and Central NH region experienced the ice storm, it is very likely Concord experienced similar damages	Extreme Temp, Ice Storm, Debris Impacted Infrastructure, Traffic Accidents, Power Failure, Communications Failure	FEMA, US Army Corps of Engineers NH Storms database, Concord Hazard Mitigation Committee
Severe Storms and Flooding 1996	1144	1996	Oct 20-23	No	Heavy rains caused flooding in six counties, including Merrimack and Hillsborough Counties. Damage totaled \$2.3m for all counties.	Concord did not apply for/receive funding. It is likely experienced heavy rains and possibly some flooding.	Flood	FEMA, NH HSEM, CNHRPC

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
Storms and Floods 1995	1077	1995	Oct 20-Nov 15	No	Four NH counties were damaged by excessive rain, high winds and flooding, including Merrimack (not Hillsborough).	Concord did not apply for/receive funding. It is likely experienced heavy rains and possibly some flooding.	Flood	FEMA, Federal Register, CNHRPC
Concord Severe Thunderstorms 1995	No	1995	Jul 8, Jul 15, Sep 14	N/A	Three separate regional thunder storms in summer 1995.	A severe thunderstorm caused several trees to blow down in Concord. Hail was reported. Another severe thunderstorm in Concord caused a large tree to fall over on top of a manufactured home. Thunderstorms ahead of a fast moving cold front produced damaging winds which downed trees and power lines, causing power outages in Concord.	Thunderstorms, Severe Wind Events, Hail, Lightning, Heavy Rain Storms, Debris Impacted Infrastructure	Concord Mitigation Committee
Severe Storm-Hurricane Bob 1991	917	1991	Aug 18-20	N/A for Concord	Public assistance was available for Hillsborough County and 2 other counties (not declared in Merrimack County) as a result of damages caused by Hurricane Bob. The 2 seacoast counties fared the worst.	As Concord is within Merrimack County, it likely experienced heavy rains, wind gusts, tree debris, power outages and possibly some flooding.	Wind, Hurricane	FEMA, CNHRPC
Flooding and Severe Storm 1990	876	1990	Aug 7-11	No data available	Moderate to heavy rains caused flooding in eight counties, including Merrimack and Hillsborough Counties. Damage totaled \$2.3m for all counties	As Concord is within Merrimack County, it likely experienced heavy rains, tree debris, power outages and possibly some flooding.	Flood, Wind	FEMA, NH HSEM
Severe Storms and Flooding 1987	789	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. Nearly \$5m in damages.	As Concord is within Merrimack County, it likely experienced heavy rains, tree debris, power outages and possibly some flooding.	Flood, Wind	FEMA, NH HSEM
Severe Storms and Flooding 1986	771	1986	Jul 29-Aug 10	N/A for Concord	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).	It is likely Concord experienced heavy rains and possibly some flooding.	Flood, Wind	FEMA, NH HSEM
Concord Wildfire 1986	No	1986	May 15	N/A	N/A, the Garvins Falls area is bordered by the Soucook River to the east	A suspicious forest fire burned 50 acres near Garvins Falls Road. The isolated area made efforts to fight the fire difficult; the railroad bed did provide some access.	Wildfire	Concord (Daily) Monitor
Concord Wildfire 1985	No	1985	Apr	N/A	N/A, although a fire of this size and dry conditions could have allowed the fire to reach surrounding communities	Several fires occurred while the City experienced drought conditions. A Garvins Falls brush fire consumed 20 acres. Many local and area brush	Wildfire, Drought	Concord (Daily) Monitor

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
						fires were occurring. One, a fire on the Heights, burned 90 acres, during which five homes were threatened. It was the worst forest fire since the same area burned in 1962		
Earthquake 4.5M Sanbornton 1982	No	1982	19-Jan	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 Merrimack County including the Concord area communities in Central NH.	With a quake of this size, it is highly likely Concord experienced some strong shaking and noise. This caused a water main to rupture in Concord 20 miles away.	Earthquake	Earthquake track .com, Northeast States Emergency Consortium
Concord Beaver Meadow Tornado 1979	No	1979	Jul 27	N/A	N/A, although some regional communities likely experienced a thunderstorm	In Concord, a severe thunder and lightning storm lit skies, and uprooted trees. 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.	Severe Winds, Tornado, Thunderstorm	Concord (Daily) Monitor
Blizzard of 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 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.	Concord reportedly received 15" of snow. The City likely experienced many of the same effects as the rest of NH.	Extreme Temperatures, Severe Snow Storms, Windchill, Debris Impacted Infrastructure, Power Failure	American Meteorological Society, Northeast States Emergency Consortium, NY Times 03/15/84
Concord Drought 1974	No	1974	Aug	N/A	N/A, although a drought is usually experienced regionally	A months-long drought impacted Concord and surrounding towns. There were multiple area brush fires. Water restrictions were imposed in Concord, and area towns did likewise. Rain was hoped for to alleviate the fire danger conditions.	Drought	Concord (Daily) Monitor

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
Quebec Earthquake 4.8M 1973	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 the State.	N/A, although some Concord residents may have felt the effects	Earthquake	Northeast States Emergency Consortium
Severe Storms and Flooding 1973	399	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.	No information available	Flood, Wind	FEMA
Concord Lightning Strike 1969	No	1969	—	N/A	N/A, although some regional communities likely experienced thunderstorm and/or lightning	The Concord Daily Monitor reported that a bolt of lightning killed a youth on Pleasant Street during a severe storm.	Lightning	Concord (Daily) Monitor
Concord Rapid Snow Pack Melt Flooding 1969	No	1969	—	N/A	N/A, although some regional communities likely experienced similar melt and flooding conditions	The Concord Daily Monitor regularly reported lowland flooding from the Merrimack River due to rapid pack snowmelt. The Bridge Street level reading was 9' 11", and at 11'3" Fort Eddy would be flooded. Evacuation information was sought for East and West Portsmouth Streets, Foundry Street, and Eastman Street.	Flood, Rapid Snow Pack Melt	Concord Hazard Mitigation Committee
Concord Severe Thunderstorm 1968	No	1968	Aug	N/A	N/A, although some regional communities likely experienced a thunderstorm	A violent wind, hail, and thunderstorm uprooted trees and downed powerlines. Lightning struck the South Congregational Church steeple on Pleasant Street. A second storm later that month clocked winds at 71 miles per hour.	Severe Winds, Thunderstorm, Hail, Debris Impacted Infrastructure	Concord (Daily) Monitor
Concord Ice Jam on Soucook River 1968	No	1968	Mar 19	N/A	N/A, although the Soucook River forms the border of Concord/Pembroke	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	US Army Corps of Engineers NH Ice Jams Database
Concord Severe Snow Storms 1967	No	1967	Feb-Mar	N/A	N/A, although it is likely the snowstorms were experienced within the Central NH region	Two February storms brought 8.5 inches and 9.5 inches of snow to Concord. In March, a major snowstorm dumped an additional 12-14 inches of snow.	Extreme Temperatures, Severe Snow Storms, Windchill, Power Failure	Concord (Daily) Monitor
Concord Drought Conditions 1963	No	1963	Oct 19	N/A	N/A, although a drought is usually experienced regionally	The Concord Daily Monitor reported that the Merrimack River dried up around Sewalls Falls.	Earth, Drought	Concord (Daily) Monitor
Concord Severe Wildfire 1962	No	1962	Apr 30	N/A	N/A, although a fire of this size and dry conditions could have allowed the fire to reach surrounding communities	A Concord Heights blaze fueled by drought conditions covered 300 acres. Homes were evacuated along Old Loudon Road and Sheep Davis Road. Rainfall finally extinguished the fire.	Wildfire, Drought	Concord (Daily) Monitor

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
Concord Ice Jam on Soucook River 1959	No	1959	Apr 3	N/A	N/A, although the Soucook River forms the border of Concord/Pembroke	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	US Army Corps of Engineers NH Ice Jams Database
Older Hurricanes 1954-1991	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), Doria on August 28, 1971, Bell on August 10, 1976, Gloria on September 27, 1985, and Bob in 1991.	Downed trees, wind damage, and flooding was likely experienced in Concord during many of these hurricanes.	Wind, Flood, Hurricane, Tropical Storm, Debris Impacted Infrastructure	NH Homeland Security and Emergency Management, Concord Hazard Mitigation Committee
Concord Severe Thunderstorm 1950	No	1950	Jun 26	N/A	N/A	A severe wind and rain storm, with 100-mile per hour gusts, ripped the roofs off of homes and businesses, felled hundreds of trees which blocked streets, and disrupted the electricity and telephone lines. The drive-in theater screen was flattened. Planes at the airport were toppled and severely damaged. It was “the worst storm since the 1938 hurricane.” About \$1 million in damages was estimated.	Severe Wind Events, Downburst, Thunderstorm, Rainstorm	Concord (Daily) Monitor
Concord Airport Road Tornado 1946	No	1946	Jul 23	N/A	N/A	A tornado struck and damaged the National Guard Armory on Airport Road	Tornado, Severe Wind Events	Concord (Daily) Monitor
NH Earthquakes December 1940	No	1940	Dec 20 & 24	N/A	In late December, New Hampshire felt the shock of two earthquakes, both at 5.5 on the Richter scale. The earthquakes originated near Tamworth in Ossipee but the tremors were felt in Concord, 50 miles away.	Tremors were felt in Concord, 50 miles away. The State Library sustained damage and a building at St. Paul’s School was cracked.	Earth, Earthquake	National Earthquake Information Center, Northeast States Emergency Consortium
10 Severe Snowstorms 1940-1978	No	1940	to 1978	N/A	Ten severe snowstorms are documented in south-central New Hampshire during this time span, February 14-15, 1940 (depths over 30” and high winds), February 14-17, 1958 (20-33”), March 18-21, 1958 (22-24”), March 2-5, 1960 (up to 25”), January 18-20, 1961 (up to 25”, blizzard conditions), January 11-14, 1964 (up to 12”), January 29-31, 1966 (up to 10”), February 22-28, 1969 (24-98”, slow-moving storm),	Although it is unknown what Concord experienced, it is likely many of the same depths occurred. Concord has a long history of severe winter weather storms.	Extreme Temperatures, Severe Snow Storms, Ice, Windchill, Power Failure	American Meteorological Society

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
					December 25-28, 1969 (12-18"), January 19-21, 1978 (up to 16").			
Concord Hurricane of 1938	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. Most deadly New England hurricane. Central New Hampshire was inundated with water. Downed trees caused extensive damage to homes, businesses and community infrastructure. President Roosevelt ordered emergency aid be sent to NH, including Merrimack County	The hurricane of September 1938 impacted Concord with flooding and high winds. Thirteen people died in New Hampshire; one man was killed in Concord as a cause of high winds. This was the worst hurricane to ever strike New England, resulting in 564 deaths and over 1,700 injuries. In Concord, areas along the Merrimack River experienced heavy flooding. The Merrimack River rose to 11 feet over its flood stage. Roads throughout Concord were washed out, making them impossible to pass. Concord became isolated from the State because all roads leading out of Concord were either flooded or obstructed by trees. Rollins Park in the South End was flooded. In Concord, winds caused more than 1,000 electrical poles to topple and were responsible for the death of one Concord man. In front of the State House, five century-old elms were knocked down. As reported in the Concord Monitor in September 1938, the hurricane was "the sharpest setback the state has ever experienced." Thirteen deaths and 1,363 families received assistance as a result of the hurricane. Other loses included smashed homes, crippled communication lines, blocked roads, and total direct losses of \$12,337,643 (1938 dollars). The timber industry was hit hard with the loss of trees	Severe Wind, Hurricane & Tropical Storms, Flood, Debris Impacted Infrastructure	Wikipedia, Concord Monitor, Concord Hazard Mitigation Committee, NH HSEM
Concord Flood of 1936	No	1936	Mar 11-21	N/A	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 snow pack melt.	In Concord, the flooding caused by heavy snowfall totals, heavy rains, warm weather, and run-off from melting snow overflowed the rivers and caused severe damage. An ice jam occurred in the Merrimack River and resulted in road flooding. As a result of heavy snowfall totals, heavy rains, and warm	Flood, Ice Jams, Rapid Snow Pack Melt	Concord Monitor, Union Leader, Army Corps of Engineers Ice Jam Database, Northeast States Emergency Consortium

City of Concord, NH Hazard Mitigation Plan Update 2017

4 HAZARD RISK ASSESSMENT

Event	Declared Disaster DR-	Year	Date	FEMA Public Assistance	Area Effects Surrounding Concord	Local Effects Occurring in Concord	Hazard Category	Source
					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 the surrounding area. NH issued boil water warnings to everyone.	weather, ice chunks jammed up the Contoocook River. The train tracks running through Concord were covered, preventing passage. Country roads throughout the City were damaged, many being completely washed out. More than 60 Concord families had their homes isolated by floods and were forced to evacuate with the aid of a boat. It took more than seven days before roads were open again.		
Concord Flood 1852	No	1852	Apr 21-24	N/A	N/A, although the Merrimack River is a Central NH river and other communities likely experienced flooding conditions from brooks or local rivers	Merrimack River was at its highest stream stage in 70 years.	Flood, Rapid Snow Pack Melt	Concord Hazard Mitigation Committee, NH HSEM
Concord Ice Jam on Merrimack River 1812	No	1812	Apr 12	N/A	N/A, although the Merrimack River forms part of the Bow/Concord boundary	Ice chunks carried 100 feet of a Concord bridge downstream on the Merrimack River.	Ice Jam	History of Concord (Bouton)
Concord Hurricane 1889	No	1889	Jul 30	N/A	N/A, although it is likely regional communities experienced the severe winds of this event	Damage from this hurricane resulted from high winds, and struck portions of the State. In Concord's South End, uprooted trees were reported.	Hurricane, Severe Winds	History of Concord, NH (J Lyford)
Concord Earthquakes 1870-1884	No	1870-1884	---	N/A	Realistically, these earthquakes would have been felt throughout the Central NH Region. Epicenters and magnitude unknown.	10-20-1870- Four earthquake shocks were felt in Concord at 11:30 am. 11-18-1872- "Every heavy shock of earthquake" was reported at 2:05 pm in Concord. 12-19-1882- Heaviest shock "ever remembered" occurred at 5:20 pm in Concord. 11-23-1884- Two heavy shocks of an earthquake were reported at 12:30 and again at 12:45 in Concord.	Earth, Earthquake	History of Concord, NH (J Lyford)

Source: Compilation of Events by Concord Hazard Mitigation Committee; CNHRPC

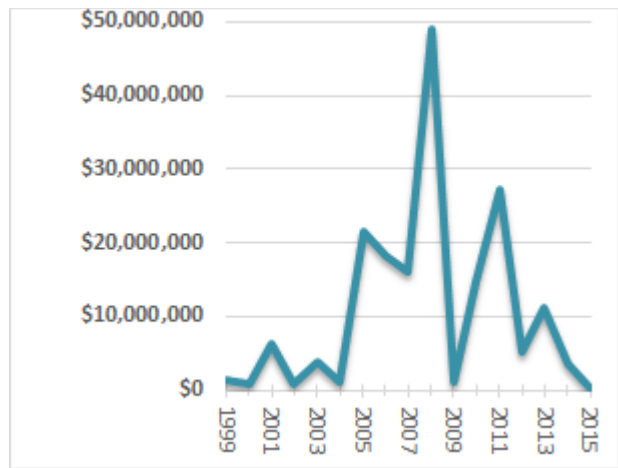
Local Climate Changes and Extreme Weather

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 Concord can expect to see in terms of extreme weather in the future.

Table 13
Summary of Hazardous Weather Fatalities, Injuries, and Damage Costs in NH, 1998-2015

Year	Fatalities	Injuries	Total Damages \$
1998	1	23	\$32,400,000
1999	3	17	\$1,300,000
2000	2	6	\$800,000
2001	0	2	\$6,200,000
2002	0	7	\$900,000
2003	2	29	\$3,800,000
2004	0	11	\$1,200,000
2005	4	9	\$21,500,000
2006	1	9	\$18,200,000
2007	0	3	\$16,150,000
2008	2	5	\$48,890,000
2009	1	0	\$1,130,000
2010	1	6	\$14,630,000
2011	1	2	\$27,280,000
2012	1	4	\$5,280,000
2013	0	30	\$11,250,000
2014	0	2	\$3,700,000
2015	2	34	\$370,000

Total Annual Hazardous Weather \$ Damages in NH 1998-2015



Source: National Oceanic and Atmospheric Administration, last accessed 12/16/16
<http://www.nws.noaa.gov/om/hazstats.shtml>

Injuries to people and the costs of damages in New Hampshire have increased as a result of hazardous weather. These increases of injuries and damages can be generally applied to the major disasters declared in the State. As displayed in **Table 13**, the highest numbers of damage costs correlate to the 1998 (**\$32m**) and 2008 (**\$49m**) ice storms between 1998 and 2015.

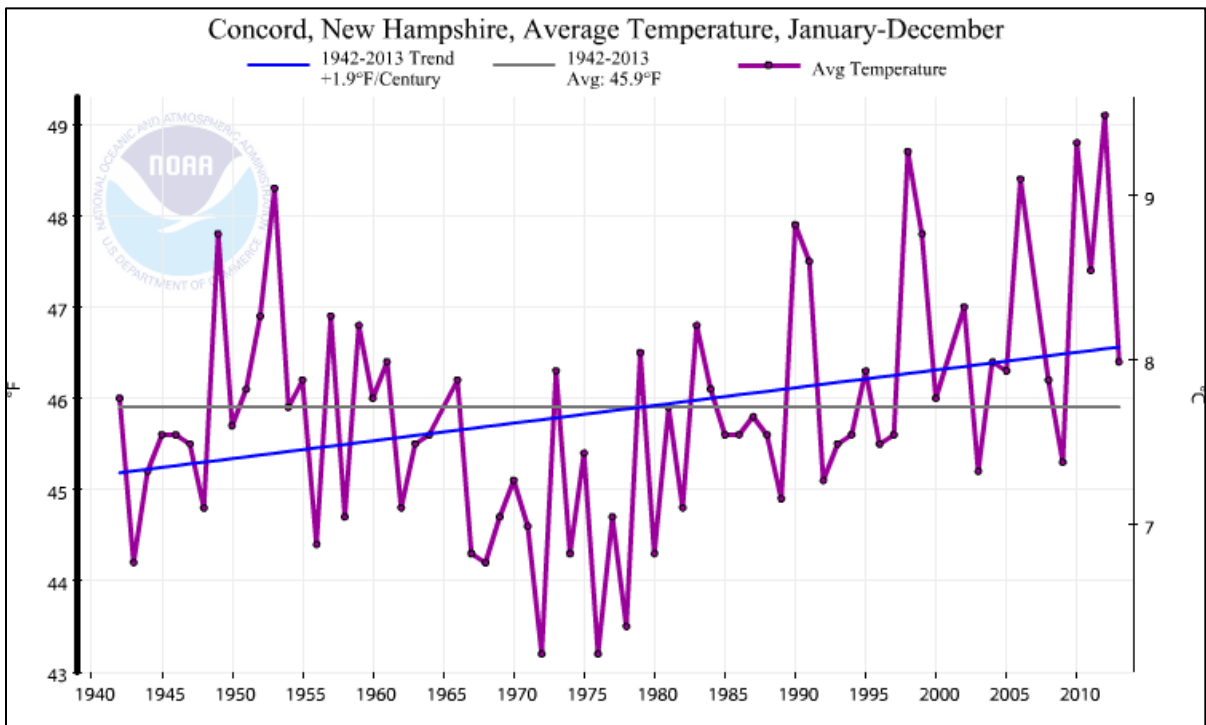
The number of injuries and fatalities have a less distinct association, with the highest numbers shown in 2013 (**30**) and 2003 (**31**). However, the greatest number of fatalities during this time period occurred in

2005 (4), likely during the time of the Columbus Day floods that hit the southwestern section of the State very hard.

Much of the rest of the discussion in this section has been directly excerpted or paraphrased from the *Central NH Regional Plan 2015*. The Central NH Region’s weather history is summarized to provide a view of the trends around the Concord area where the weather measurements have taken since 1939 at the Concord Airport.

Figure 4 displays Concord’s average annual temperature between 1942 (46.0°F) and 2013 (46.4°F). Earlier data was not available. 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 displayed trend line allows a definitive way of averaging all of the temperatures and illustrates a +2.8°F increase in average annual temperature during this 70-year time period.

Figure 4
Average Annual Temperature for Concord, 1942-2013

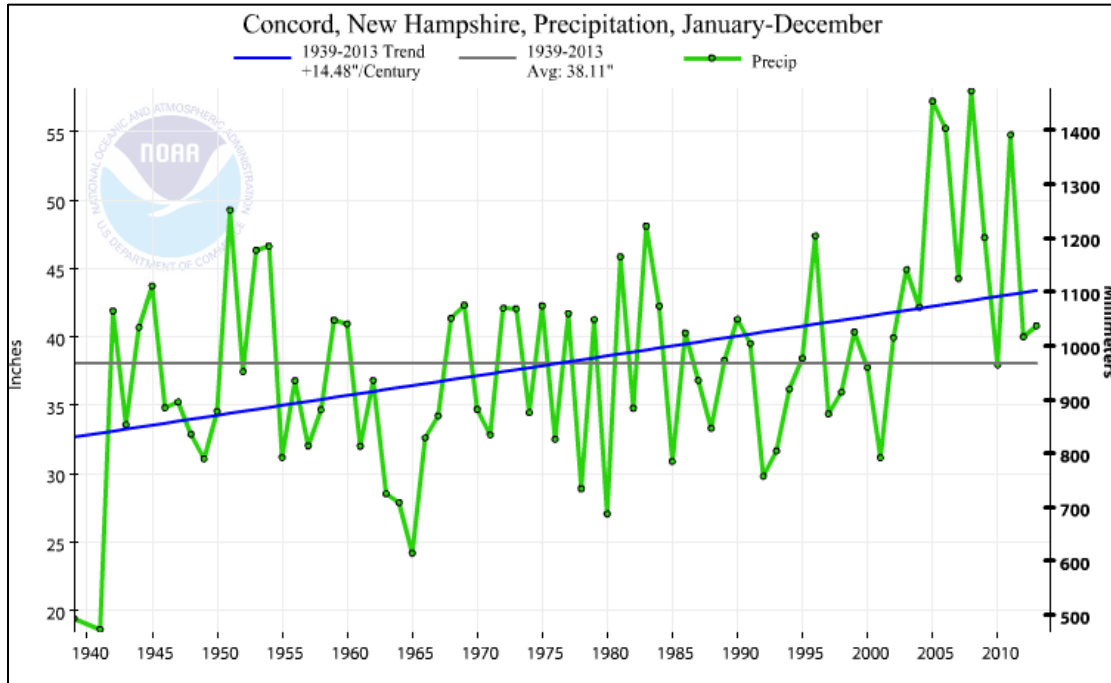


Source: National Oceanic and Atmospheric Administration

For precipitation changes, **Figure 5** displays Concord’s average annual precipitation rates between 1939 and 2013. Varying seasonal rainfall amounts continue over the decades. The trend line serves the same purpose to illustrate an overall increase of **+14.48”** in precipitation over the 74-year time period from 1939 to 2013.

Figure 5

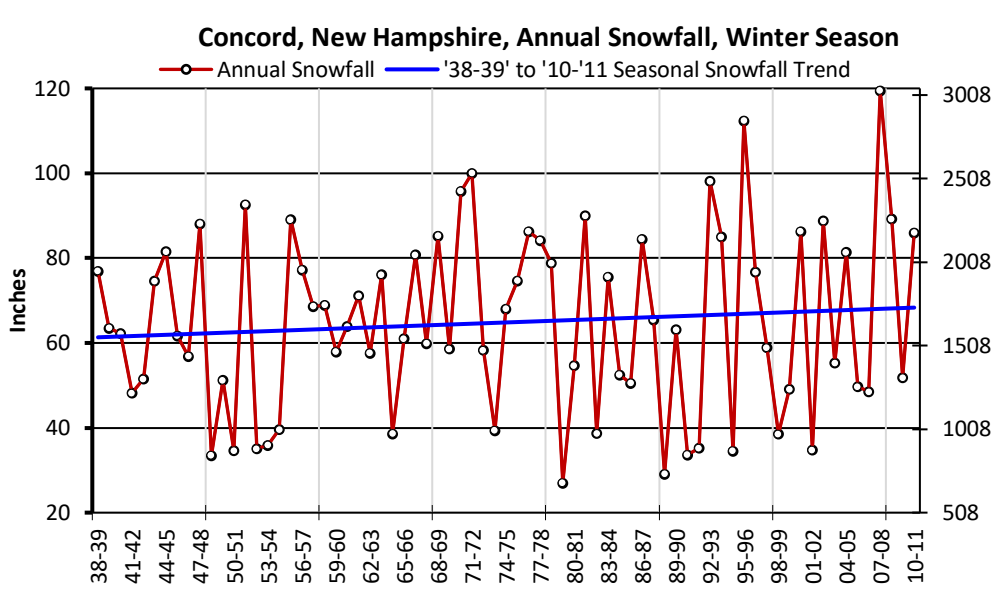
Average Annual Precipitation for Concord, 1939-2013



Source: National Oceanic and Atmospheric Administration

Similar to temperature and precipitation, annual snowfall amounts as reported by NOAA were observed for Concord starting in the **1938-1939** winter season through the **2010-2012** winter season. Snowfall data from **2012-2013** was not available. As displayed in **Figure 6**, the amount annual of snowfall has varied greatly over the past century. Overall, the trend line indicates a slight increase in annual snowfall inches, from about **60”** in the **1938/39** season to about **68”** in **2010/11**, totaling an increase of **+8”** of snowfall over the 72-year time span.

Figure 6
Average Annual Snowfall for Concord, Winter Seasons 1938/39 - 2010/11



Source: NOAA Compiled by: CNHRPC

This climate data may certainly be relevant to the entire Central NH Region which includes the City. The Central NH region climate summation is that the temperature is getting warmer, the precipitation is increasing, and the snowfall is slightly increasing 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 although the snowfall varies greatly from one season to the next, almost in an alternating pattern.

The Southern NH Climate Change Assessment, formally entitled *Climate Change in Southern New Hampshire: Past, Present, and Future, 2014* by the University of New Hampshire, reviewed current climate conditions and projected future conditions of Southern New Hampshire under potential low and high emission scenarios. Their past and future climate overview is illustrated in **Figure 7**.

Figure 7

Southern NH Climate Assessment Projections

As a result of anticipated extreme weather continuing and climate changes in Central NH and Concord, consideration should be given for potential impacts to the community. A few new issues are considered, although the list is not detailed. For more information on these topics, refer to the **Central NH Regional Plan 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 City’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.

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.

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 (annual) and 2.9°F (winter)
- Average minimum temperatures have warmed by 3.2°F (annual) and 6.1°F (winter)

What can we expect?

- 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?

- 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?

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

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 Woolly 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.

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 impacted by flooding and cannot perform their function.
- ☞ Blocking of water can lead to flooding of the area and roadways, potential 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 Concord. Consideration should be given to applicable items during the development and update of the **Hazard Mitigation Plan**.

Detailed Hazard Events in Concord

A compilation of hazards that have occurred in Concord and the Central NH Region area is provided in the prior Table of **Local and Area Hazard Events**. **Hazard Locations in City** 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 City to provide focus to future potential problem areas and to help with mitigation action development.

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

Hazard events were researched using a wide variety of sources for the **original Concord Hazard Mitigation Plan 2005** which were the basis for many of the past disaster events and updated to the present. The **Hazard Mitigation Plan Update 2012** provided recent information on many of the extreme disasters experienced between 2005-2008. Sources and techniques researching City Histories and related documents, talking with people, 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 2017** 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 City**. While additional hazards might have occurred in City, 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.

FLOODING

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 lands 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 year.

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.

There are several types of **Flooding** hazards examined in the **Hazard Risk Assessment**:

- **Floods and Flash Floods**
- **Rapid Snow Pack Melt**
- **Ice Jams**
- **Riverine Fluvial Hazard Flooding, Erosion, Channel Movement**

Magnitude of Flooding

Flooding magnitude, or how bad flooding could get in Concord, can be measured by the following SFHA Flood Zone scale in **Table 14**. “Flooding” encompasses all types of flooding including **Floods and Flash Floods, Rapid Snow Pack Melt, River Ice Jams** and **Fluvial Hazard Erosion and Channel Movement**.

Table 14
Special Flood Hazard Area (SFHA) Zones on 2010 DFIRMS

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

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


Concord 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 2009 Floodplain Maps in the City 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**.

Flooding in Concord


Concord has several areas particularly susceptible to flooding. The Soucook River forms the City's eastern boundary with Pembroke. The wide and meandering Merrimack River bisects the community directly in the middle from north (Boscawen) to south (Bow). The Contoocook River flows through the rural northwest section of Concord into Penacook where it converges with the Merrimack. The Turkey River begins at the Turkey Ponds and flows south into Bow. There are many locations and opportunities for the City to flood from these water bodies. City infrastructure and drainage areas attempt to maintain and upgrade to accommodate storm conditions. During flash flooding and heavy rain events, the City streets can become flooded or washed out. Drainage upgrades are funded to address increased water flow and some of these are listed as Actions in **8 MITIGATION ACTION PLAN**.

Floodplains

These four rivers, large watercourses and numerous individual brooks and ponds in Concord contribute to flooding these and other areas in City:

 **Watercourses:** Merrimack River, Contoocook River, Soucook River, Turkey River, Bow Brook, Burnham Brook, Hoyt Brook, Bowen Brook, Mill Brook, Hayward Brook, Hackett Brook, Snow's Brook, Turree Brook, Bela Brook, Ash Brook, Rattlesnake Brook, White Brook and several unnamed Brooks.

There are also several brooks in Concord which are not in a flood zone but contribute to the City's environment, including: Cemetery Brook, Woods Brook, and unnamed streams.

 **Waterbodies:** Horseshoe Pond, Little Turkey Pond, Great Turkey Pond, Hoit Marsh and Sewalls Falls.

There are several other ponds in Concord which are not in a flood zone but contribute positively to the City's environment, including: Penacook Lake (City water reservoir), Snow Pond, Turtle Pond, Little Pond, Thayer's Pond, and Hothole Pond and unnamed wetlands and ponds.

Floodplains of Turkey River, Soucook River, Merrimack River and the Contoocook River and Rattlesnake Brook result in expanded flooding of Concord. The City is susceptible to flooding because of the close proximity of these rivers. Homes near the Merrimack and Contoocook Rivers, especially in low-lying areas, are at risk. Other water systems, such as the Turkey River, Turkey Pond, Little Turkey Pond, Burnham Brook, Hayward Brook, Woods Brook, Snow's Brook, Hackett Brook, Hoyt Road Marsh, Mill Brook, Bela Brook, Turree Brook, Bow Brook (May 2006), Millstream Brook (May 2006), and Rattlesnake Brook (May 2006) are also prone to flooding.

Areas which are susceptible to regular flooding include the Merrimack River’s edge at the former Christian Mutual Building, along Shaw’s Fort Eddy Road, at the NH Technical Institute fields, at Hall Street in the Amoskeag Beverages area, and at Long Meadow Drive manufactured housing park.

Roadways and Drainage

Roads in Concord are vulnerable to washouts and floods but do not consistently washout during flash flooding and heavy rain events. The City regularly performs drainage upgrades on a priority basis when funding becomes available and the need is a priority. A listing of past and future potential road washouts is shown on *Map 1 Potential Hazards* and *Map 2 Past Hazards*. A **Table** of undersized City-owned culverts/drainage areas to be upgraded to ensure their carrying capacity can be found in **5 COMMUNITY VULNERABILITY ASSESSMENT**. The most common, sometimes regular locations of **road washouts** or water flooding over the roadways include:

- Intersection of North Main Street and I-393, Kimball Jenkins Estate
- Lincoln Street (between South and Spring Streets)
- Federal Street
- Carter Hill Road
- Horseshoe Pond area, Commercial Street businesses
- Public gravel road near Snow Pond Road
- Fort Eddy Road

Runoff from roadways or heavy rain can cause floods over the Entire City. Lincoln Street, low catchment area catch basin & hydraulic capacity of area is deficient, floods during flash storm. Kimball Jenkins Estate is flooded by water from I-393 and Main Street cascading down over retaining wall (waterfall). Velocity eroded the north side of the pavement and washes out the area. Driveway and foundation near building keep eroding. Currently (Oct 2016), the City is working on a solution for placement of new pipe system into Horseshoe Pond to divert water. The existing hazard locations are still potentially hazardous in the future. A lot of 1800s vintage brick pipe and clay pipe stormwater infrastructure, susceptible to high velocity and heavy scour flooding, supports the most unpredictable.

Dams

There are many dams along the rivers and brooks in Concord. If a dam failure occurred, the lower areas could experience sudden flooding damage to infrastructure and destruction of property. Areas particularly vulnerable to dam failure include High (**H**) Hazard Dam Penacook Lake at Fisherville Road and Hutchins Street. The following areas have been identified by the Hazard Mitigation Committee as being immediately susceptible to the impacts to **flooding** by dam breach:

- 🌀 (**H**) Penacook Lake Dam (**360** acres/water impoundment) dam breach area
- 🌀 (**H**) Turkey Pond Dam at St. Paul’s School (**360** acres/water impoundment) dam breach area
- 🌀 (**S**) York Dam at Contoocook River (**250** acres/water impoundment) dam breach area

- 🔄 (L) Turtletown Pond Dam (159 acres/water impoundment)
- 🔄 (L) Lower School Pond Dam at St. Paul’s School (46 acres/water impoundment)
- 🔄 (L) Steeplegate Mall Dam (12 acres/water impoundment, drainage treatment)

Special Flood Hazard Areas (SFHAs)

Base Flood Elevations (BFEs) are abundant along the Merrimack River, Contoocook River and Soucook River on the DFIRMs of 2010. There are 26 DFIRM panels for Concord (330110); of these, 20 include floodways with BFEs. The 4 Rivers flow throughout the geographical area of Concord providing for abundant floodplains. The 20 DFIRMs with BFEs have SFHAs Zone AE (1% annual risk of flooding) with floodways as depicted in Table 15, highlighted gray.

These 20 BFE DFIRMs can also display the SFHA Zone AE (1% annual risk of flooding) without floodways, SFHA Zone A (1% annual risk of flooding), and/or Zone X (0.2% annual risk of flooding) locations.

Four (4) of the remaining 6 DFIRMs without BFEs display SFHA Zone A (1% annual risk of flooding). Two (2) panels do not depict any floodplains in Concord. Zone A floodplains are typically found along the major brooks and wetlands. Table 15 also provides the data about the geographical locations of each of the panels, which watercourses or waterbodies are in the SFHAs, classification of flood zone, and BFEs along the river.

Table 15

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

Panel NH (D33013C)	Flood Zones in Concord	Base Flood Elevations (BFEs)	Water Body Areas	Concord (330110) Panel Location
#0318	AE with floodway, X	359	Contoocook River	Northwest corner with Webster and Hopkinton. Allen State Forest, Warner Road.
#0319	AE with floodway, AE, X, A	358	Contoocook River, Unnamed Wetland of Merrimack River	Northern edge of Concord, bordering Boscawen and Webster. Blackwater Road, Elm Street, Horsehill Road
#0336	AE with floodway, X	310, 308	Contoocook River	Northern center edge with Boscawen.
#0337	AE with floodway, AE, A, X	253, 252, 251. 254 (Contoocook)	Merrimack River, Burnham Brook, Contoocook River	Northeastern edge with Canterbury. Includes Hannah Dustin Drive, I-93 Exit 17, Penacook Street.
#0338	AE with floodway, AE, A, X	355, 354, 353, 353- 336, 320, 311, 310. Lower Branch 353- 347, 338, 322, 320, 319, 313, 310.	Contoocook River with Canals	Northcentral section of City in Penacook. Bog Road, Washington Street, Borough Road, Riverhill Avenue
#0339	AE with floodway, AE, A, X	252, 249, 248, 247, 245, 244	Merrimack River, Hoyt Brook, Sewalls	Northern Concord in Penacook along the Merrimack River. Railroad line, I-93, Penacook Street

Panel NH (D33013C)	Flood Zones in Concord	Base Flood Elevations (BFEs)	Water Body Areas	Concord (330110) Panel Location
			Falls, Unnamed Stream	
#0343	AE with floodway, X	245, 242, 241, 239, 236, 237	Merrimack River, Sewalls Falls, Unnamed Stream	Center of Concord, eastern side. I-93, Snow Pond Road, Sewalls Falls Road, Blood Agricultural Preserve, Sewalls Falls WMA
#0506	AE with floodway, X	359	Contoocook River	Northwestern edge with Mast Yard State Forest at Hopkinton border.
#0507	AE with floodway, AE, X	358, 357, 356	Contoocook River	Northwestern edge with Mast Yard State Forest at Hopkinton border. West Parish Road, Broad Cove Road
#0526	AE with floodway, AE, X	356, 355	Contoocook River	Northwest area of City, including Carter Hill Road, Bog Road, Riverhill.
#0527	AE, X	237	Merrimack River	Geographic center of City. North State Street, Fisherville Road, Railroad
#0531	AE with floodway, AE, X, A	237, 236, 235, 234, 233	Merrimack River, Cider Mill Dam, Horseshoe Pond, Bowen Brook	Center of the City, with Merrimack River and I-93. Eastside Drive (Exit 16), Commercial Street (Exit 15), Old Locke Road
#0532	AE with floodway, AE, A, X	233	Merrimack River, Mill Brook	Central-eastern section of Concord. North Curtisville Road, Eastside Drive, I-393, Portsmouth Street, NHTI Island Reserve
#0533	AE with floodway, AE, X	232 (Merrimack River), 235 (Horseshoe Pond)	Merrimack River, Horseshoe Pond	Downtown Concord. I-93, I-393, Commercial Street, North Main Street.
#0534	AE with floodway, AE, X	233, 232, 231, 230 (Merrimack)	Merrimack River, Soucook River	Downtown East, Loudon Road. Concord Airport, I-93, I-393, Airport Road, Manchester Street.
#0542	AE with floodway, AE, X	224, 220 (Soucook). 230, 228 (Merrimack)	Soucook River, Merrimack River, Turkey River (Bow)	Southern point at Bow town line. I-93, South Main Street, Integra Drive
#0551	AE with floodway, AE, A, X	285, 283, 281, 281, 279, 277, 276	Soucook River	Eastern edge boundary with Pembroke. East Concord, I-393, Sheep Davis Road, Loudon Road.
#0552	AE with floodway, AE, A, X	315, 314, 313, 312, 311, 304, 300, 294, 284	Soucook River	Eastern edge corner with Loudon and Pembroke at the Soucook River. Ricker Road, Sheep Davis Road, I-393, Dover Road (Route 9), Loudon Road.
#0553	AE with floodway, AE, X	276, 266, 261, 253, 244, 239, 236, 233	Soucook River	Eastern boundary with Pembroke, middle of the Soucook River. Sheep Davis Road, Riverwood Drive, Regional Drive
#0561	AE with floodway, AE, X	233, 225, 216, 210, 203 (Soucook). 204, 202 (Merrimack)	Soucook River, Merrimack River	Southeastern edge where Soucook & Merrimack Rivers converge. Bordering Bow & Pembroke. Route 3, Pembroke Street, Garvins Falls Road

Panel NH (D33013C)	Flood Zones in Concord	Base Flood Elevations (BFEs)	Water Body Areas	Concord (330110) Panel Location
#0345	A	N/A	Hayward Brook, Hackett Brook, Hoit Marsh	Northeast corner with Loudon & Canterbury. Mountain Road, Hoit Road Marsh WMA, Tallant Road.
#0365	None	N/A	None	Eastern edge with Loudon.
#0510	None	N/A	None	Western edge with Hopkinton. Kimball Easement, Ash Brook. No roads.
#0530	A	N/A	Turkey River, Ash Brook, Little Turkey Pond, St. Paul's Dams	Southwest Concord, edges into Hopkinton. St. Paul's, Pleasant Street, Hopkinton Road, Shenandoah Drive, White Farm.
#0540	A	N/A	Little Turkey Pond, Great Turkey Pond, Turkey River, Turree Brook, Bela Brook	Southwestern corner with Hopkinton and Dunbarton. Clinton Street (Route 13), I-89, Silk Farm Road, Birchdale Road
#0541	A	N/A	Turkey River	Southern edge with Bow. I-89 and I-93 junction, Clinton Street, South Street, Cilley State Forest.

Sources: FEMA and NH Geographically Referenced Analysis and Transfer System (NH GRANIT) websites, DFIRMS 2010

Soucook River

The DFIRMS identifying floodplains along the **Soucook River** sharing the boundary with Pembroke (330119) from north to south are #0551, #0552, #0553, #0534, #0542 and #0561. These 6 DFIRMS include regular BFEs along the Soucook River’s entire length of Concord’s eastern boundary. The BFEs begin at their highest with 315’ at the Loudon (330117) boundary and as the river flows south, elevation declines significantly to reach 203’ in Concord as the **Soucook River** converges with the **Merrimack River**, a total decline of 112’.

Merrimack River

The DFIRMS identifying floodplains along the **Merrimack River** share the northern border with Boscawen (330105) and Canterbury (330108) and the southern boundary with Bow (330107). From north to south, the panels are #0337, #0339, #0343, #0531, #0532, #0533, #0534, #0542 and #0561. The BFEs begin at their highest with 253’ where the **Merrimack River** flows into Concord and declines in elevation slowly in each DFIRM to reach its lowest BFE of 204’ in Concord, a total decline of 49’ when the **Soucook River** converges with the **Merrimack River**.

Contoocook River

The Contoocook in an unusual river which flows in the opposite direction, from south to north. The DFIRMS identifying floodplains along the **Contoocook River** include the river’s travels through Hopkinton (330116) and Boscawen (330105) until it converges with the Merrimack in Penacook, a village of Concord. From south to north, the panels are #0318, #0319, #0338, #0336, and finally #0337 which is also shared

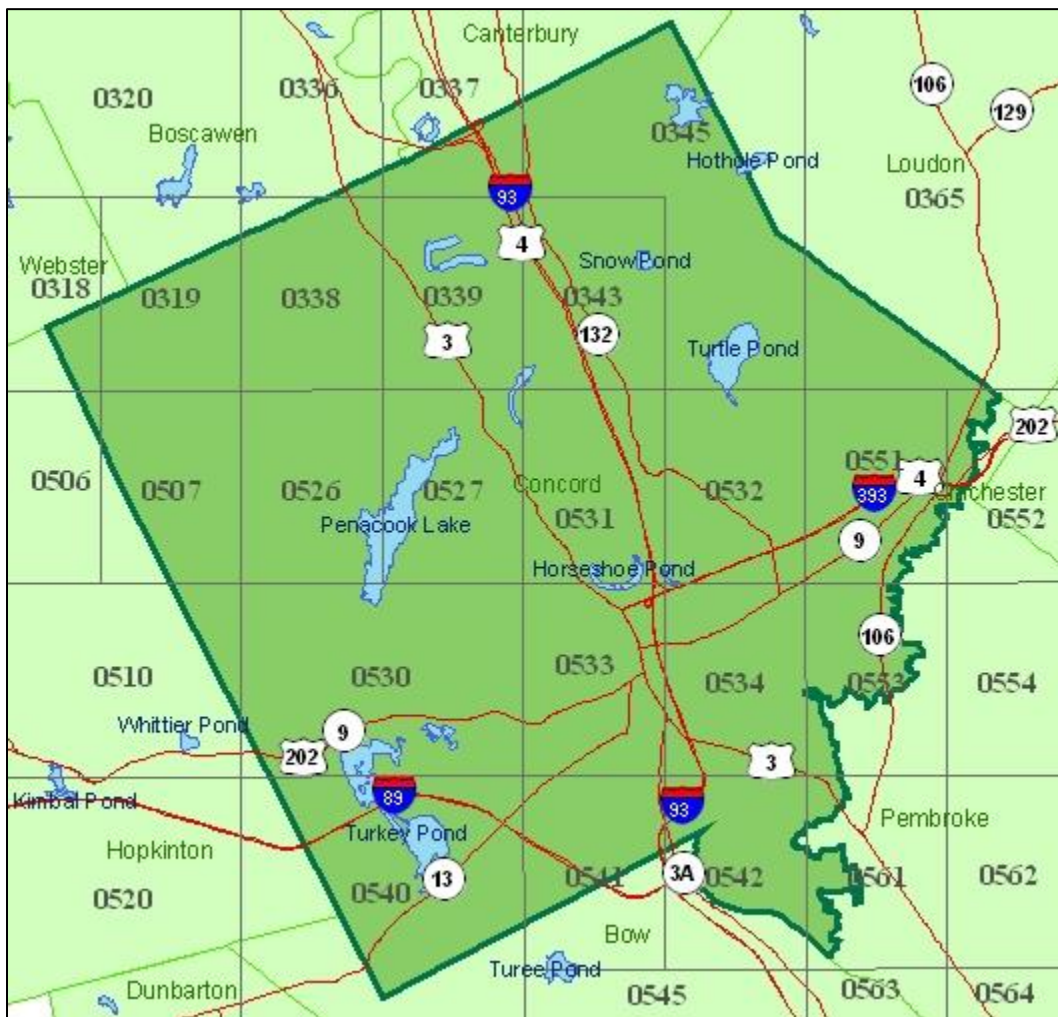
with the **Merrimack River**. The **BFEs** begin at their highest with **359'** where the **Contocook River** flows into Concord from Hopkinton and declines in elevation quickly in each DFIRM to reach its lowest **BFE** of **254'** in Boscawen and Concord, a total decline of **155'**, when the **Contocook River** converges with the **Merrimack River**.

Turkey River

This small local river originates from the Little and Great Turkey Ponds. The DFIRMs identifying floodplains along the **Turkey River** begin in Concord and continue south into Bow (**330107**). From north to south, the panels are **#0530**, **#0540** and **#0541** although there are no **BFEs** for the **Turkey River**.

Figure 8 displays the relative location of each of the DFIRM panels in the community used in **Table 15**. This set of DFIRMs is excerpted from the *Merrimack County Flood Insurance Study (FIS) of 2010*.

Figure 8
DFIRM Panel Location, 2010



Source: Concord DFIRMS can be downloaded at <http://www.granit.nh.edu/dfirms/>, last accessed 03-03-17

Figure 9 displays an example of a zoomed-in view of the Concord floodplain at Interstate 393 and the NH Technical Institute (NHTI) campus area. The new 2010 DFIRMs illustrate a significant upgrade from the previous series of paper maps. The maps are now set on an aerial photography background that displays roads, buildings, urban and forested areas.

Figure 9

Zoom View of Concord DFIRM Panel Location #0532



Source: FEMA DFIRMS 2010 for Concord NH, #0532

Rapid Snow Pack 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 snow pack melt because of the flooding from the Merrimack River and the various streams along the roads, and from the culverts of the various brooks. Locations in Concord that may be vulnerable to rapid snow pack melt include undersized or unmaintained culverts, roads, driveways, slopes, yards or fields, or swollen brooks, or any of the City's fast moving brooks or ditches. Damage to roads is expected.

Magnitude of Rapid Snow Pack Melt

Rapid snow pack 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.

Rapid Snow Pack Melt in Concord

Melt runoff from impervious surfaces and roadways or from tree cover and fields can cause floods over the entire City. Most of the melt water flooding is away from residential areas except for Fort Eddy Road and any facilities along the bank of the Merrimack River. The Soucook River on North Pembroke Road may be susceptible to rapid snow pack flooding on the west side of the river.

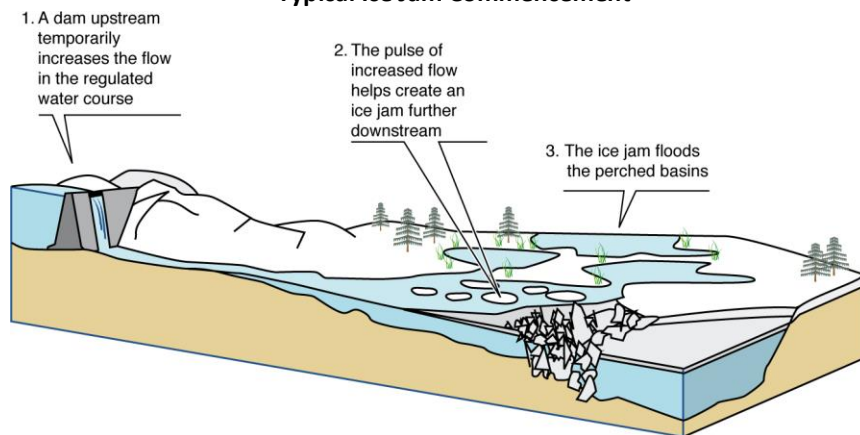
On these and other roads, the road beds may be washed away, preventing traffic from passing. All areas of City could be susceptible to rapid snow pack melt. Based on past flooding events, flooding damage could also occur along the banks of the Merrimack River, Soucook River or Turkey River. Floodplains could become inundated and (limited) evacuations might be necessary.

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 10**.

Figure 10

Typical Ice Jam Commencement



Source: USGS, Internet Accessed May 2014

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.

River Ice Jams in Concord

Ice jams have been known to have occurred along the **Contoocook River** and **Soucook River**. The wide and meandering **Merrimack River** has not known to have produced an ice jam. The **Turkey River**, Soucook River, Merrimack River and the **Contoocook River** and **Rattlesnake Brook** would be at greatest risk for flooding due to ice jams. The **Soucook River** has had ice jams in the past and could endanger the North Pembroke Road bridge. River ice jams cause debris impacted infrastructure; sites susceptible to ice jam debris impacted infrastructure (bridges and dams) include St. Paul's, which could sustain significant building damage from the **Turkey River** because of the dam's open spillway.

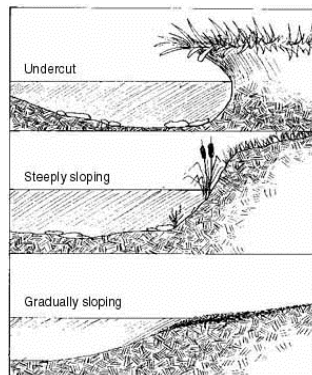
Flow volumes which could encourage potential ice formation and movement occur high water levels in spring and during severe rainfall events after a deep winter freeze. **River ice jams** may have future potential to occur on any of Concord's four rivers. Bridges and dams as identified in **APPENDIX A Critical and Community Facility Vulnerability Assessment** might have the potential for river ice jam damage.

Riverine 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 11** displays visual bank erosion characteristics.

Figure 11
Bank Erosion Characteristics

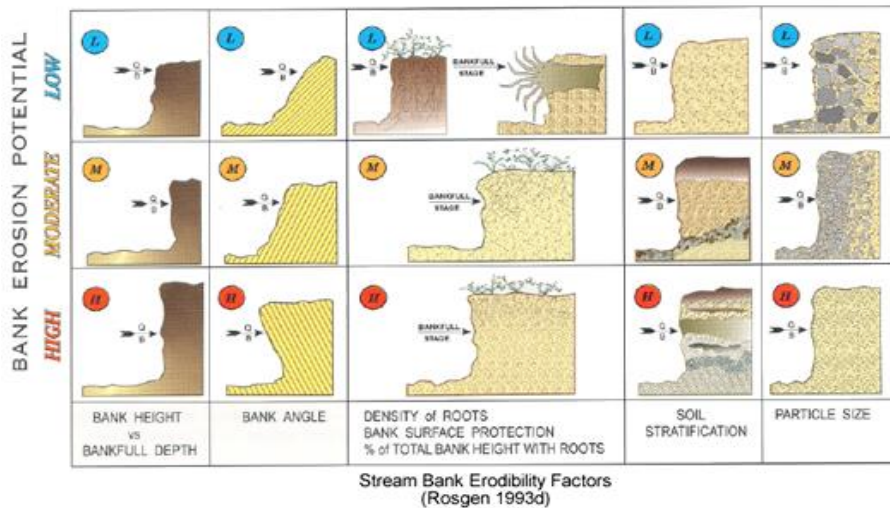


Source: US Geological Survey (USGS)

Magnitude of (Fluvial) River Bank 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 12** displays the visual version of the index.

Figure 12
Bank Erosion Prediction Index (BEHI)



Source: US Environmental Protection Agency (US EPA)

Riverine Fluvial Erosion, Bed Scouring and Channel Movement in Concord

To identify areas of river and stream erosion that could impact public health and safety in the Soucook River watershed, the New Hampshire Geological Survey (NHGS) at the NH Department of Environmental Services (NHDES) coordinated a **fluvial geomorphology assessment** (FGA) conducted by Field Geology Services who collected field data along the **Soucook River** and **Turkey River** in 2013.

Data collection included line geomorphic features (artificially straightened channel, encroachments, riverside development, vegetated buffer less than 25’ in length, bank erosion, bank armoring, and mass failure). Data collection also included point geomorphology features such as channel migration areas, beaver dams, bridges/culverts, large woody material jams, flood chutes, steep riffles, etc.). New **Maps of Fluvial Geomorphic Features** and **Fluvial Erosion Hazard Meander Belts** were developed to display this important river data.

Floodplains of **Turkey River**, **Soucook River**, **Merrimack River** and the **Contocook River** and **Rattlesnake Brook** have the greatest potential for erosion, scouring or channel movement. These are the largest watercourses in the City and run through urban and rural locations alike. Bank erosion and scouring is most prevalent on the banks of the four Rivers. Along **Soucook River** off of Route 106 (near the Steeplegate Mall), a large slope slip is developing at one of the s-curves owned by the City. A nearby privately owned house on a bluff behind the mall could experience erosion; nearby paving blasting is also felt there and sinkholes around the property are occurring. There is a potential for scouring on the **Merrimack River** behind the NH DOT and Shaws on Fort Eddy Road. More trees have fallen into the River at the Shaws plaza. Erosion from the **Contocook River** occurs on Broad Cove Road area, some of which has been ripped.

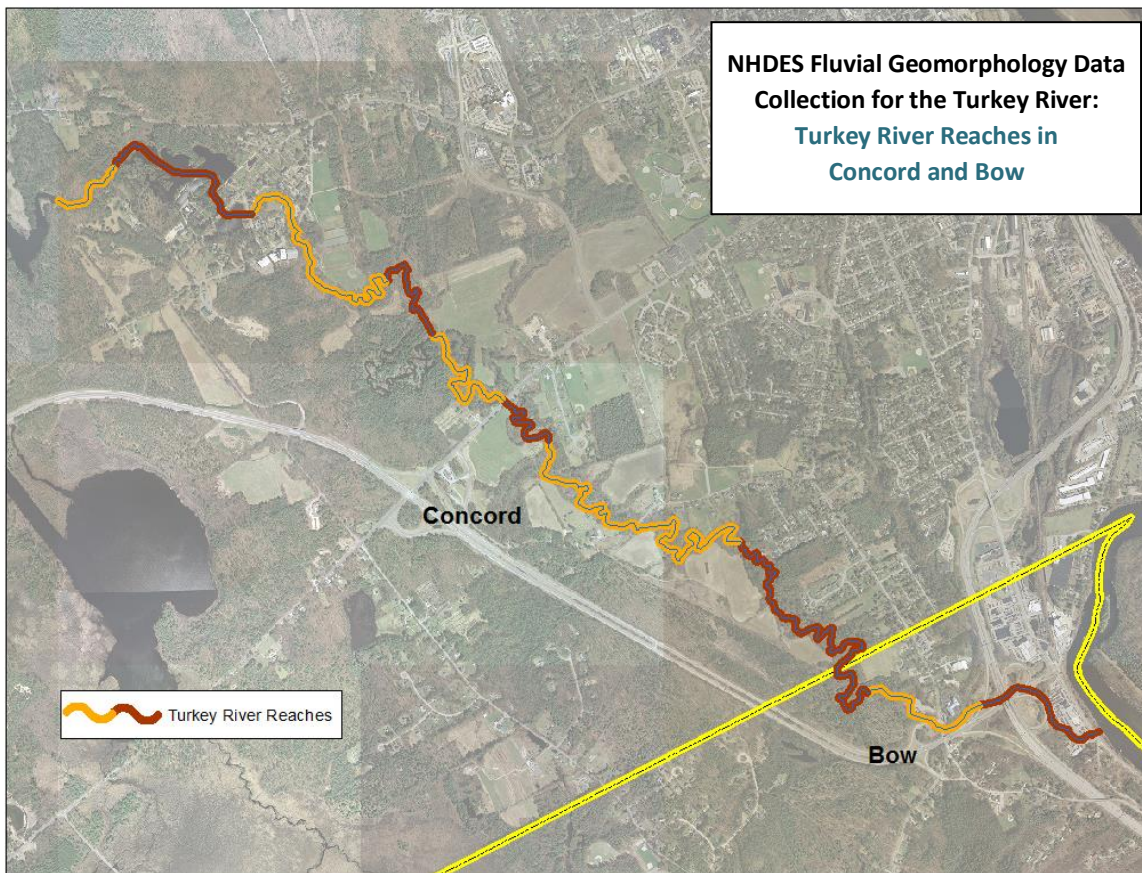
Turkey River

The entire length of the **Turkey River** is **6.7 miles (35,469 feet)**. In Concord, **2.7 miles (14,030 feet)** were assessed, the entire **1.3 miles** of the **Turkey River** in Bow was assessed, and **2.7 miles** remained unassessed due to difficulty reaching the river at certain locations.

Three (3) geomorphically similar **Turkey River** reaches were assessed in Concord, with one of the reaches shared by both Concord and Bow. These 3 reaches totaling **2.7 river miles** had geomorphic and impact feature data collected and are the focus of the FGA discussion and mapping as discussed in detail in the **Turkey River Addendum** in **APPENDIX G**.

The **Turkey River** data features collected during the fluvial geomorphology assessment are displayed on series **Maps 5A** and **5B Fluvial Geomorphic Features**, **Maps 6A** and **6B Fluvial Erosion Hazard Meander Belts**. **Figure 13** displays the area of assessment including each of the individual river reaches.

Figure 13
Turkey River Reaches in Concord and Bow



Source: Map developed by Central NH Regional Planning Commission (CNHRPC), 2015, from data provided by the NH Geological Survey (NHGS)

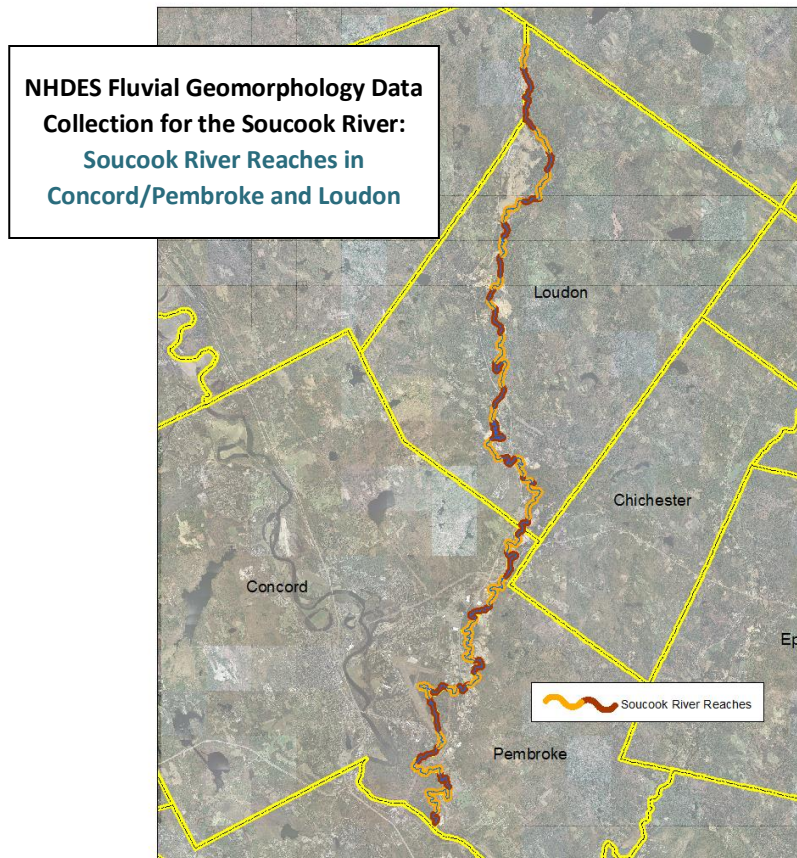
Soucook River

The entire length of the **Soucook River** is **29.8 miles (157,298 feet)**, beginning in Loudon to the river’s confluence with the **Merrimack River** in Bow. In Concord/Pembroke, the **Soucook River** miles total **13.8 miles (72,941 feet)**, but only **5.6 miles (29,356 feet)** were assessed because of access issues and priority areas.

Eight (8) geomorphically similar **Soucook River** reaches were assessed in Concord, with one of the reaches located in both Concord/ Pembroke and Loudon. These **8** reaches totaled **5.6** river miles with geomorphic and impact feature data collected and are the focus of the FGA discussion and mapping as discussed in detail in the **Soucook River Addendum** in **APPENDIX H**.

The **Soucook River** data features collected during the fluvial geomorphology assessment are displayed on series **Maps 7A, 7B, and 7C Fluvial Geomorphic Features** and **Maps 8A, 8B, and 8C Fluvial Erosion Hazard Meander Belts**. **Figure 14** displays the locations of the river reaches described within the assessment.

Figure 14
Soucook River Reaches in Concord/Pembroke



Source: Map developed by Central NH Regional Planning Commission (CNHRPC), 2015, from data provided by the NH Geological Survey (NHGS)

Fluvial Erosion Hazard Meander Belts – Turkey and Soucook Rivers

Fluvial erosion hazard areas, or *meander belt*, data is derived from assessed river reaches. A *meander belt* is that area of land on either side of a river or stream channel that a river can potentially access over time as a river naturally migrates across its floodplain

For identified river reaches, including those for the Soucook River, the suite of river geomorphology (condition) data was collected to provide an understanding of the river channel’s sensitivity to future change (inclusive of bed and bank erosion) within the meander belt (or fluvial erosion hazard zone) as a result of high flow events. Sensitivity for a reach can be in any one of six categories, based on its condition, ranging from Very Low to Extreme, with the categories of Low, Moderate, High and Very High in between.

The **8** assessed **Soucook River** reaches in Concord/Pembroke were delineated by the NH Geological Survey (NHGS) using scientific techniques to define fluvial erosion hazard meander belt locations and their relative sensitivity to future change. Future reach change could include channel migration, bank erosion, and other fluvial geomorphic changes during high flow or flooding conditions.

On the relative scale of the six sensitivity categories ranging from Very Low to Extreme, the **5 Soucook River** reaches were rated as Very High, **2** reaches were rated as High, and **1** reach was rated as Moderate.

Of the **3** assessed **Turkey River** reaches in Concord, **2** were rated as Extreme and **1** was rated as Very High.

These are displayed on the **Fluvial Erosion Hazard (FEH) Meander Belt Map Series** which depict the meander belt sensitivity for Concord’s **Turkey River** and **Soucook River**. See **APPENDIX G & APPENDIX H** for the **Fluvial Geomorphic Assessments 2015** for more information.

Fluvial Erosion Hazard (FEH) Meander Belt Sensitivity
Very Low
Low
Moderate
High
Very High
Extreme

Erosion along the **Turkey River** occurs at many locations along its banks according to the **Map 5** series. The City should remain alert for potential developing erosion sites. **Turkey River** banks have been seen eroding into the water during the assessment. In addition, the assessment developed projected meander belt sensitivity locations along key sections of the river, some of which have an Extreme or Very High sensitivity to future channel movement. The City should remain alert for continually eroding sites, using these maps as a basis.

From the **Map 5** series, existing or potential future hazard locations of **Turkey River bank erosion and scouring** could include:

- Along much of river banks along the meanders north of Iron Works Road;
- Along areas of artificial straightening south of Iron Works Road and along the large meanders;

- Along most of the river bends south of Dunbarton Road (St. Paul’s School); and
- Other areas denoted on the 2015 **Turkey River** fluvial geomorphic maps.

Erosion along the **Soucook River** occurs at many locations along its banks according to the **Map 7** series. The City should remain alert for potential developing erosion sites. **Soucook River** banks have been seen eroding into the water during the assessment. In addition, the assessment developed projected meander belt sensitivity locations along key sections of the river, some of which have a Very High or High sensitivity to future channel movement. The City should remain alert for continually eroding sites, using these maps as a basis.

From the **Map 7** series, existing or potential future hazard locations of **Soucook River bank erosion and scouring** could include:

- Along meanders near Concord Airport;
- North and south of the Sheep Davis Road (Route 106) intersection with the river;
- Along meanders north of Smokey Bear Boulevard and south of North Pembroke Road;
- Along meanders north of North Pembroke Road
- To the east of Soucook Lane (north of I-393W);
- Along meanders north of Dover Road; and
- Other areas denoted on the 2015 **Soucook River** fluvial geomorphic maps.

With this **Turkey** and **Soucook River** information incorporated into the **Hazard Mitigation Plan 2017**, the City has an opportunity to consider areas of identified potential flooding and erosion risk in future planning efforts. River assessments data can also be utilized to develop fluvial erosion hazard maps. If a community elected to do so, they could use the maps to pursue development limitations through the zoning ordinance amendment process to protect infrastructure and people.

WIND HAZARDS

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 Concord during hurricanes. Numerous hurricane events in recent history have occurred in the State, region, and the local area surrounding Concord that may have also had an impact on the City.

Wind is also found in severe winter snow and ice storms, making this hazard likely to occur during the entire year. Significantly high winds occur especially during hurricanes, tornadoes, 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 City. A communications interruption or failure resulting from damage to telecommunications towers could affect the capabilities of emergency personnel to respond to the hazard event.

There are several types of **Wind** hazards examined in the **Hazard Risk Assessment**:

- **Tornadoes**
- **Downbursts**
- **Hurricanes and Tropical Storms**
- **Severe Wind, Rain Storms and Thunderstorms**

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 280 mph or more. In addition, tornadoes can travel at a forward speed of up to 70 mph. Damage paths can be in excess of one-mile wide and 50 miles long. Violent winds and debris slamming into buildings cause the most structural damage.

Magnitude of Tornadoes

A tornado occurring in Concord 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), which are provided in **Table 16**.

Table 16
Enhanced Fujita (EF) Scale

Enhanced Fujita (EF) Scale 2007 – Present	Fujita (F) Scale <i>replaced</i>
F Number with 3-Second Gust mph	F Number with 3-Second Gust mph
EF0 65-85 mph	F0 45-78 mph
EF1 86-110 mph	F1 79-117 mph
EF2 111-135 mph	F2 118-161 mph
EF3 136-165 mph	F3 162-209 mph
EF4 166-200 mph	F4 210-261 mph
EF5 over 200 mph	F5 262-317 mph

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

Tornadoes in Concord

The whole City could be vulnerable to a **tornado**. A tornado occurring in Concord would cause considerable damage. Roofs could be torn off frame houses; mobile homes demolished; large trees snapped or uprooted; and light object missiles would be generated as a result of an EF-2 Tornado. Schools, manufactured housing and populated areas with trees would be most vulnerable to severe wind events. Areas of high density including Downtown, Concord Heights, and Penacook would be the most vulnerable in Concord, in addition to senior housing, schools, and apartments. These types of facilities are scattered throughout the City. Disturbance of communications towers would cause the most difficulty in the City.

Wooded sections of City run a risk of isolation through debris impacted infrastructure (trees down on roads and powerlines) resulting in power failure with little emergency access until the way is cleared. A tornado occurring in Concord would cause considerable damage. Wooded and forested sections of City: Rollins Park contains legacy pine trees; rural roads - Shaker Road, Snow Pond Road, Oak Hill Road, Dunbarton Road (private St. Paul's), Fisk Road, Carter Hill Road, West Parish Road, Broad Cove Road, River Road, Bog Road, Elm Street, Horsehill Road, Iron Works Road, Currier Road, Silk Farm Road, Long Pond Road, Hoit Road, Mountain Road (Route 132), Graham Road, District Five Road, Runnells Road, Weir Road,

Blackwater Road, Warner Road, Garvins Falls Road, Portsmouth Street. would be most subject to tree and home damage from severe wind events. Taller buildings, telecommunications towers, and aboveground utilities are particularly vulnerable. Facilities are listed in **APPENDIX A Critical and Community Facility Vulnerability Assessment**.

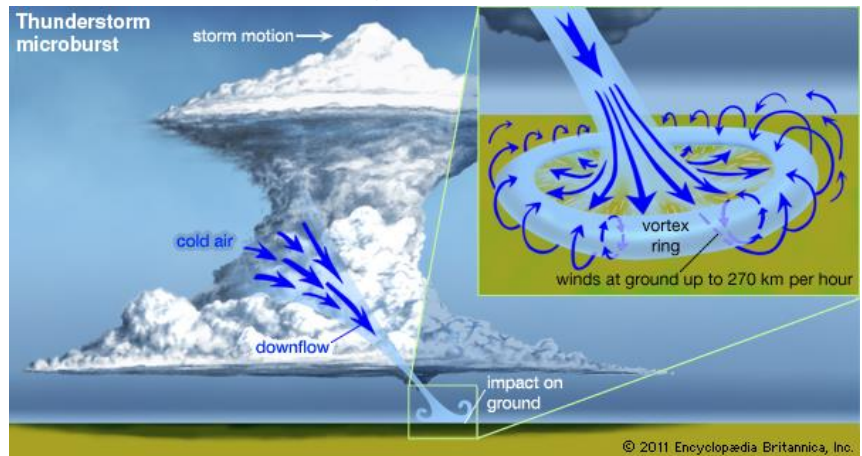
Downbursts

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. Microbursts and macrobursts (wet) have been known to occur here in the region.

Downbursts of both sizes can produce strong wind shear - or 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**.

Figure 15

Microburst Forming from Thunderstorm Clouds



Source: Internet (Encyclopedia Britannica)

Magnitude of Downbursts

Downburst magnitude is rated on the same NOAA 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.

Downbursts in Concord

Downbursts are considered a greater threat than tornadoes in Concord. The likelihood of future wind events in City seems high, given the long history of **downbursts** in Concord. **High winds** are unpredictable, and are often more prevalent at higher elevations. The City Center of Concord is at a moderate elevation but is located above the floodplains, in a more open area.

Schools, manufactured housing and populated areas with trees would be most vulnerable to severe wind events like **downbursts**. Areas of high density including Downtown, Concord Heights, and Penacook would be the most vulnerable in Concord, in addition to senior housing, schools, and apartments. These types of facilities are scattered throughout the City. Disturbance of communications towers would cause the most difficulty in the City.

Wooded sections of City run a risk of isolation through debris impacted infrastructure (trees down on roads and powerlines) resulting in power failure with little emergency access until the way is cleared. A **downburst** occurring in Concord would cause considerable damage. Wooded and forested sections of City: Rollins Park contains legacy pine trees; rural roads - Shaker Road, Snow Pond Road, Oak Hill Road, Dunbarton Road (private St. Paul's), Fisk Road, Carter Hill Road, West Parish Road, Broad Cove Road, River Road, Bog Road, Elm Street, Horsehill Road, Iron Works Road, Currier Road, Silk Farm Road, Long Pond Road, Hoit Road, Mountain Road (Route 132), Graham Road, District Five Road, Runnells Road, Weir Road, Blackwater Road, Warner Road, Garvins Falls Road, Portsmouth Street. would be most subject to tree and home damage from severe wind events. Taller buildings, telecommunications towers, and aboveground utilities are particularly vulnerable. Facilities are listed in **APPENDIX A Critical and Community Facility Vulnerability Assessment**.

Hurricanes and Tropical Storms

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 Concord 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 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 17**.

Table 17
Saffir-Simpson Hurricane Wind Scale

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 mph	Very dangerous winds will produce some damage: 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.
2	96-110 mph	Extremely dangerous winds will cause extensive damage: 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.
3 <i>major</i>	111-129 mph	Devastating damage will occur: 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.
4 <i>major</i>	130-156 mph	Catastrophic damage will occur: 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.
5 <i>major</i>	157 mph or higher	Catastrophic damage will occur: 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)

Hurricanes and Tropical Storms in Concord

Hurricane Sandy, which was not a declared disaster in Concord, caused many roads to temporarily close while General Services and Eversource crews cleared them of debris. Trees and limbs fell onto the roadways and onto powerlines, closing off neighborhoods. If vehicles had been traveling on these roads while the hurricane was in progress, they would have been in danger.

When **hurricanes or tropical storms** occur in Concord, the entire City’s electrical utilities of Eversource (formerly Public Service of NH PSNH) and Unitil will continue to be prone to power outages. The response time to these outages could be several days in the more remote or densely populated areas of City, depending on where debris has fallen onto roads. Areas particularly vulnerable to the combination of **flooding, wind, tree debris** and **power failure** include Rollins Park contains legacy pine trees; rural roads - Shaker Road, Snow Pond Road, Oak Hill Road, Dunbarton Road (private St. Paul's), Fisk Road, Carter Hill Road, West Parish Road, Broad Cove Road, River Road, Bog Road, Elm Street, Horsehill Road, Iron Works Road, Currier Road, Silk Farm Road, Long Pond Road, Hoit Road, Mountain Road (Route 132), Graham Road, District Five Road, Runnells Road, Weir Road, Blackwater Road, Warner Road, Garvins Falls Road, Portsmouth Street. These areas would be most subject to tree and home damage from severe wind events.

In addition, resident communications and radio operability for emergency communications could be adversely affected. Land line and cable internet utilities are at risk of failure during severe storms. Cellular

phones might have ability to call out during these situations depending on the condition and location of the nearest telecommunications towers and atmospheric interference.

Severe Wind, Rainstorms and Thunder Storms

More commonly experienced are severe wind storms, rainstorms and thunder storms. The severe wind storms occur during all months of the year while the thunder storms 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 hazards in addition to high winds and flooding.

Magnitude of Severe Wind, Rainstorms and Thunder Storms

Many of the severe wind storms Concord experiences are not hurricanes but are severe wind storms or thunderstorms. Thunderstorms are common in New Hampshire, particularly during the hot weather months. The [Thunderstorm Category Criteria](#) scale in **Table 18** measures the magnitude of thunderstorms with their various weather components, including rain, wind, hail, tornado, and lightning.

Table 18
Thunderstorm Criteria Scale

Thunderstorm Categories	Rainfall Inches per hour	Wind Gust max mph	Hail Size in	Tornado Potential Highest Category	Lightning Frequency per 5 minutes	Darkness Aspect	Overall Thunderstorm Impact
T-1 Weak Thunderstorms or Thundershowers	0.03" to 0.10"	< 25 mph	None	None	Few strikes during entire storm	Slightly Dark Sunlight may be seen after storm	1. No damage. 2. Gusty winds at times.
T-2 Moderate Thunderstorms	0.10" to 0.25"	25-40 mph	None	None	Occasional 1 to 10	Moderately Dark Heavy downpours might cause the need for car headlights	1. Heavy downpours. 2. Occasional lightning. 3. Gusty winds. 4. Very little damage. 5. Small tree branches might break. 6. Lawn furniture moved around. 7. Power outages are possible.
T-3 Heavy Thunderstorms 1. Singular or lines of storms	0.25" to 0.55"	40-57 mph	1/4" to 3/4"	EFO	Occasional to Frequent 10 to 20	Dark Car headlights used. Visibility low in heavy rains. Cars might pull off the road.	1. Minor damage. 2. Downpours produce some flooding on streets. 3. Frequent lightning could cause house fires. 4. Hail occurs with the downpours. 5. Small tree branches are broken. 6. Shingles are blown off roofs. 7. Power outages are likely.

Thunderstorm Categories	Rainfall Inches per hour	Wind Gust max mph	Hail Size in	Tornado Potential Highest Category	Lightning Frequency per 5 minutes	Darkness Aspect	Overall Thunderstorm Impact
T-4 Intense Thunderstorms 1. weaker supercells 2. Bow echoes or lines of storms	0.55" to 1.25"	58-70 mph	1" to 1.5"	EF0 to EF2	Frequent 20 to 30	Very Dark Car headlights used. Some streetlights come on.	1. Moderate damage. 2. Heavy rains can cause flooding to streams and roadway flooding occurs. 3. Hail can cause dents on cars and cause crop damage. 4. Tornado damage. 5. Power outages will occur.
T-5 Extreme Thunderstorms 1. Supercells with family of tornadoes 2. Derecho Windstorms	1.25" to 4"	> 70 mph	1.5" to 4"	EF3 to EF5	Frequent to Continuous > 30	Pitch Black Street lights come on. House lights might be used.	1. Severe damage to trees and property. Damage is widespread. 2. Flooding rains. 3. Damaging hail. 4. Damaging wind gusts to trees and buildings. 5. Tornadoes EF3 to EF5 or family of tornadoes can occur. Tornadoes cause total devastation. 6. Widespread power outages.

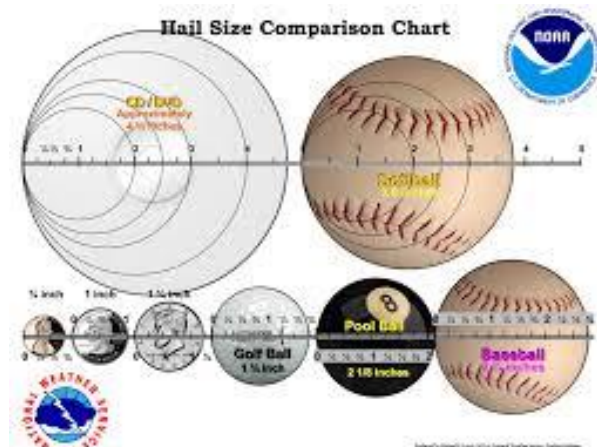
Source: Adapted from Accuweather.com, Henry Margusity, Senior Meteorologist

Incidentally, hail can accompany thunderstorms, hurricanes, or severe wind events. The [Hail Size Description Chart](#) describes the potential size of hail during a hurricane or severe storm event, which could occur anywhere in Concord. The chart is shown below along with a Hail Size Comparison Chart which is a visual representation of some of the relative sizes of hail (note this chart image is not shown to scale). The **Table 19** hail size description and **Figure 16** size comparison scales measure the magnitude of hailstones that could fall on Concord during severe storm events.

Table 19
Hail Size Description

Hailstone Diameter (inches)	Size Description
< 1/4	bb
1/4	Pea Size
1/2	Mothball Size
3/4	Penny Size
7/8	Nickel Size
Severe Criteria 1	Quarter Size
1 1/4	Half Dollar Size
1 1/2	Walnut or Ping Pong Ball
1 3/4	Golf Ball Size
2	Hen Egg Size
2 1/2	Tennis Ball Size
2 3/4	Baseball Size

Figure 16
Hail Size Comparison



Sources: National Oceanic and Atmospheric Administration (NOAA), National Weather Service (NWS)

Hailstone Diameter (inches)	Size Description
	Teacup Size
3 4/5	Softball Size
4	Grapefruit Size

Severe Wind, Rainstorms and Thunder Storms in Concord

All of Concord has experienced **severe wind**, **rainstorms**, and **thunderstorms**. The entire City’s electrical utilities of Eversource (formerly Public Service of NH PSNH) and Unitil will continue to be prone to power outages. The response time to these outages has been up to **3** days in the more remote or densely populated areas of City, depending on where debris has fallen onto roads. Areas particularly vulnerable to the combination of **flooding**, **wind**, **tree debris** and **power failure** are the rural roads and residential areas listed previously. In addition, resident communications and radio operability for emergency communications could be adversely affected. Land line and cable internet utilities are at risk of failure during severe storms. Cellular phones might have ability to call out during these situations depending on the condition and location of the nearest telecommunications towers and atmospheric interference.

The rural roadways (fallen trees), electrical power utilities, communications network, local government operations are susceptible to damage from debris impacted infrastructure. The close proximity to the Merrimack River, Contoocook River, and Soucook River and Turkey River makes areas of the City susceptible to flooding during heavy rain storms. The storm drain system is the oldest infrastructure in the City. Dimond Hill Farm land was damaged by heavy rains eroding through the fields in November 2015. Such **severe storm** events can be damaging to local agriculture.

FIRE HAZARDS

Fire can be caused by several agents and can spread rapidly to consume property and endanger lives. This **2017 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 and procedures. Lightning can cause fire or wildfire. The forested, rural roads are among the most vulnerable locations for fire and wildfire hazards. The City’s trail system is comprised of forested conservation areas which can be extremely vulnerable to both wildfire and lightning.

There are two types of natural **Fire** hazards examined in the **Hazard Risk Assessment**:

- **Lightning**
- **Wildfire**

Lightning

All thunderstorms contain lightning. 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”.

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 20**.

Table 20
Lightning Activity Level (LAL)

Level	LAL Cloud and Storm Development	Cloud to Ground Strikes per 5 Minutes	Cloud to Ground Strikes per 15 Minutes
LAL 1	No thunderstorms	n/a	n/a
LAL 2	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
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5-minute period.	6 to 10	9 to 15
LAL 4	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

Level	LAL Cloud and Storm Development	Cloud to Ground Strikes per 5 Minutes	Cloud to Ground Strikes per 15 Minutes
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a 5-minute period.	> 15	> 25
LAL 6	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

Lightning Strikes in Concord

Lightning regularly strikes in City, including downtown, at the high roofs and spires. Specific sites which would cause the greatest impact if struck by **lightning** include the City buildings, Municipal Complex, electrical utilities, generators, transformers and telecommunication towers. The heavily forested northern Concord, older narrow graveled roads, and densely packed residential areas are among the most vulnerable locations for fire and wildfire hazards. Large forested or scrub blocks of land, particularly those with restricted access, are susceptible. Concord has a number of these locations.

The Concord Fire Department maintains a database of **lightning** strikes in the City. Between **January 2011 - March 2017**, a total of **33** lightning strikes were recorded, all of them between the months of June and August. Downtown is a regular target as well as flat, open areas. A few strikes occurred in the rural areas and on the Heights. The entire listing of lightning strikes is provided in **APPENDIX F Lightning Strikes and Wildfires 2011-2017**.

Wildfire

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

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

The standard of measuring wildfire magnitude is by the National Wildfire Coordinating Group (NWCG)'s wildfire classification scale. **Table 21** displays the wildfire classification size per the number of acres burned.

Table 21
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

Wildfire in Concord

Although **wildfire** damage has been kept to a minimum to date, the potential for losing an immense acreage of Concord to this natural hazard is possible, particularly with the severe drought conditions currently occurring in 2016. The heavily forested woodlands of the City and its multitude of conservation areas and trail systems are often remote locations and are difficult to access by emergency vehicles. The City's rural residential neighborhoods could be difficult to evacuate. Any **debris** left over from **flooding**, **winter storms**, or **wind events** create a **wildfire hazards**. When **droughts** or drier conditions occur, the dry vegetation becomes a significant hazard to the City Fire Department.

Provided in **APPENDIX F Lightning Strikes and Wildfires 2011-2017** is a complete listing of **brush fires** and **wildfires** in the City between **January 2011 - March 2017**. During this time, the Concord Fire Department fought a total of **59 wildfires** plus **185 brush fires**, considered a lower scale and more urban than wildfires. The **wildfires** are more prone to occur along the rural roadways and conservation lands such as Long Pond Road, Garvins Falls Road, District Five Road, Sewalls Falls or Concord Heights areas. The **brush fires** occur all over the **64** square mile City, both in the built environment of Concord Heights, Downtown and in the rural areas. Some of those incidents listed do involve Concord's Fire response to surrounding communities.

EXTREME TEMPERATURE (COLD-HOT) HAZARDS

Extreme temperature hazards include diverse hazards such as severe cold and snowstorms, excessive heat, drought, and public health. The snow and ice component often results in communications & power failure for a large segment of the City. This category is meant to encompass all the hazards which can be influenced by the extreme weather temperatures and climate changes that New England, New Hampshire, the Central NH Region, and Concord are experiencing.

There are several types of **Extreme Temperature (cold-hot)** hazards examined in the **Hazard Risk Assessment**:

- Severe Winter Weather, Cold, and Ice Storms**
- Drought**
- Excessive Heat**
- Public Health (Epidemics)**

The National Weather Service (NWS) in Gray, Maine which covers New Hampshire collects and reports climate data in addition to issuing warning and advisories. Winter 2015-2016 was the warmest and one of the least snowy on record in Concord, their most local reporting station. The average temperature this season since 1868 was **30.9** degrees, topping the previous record of **30.4** degrees in the season of 1879-1880. Precipitation was **2.01** inches above normal this winter, totaling **10.53** inches. Total snowfall was **24.7** inches, **20.2** inches below normal. Warmest temperature records were also set during 2015.

Severe Winter Weather, Cold, and Ice Storms

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.

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 one-fourth inch 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.

Numerous severe winter events in recent history have occurred in the State, region, and the local area surrounding Concord that may have also had an impact on the City. Unlike the relatively infrequent hurricane, New Hampshire generally experiences at least one or two Nor'easters each year with varying degrees of severity. 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.

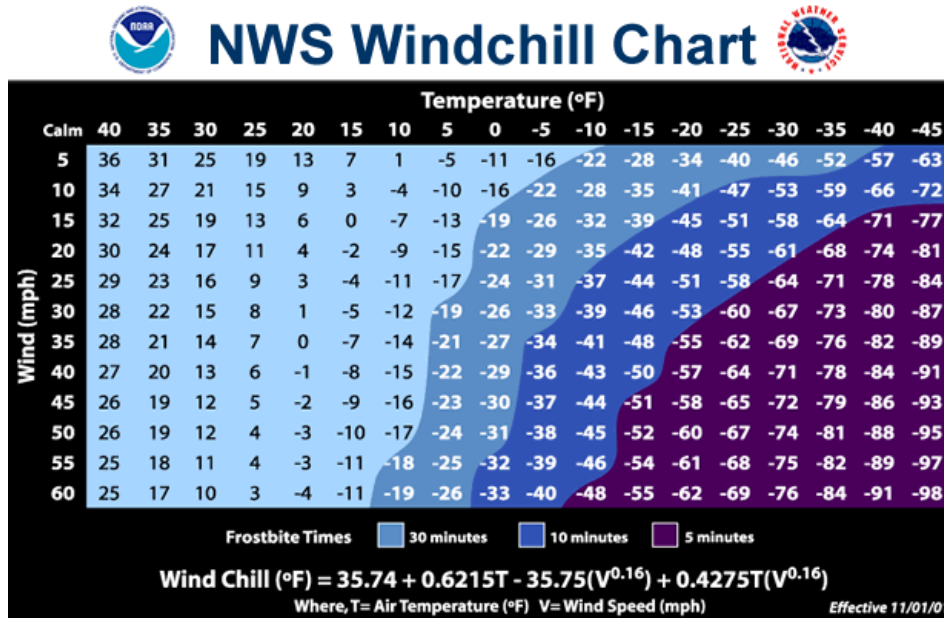
All winter storms make walking and driving extremely dangerous. The elderly and very young are at high risk during winter storms and may be affected by hypothermia and isolation. During winter storms, there is an increased risk of **fire** because people experience **power failure** and use candles,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

Magnitude of Severe Winter Weather

Severe Winter Weather magnitude can be measured for windchill, ice accumulation and snowfall using several different scales and indices including the NWS Windchill Chart, Sperry-Piltz Ice Accumulation Index (SPIA) and NCEP Regional Snowfall Index (RSI) for the Northeast. **Figure 17** displays the [Windchill Temperature Index](#) which measures the wind and temperature leading to how quickly frostbite can occur.

Figure 17

Windchill Temperature Index



Source: National Weather Service

Table 22 displays the [Sperry-Piltz Ice Accumulation Index \(SPIA\)](#) which measure the magnitude of ice damage from severe winter weather. The index is compared to the tornado and hurricane scales note above. Storm total rainfall converted to ice accumulation, wind, and temperatures during the storm period are used to develop SPIA.

Table 22

Sperry-Piltz Ice Accumulation Index (SPIA)

Ice Damage Index	Average NWS Ice Amount in Inches	Wind Speed mph	Ice Damage and Impact Descriptions
0	< 0.25	< 15	Minimal risk of damage to exposed utility systems. No alerts or advisories needed for crews, few outages.
1	0.10 to 0.25	15 to 25	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges might become slick and hazardous.
	0.25 to 0.50	> 15	
2	0.10 to 0.25	25-35	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions might be extremely hazardous due to ice accumulation.
	0.25 to 0.50	15-25	
	0.50 to 0.75	< 15	
3	0.10 to 0.25	> = 35	Numerous utility interruptions with some damage to main feeder lines and equipment
	0.25 to 0.50	25 - 35	

Ice Damage Index	Average NWS Ice Amount in Inches	Wind Speed mph	Ice Damage and Impact Descriptions
	0.50 to 0.75	15 - 25	expected. Tree limb damage is excessive. Outages lasting 1-5 days. Warming sites needed.
	0.75 to 1.00	< 15	
4	0.25 to 0.50	> = 35	Prolonged and widespread utility interruptions with extensive damage to main distribution feeder lines and some high voltage transmission lines/structures. Outages lasting 5-10 days. Shelters or warming sites needed.
	0.50 to 0.75	25 - 35	
	0.75 to 1.00	15 - 25	
	1.00 to 1.50	< 15	
5	0.50 to 0.75	> = 35	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.
	0.75 to 1.00	> = 25	
	1.00 to 1.50	> = 15	
	> 1.50	Any	

Source: www.spia-index.com (adapted by CNHRPC)

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/ (adapted by CNHRPC)

Severe Winter Weather in Concord

Winter weather events are as common in Concord as they are in the other areas of Central New Hampshire. The most recent worst winter storm on record was the **December 2008 Ice Storm** with widespread power outages that lasting for over a week in the remote, forested areas. Concord’s steep slopes

and hills and numerous residential roads, along with its unique water features and main state commuter roadways (I-93, Exits 17 & 18, NH Route 106, NH Route 132, US Route 3) suggest a potential for road icing (**transportation accidents**) when **ice and storm** events hit. **Communications failure, power failure, extreme cold** and local road impassibility (trees and/or power lines down) occur as well. Areas above 800 feet in elevation are particularly vulnerable to the effects of severe winter weather and Concord has several of these locations. Other sites of particular concern include dams, bridges, vulnerable populations, the **5** Elementary Schools, Rundlett Middle School, Concord High School, housing communities, electrical power utilities, communications network, local government operations, and older or historic buildings (roof collapse). See **APPENDIX A. Critical and Community Facilities Vulnerability Assessment** for a complete listing.

Recent examples of **severe winter weather** include freezing rain and heavy snow on trees from the January 2015 blizzard which was not a declared disaster in Merrimack County. The Thanksgiving Day **snowstorm** in November 2014 stranded residents in their homes for days, with widespread power outages and limited holiday celebration options. This event was also not a declared disaster in Merrimack County. The Fire Department can open regional shelters during emergency events.

Drought

A drought is defined as a long period of abnormally low precipitation, especially one that adversely affects growing or living conditions. Droughts are rare in New Hampshire. They generally are not as damaging and disruptive as 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 of these 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 City water supplies would be threatened. Most homes in City rely on well water which is not easily replenished during periods of drought. All farms and orchards in City, including the tree farms, would be affected by drought. Additionally, wildfires would have the potential of being more severe and commonplace during periods of drought.

Magnitude of Drought

Table 24 displays overall drought magnitude, measured by the [Palmer Hydrological Drought Index \(PHDI\)](#) the extent of hydrological drought in the form of long-term, cumulative monthly moisture conditions. The indices are developed by algorithms taking into consideration precipitation, temperature data, and the local Available Water Content (AWC) of the soil.

Table 24
Palmer Drought Conditions

Hydrological Drought Classification	
Extremely Moist	+4 and above
Very Moist	+3 to +3.99
Moderately Moist	+2 to +2.99
Mid-Range	-1.99 to +1.99
Moderate Drought	-2 to -2.99
Severe Drought	-3 to -3.99
Extreme Drought	-4 and below

Source: www.ncdc.noaa.gov/sotc/drought (as compiled by CNHRPC)

Drought in Concord

Periods of **drought** in Concord would occur City-wide and could cause property damage and economic losses. The lack of water would become a community problem to keep people hydrated and the failure of agricultural crops, products and farm animals can occur. Failure of tree farms to thrive can result in economic losses. Increased likelihood of wide-spread **brush fire** and **wildfire** will occur with drier vegetation. **Lightning** strikes could contribute to wildfire risk during droughts. Dug wells can dry up during droughts and interrupt personal water supplies. Property damage and personal injuries or death could occur from drought-related fires or dry wells. The community water suppliers could enact water saving measures to assist with keeping the groundwater table higher. Residents should be encouraged to voluntarily undertake water conservation.

Excessive Heat

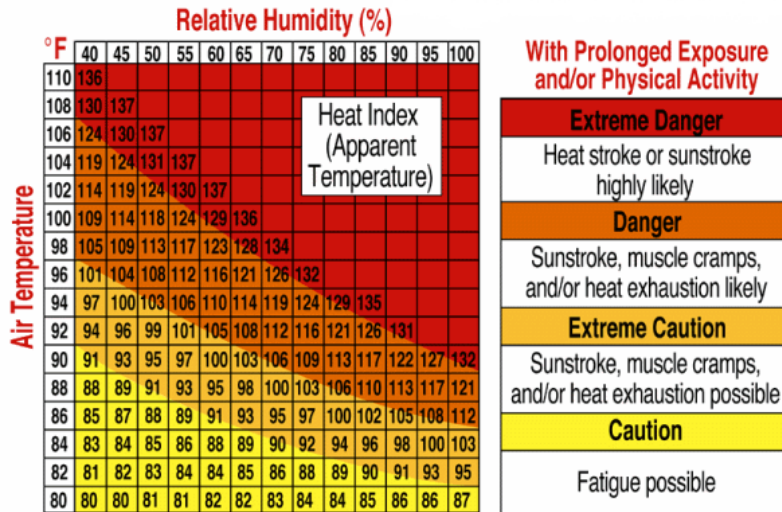
A heat wave is a period of abnormally and uncomfortably hot and unusually humid weather that typically lasts two or more days. The National Weather Services’ Heat Index is used to measure humidity against temperature to develop a “real feel” temperature. Heat disorders on the body are quick and can be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

Magnitude of Excessive Heat

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 18**.

Figure 18

Heat Index (Temperature and Humidity)



Source: weather.gov

Excessive Heat in Concord

Concord has experienced **heat waves** where temperatures exceeded 90 degrees for several days. During these times, many specific population sites in City particularly susceptible to excessive heat, including the assisted living facilities, daycares, Concord Elementary School, and the over 55+ housing community, should have access to either air conditioning or cooling facilities. **Excessive heat** can cause dehydration, heat exhaustion and more serious illnesses. Other vulnerable facilities are indicated in **APPENDIX A Critical and Community Facilities Vulnerability Assessment**.

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 as a result 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 Hazard Mitigation Plan 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 **Hazard Mitigation Plan** because of the lack of state monitoring and available action.

There are two types of **Earth** hazards examined in the **Hazard Risk Assessment**:

- Earthquake
- Landslide

Earthquake

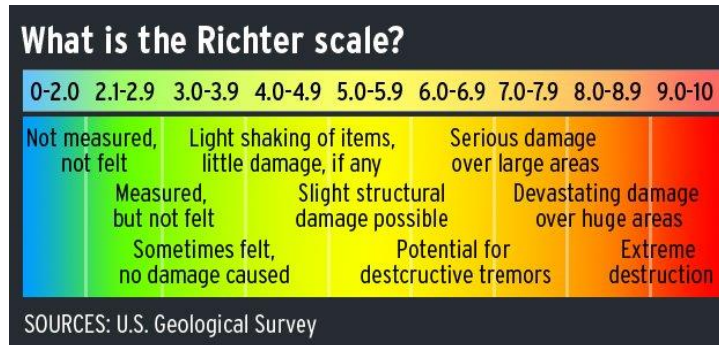
An earthquake is a rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. **Earthquakes** can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and often cause **landslides, flash floods, fires**, and avalanches. Larger earthquakes 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 the use of 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.

Magnitude of Earthquake Hazards

Earthquake hazard magnitude can be measured by the Richter Scale as shown in **Figure 19**. To better place the Richter Scale magnitude in perspective, the Mercalli Scale describes the *intensity* felt at different magnitudes in **Figure 20**.

Figure 19

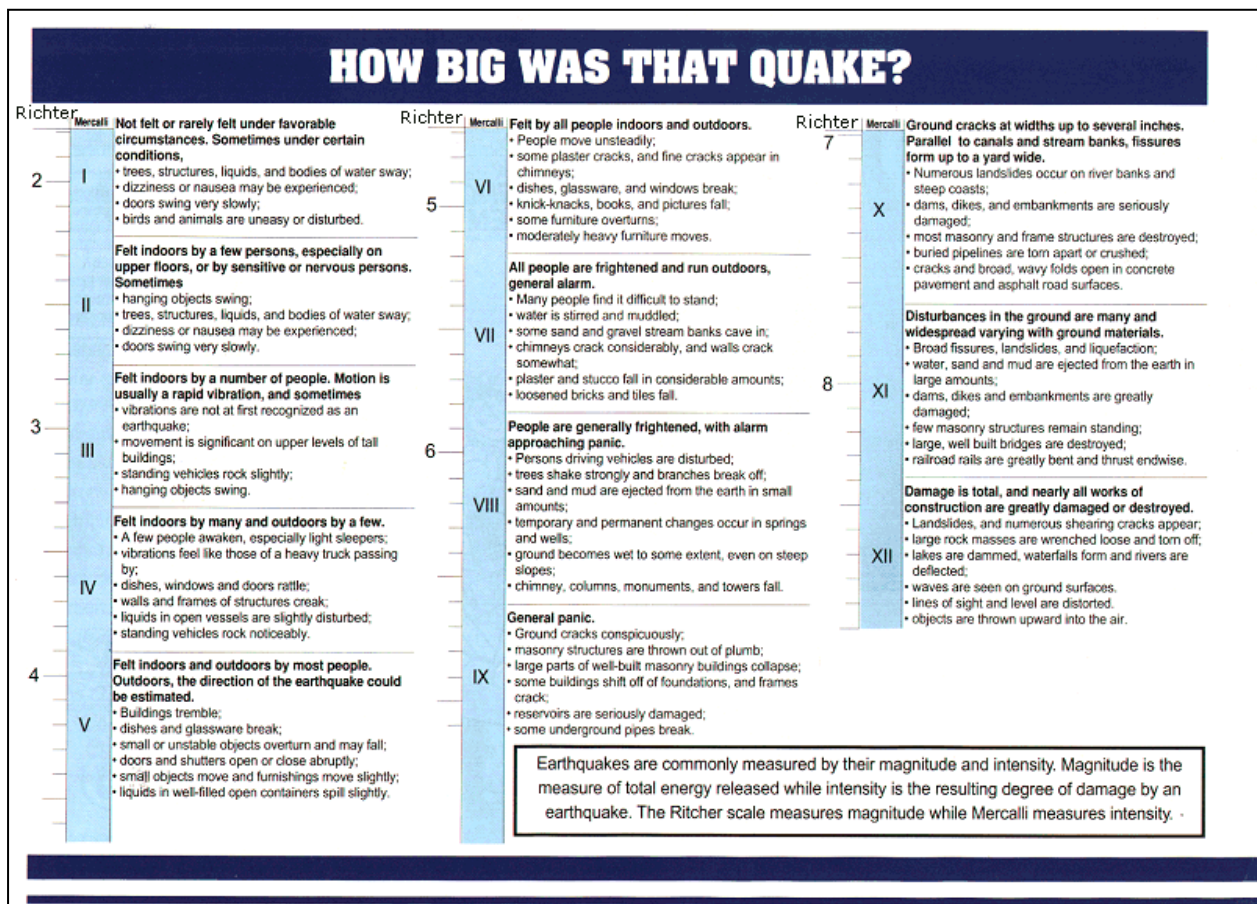
Descriptive Richter Scale



Source: US Geological Survey (USGS)

Figure 20

Earthquake Impacts on the Richter and Modified Mercalli Scales



Source: National Oceanic and Atmospheric Administration (NOAA)

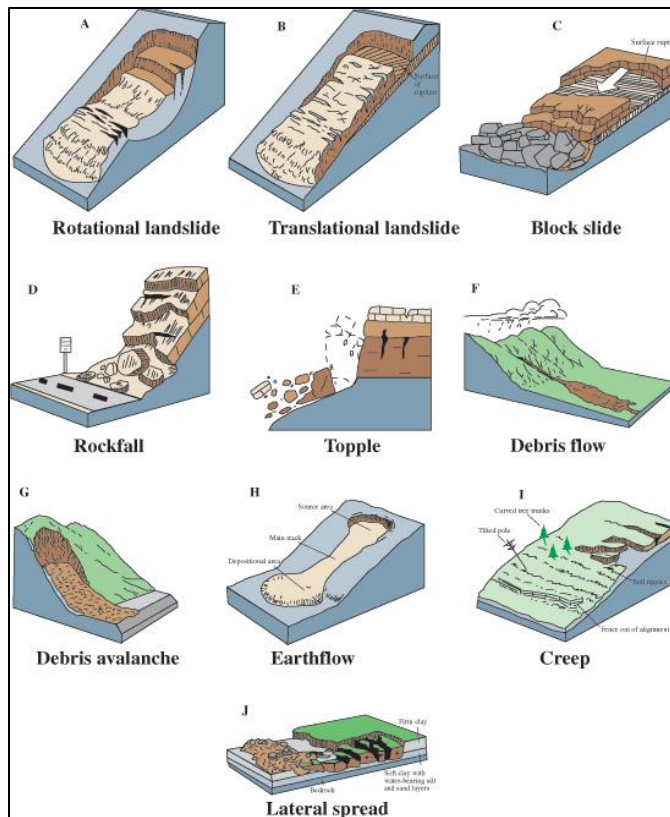
Earthquakes in Concord

Multiple small scale **earthquakes**, about **1** quake every **1-2** years, have been felt by Concord residents, with their epicenters occurring within the Hopkinton (Contoocook)/Hillsborough/Warner area or otherwise within **15** miles of Concord since 2002 to present day. The Central NH Region is an active seismic area with mild quakes in bedrock. No damages or injuries have been reported from these events. It is likely Concord residents will continue to feel earthquakes in the future; close earthquakes with a magnitude greater than 2.5 would be concerning to the City. Older buildings in the Village Center or historic buildings could be particularly susceptible to earthquake damage. Underground water and/or electric utilities, stone walls, bridges and historic resources could be susceptible.

Landslide

A landslide is the downward or outward movement of slope-forming materials reacting under the force of gravity including: mudflows, mudslides, debris flows, rockslides, debris avalanches, debris slides, and earth flows. Landslides have damaged or destroyed roads, railroads, pipelines, electrical and telephone lines, mines, buildings, canals, sewers, bridges, dams, airports, forests, parks, and farms. A display of different types of landslides is shown in **Figure 21**.

Figure 21
Basic Types of Landslides



Source: US Geological Survey (USGS)

Magnitude of Landslide Hazards

There is no known standardized measurement of landslide magnitude available.

Landslides in Concord

Landslide is a possibility in limited areas of Concord where certain topological conditions are met. Development in proximity to areas of steep slopes (greater than 15% or 25%) could present a risk to residents. Most potential landslides will be in conjunction with another hazard event, such as flooding, a severe rain event, earthquake, or from the construction of buildings or infrastructure in a topologically vulnerable area. Most roads are gravel roads which already experience **washout** during **heavy rain events**, **flooding**, or **rapid snow pack melt**. Some of the steeper roads could experience landslide erosion during heavy rain events. Although a large-scale road landslide would damage few structures, road (infrastructure) closures are costly and can last for months.

Sections of the Merrimack River, Contoocook River and Soucook River banks are **eroding** into the rivers; this could also be considered a type of landslide. Topologically, Concord Heights rests on a large bluff above the sandy Merrimack River. There are several other hills and valleys in Concord. State Offices and a highway were built high on this Merrimack River bluff. A large **earthquake** could trigger a **landslide** in the future which could impact these buildings and infrastructure.

TECHNOLOGICAL HAZARD EVENTS

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**.

There are several types of **Technological** hazards examined in the **Hazard Risk Assessment**:

- **Dam Failure**
- **Power/Utility Failure**
- **Communications Systems Failure**
- **Debris Impacted Infrastructure**
- **Transportation Accidents**
- **Fire (Vehicle, Structure, Arson)**
- **Hazardous Materials Spills**

Magnitude of Technological Events

Magnitude of most technological hazards are not addressed in this Plan. The only exception is **Dam Failure** because of its close relationship with flooding using the NH DES Dam Hazard Classifications.

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.

Magnitude of Dam Failures

Although dam failure is considered a **Technological Hazard**, it is often a secondary hazard caused by flooding conditions. Classifications of dams and their magnitude of failure can be measured by the [NH DES Dam Hazard Classifications](#) shown in **Table 25**.

Table 25
New Hampshire Dam Hazard Classifications

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

Source: NH Department of Environmental Services (NHDES) Dams Bureau, 2012

Dam Failures in Concord

Dam failures, or breaches, are a potential danger to people and property within the dam failure inundation area(s). There are **31** active dams in Concord, all listed in **APPENDIX A**.

Two (**2**) dams are of a High Hazard classification: **Penacook Lake Dam** (Rattlesnake Brook) and **Turkey Pond Dam** (Turkey River). Two (**2**) dams are of a Significant Hazard dam classification: **York Dam** (Contoocook River) and **Penacook Upper Falls Dam** (Contoocook River). Six (**6**) dams are of a Low Hazard dam classification: **Lower St. Paul’s School Pond Dam** (Turkey River), **Turtle Pond Dam** (Tributary of Mill Brook), **Hoit Road Marsh Dam** (Tributary of Hackett Brook), **Rolfe Canal Gate** (Rolfe Canal), **Rolfe Canal Penstock Intake Dam** (Rolfe Canal) and **Sheep Davis Road Dam** (runoff). The failure or breach of any of these dams could cause tremendous property damage and/or loss of live. The remaining **21** dams are classified as Non-Menace (**NM**) dams.

The **2** High Hazard dams, **2** Significant Hazard dams and **6** Low Hazard dams in Concord are displayed in **Table 26** below.

Table 26
Dams with Risk

Dam	Owner	Impoundment Acres	Risk Level	Water Body	Map	Map Index
051.13 Penacook Lake	City	360	H	Rattlesnake Brook	3B & 4B	D1
051.25 Turkey Pond	St. Paul’s School	360	H	Turkey River	3B & 4B	D4
051.02 York	NHDES	250	S	Contoocook River	3B & 4B	D2
051.06 Penacook Upper Falls	Briar Hydro Assn	11	S	Contoocook River	3B & 4B	D3
051.12 Lower St. Paul’s School Pond	St. Paul’s School	46	L	Turkey River	3B & 4B	D5
051.21 Turtle Pond	City	159	L	Mill Brook Trib	3B & 4B	D6
051.28 Hoit Road Marsh	NHF&G	71	L	Hackett Brook Trib	3B & 4B	D7
051.43 Rolfe Canal Gate	NHDES	250	L	Rolfe Canal	3B & 4B	D8
051.46 Rolfe Canal Penstock Intake	Briar Hydro Assn	4	L	Rolfe Canal	3B & 4B	D9
051.62 Sheep Davis Rd	City	12	L	NA	3B & 4B	D10

No longer listed with the active dams, the Penacook Upper Falls Dam (formerly known as the Riverside Millwork Company Dam) on the Contoocook River, the Sewalls Falls Dam on the Merrimack River, and the Smith Farm Pond Dam on Rattlesnake Brook have all been breached and many more Concord dams lie in ruins. The amount of flooding that each of these breaches caused is unknown. The 1999 FEMA Flood Study was performed taking the breach of the Sewalls Falls Dam, and likely any other dams breached prior to 1997, into consideration.

Power/Utility Failure

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.

New Hampshire contains nuclear, coal and natural gas power plants. There is only one (1) coal power plant in New Hampshire, the Eversource Merrimack Station in Bow. The Merrimack Station is the largest coal-fired electrical generating station owned by Eversource (formerly PSNH) and supplies power to 190,000 households.

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 snow storm, ice storm, or other severe weather event, someone, somewhere, loses power and/or other utilities.

Power Failure in Concord

For most storm events, some residents and businesses have experienced **power failure**. Concord receives electricity from Eversource and Unitil. Basic critical facilities that serve residents could be damaged by power failure. There is no official sheltering space available to Concord residents. Although options are being looked at, residents should be able to shelter in place, gathering needed supplies and water ahead of time, for up to three days.

Power failure can cause inconvenience, loss of economy, extra City expenditures, restrict emergency and response because the typical power failure is a secondary hazard caused by a severe wind or severe winter weather event. This problem is applicable to the **Hurricanes and Tropical Storms, Downbursts, Tornadoes, and Severe Winter Weather, Cold, and Ice Storms** hazard events described earlier as well as **Debris Impacted Infrastructure** and **Transportation Accident** hazard events in the following sections.

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, City, 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.

Communications Systems Failure in Concord

Any **communications failure** can mean lack of emergency services or delayed emergency services. Police/Fire use digital service and are members of the effective Capital Area Fire Compact Mutual Aid (CAFCMA) Dispatch service. However, for residents, services can be disrupted easily. Those at greatest risk are the same as those for **power/utility failure**. There has been a steady migration to cell phone use only with people dropping their landline telephones. A few individuals in City require oxygen and power failure and the likely accompanying communications systems failure would comprise the most vulnerable populations.

Debris Impacted Infrastructure

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.

Debris Impacted Infrastructure in Concord

Concord's watercourses, including the Merrimack River, Shaker Brook, drainage swales, ditches and detention ponds have a tendency to **flood** their banks, **overflow culverts**, or **washout roads** during certain conditions. Trees and limbs falling on roads and power lines cause **power failure** or **road blockage**. Infrastructure in Concord can refer to roadways, powerlines, utility lines, culverts, water towers, bridges or dams. 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 Merrimack River embankments causes debris flow downstream and destruction of the NH Fish and Game access road.

Transportation Accidents

Automobile accidents 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 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 Route 103, NH Route 106, NH Route 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.

In addition, the railroad lines along the Merrimack River creates 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 accidents or sabotage.

Transportation Accidents in Concord

Vehicle traffic accidents may be the most likely future transportation hazard in Concord at the major traffic highways of I-93, I-89, I-393; US Routes 3, 4, and 202; and NH Routes 106, 9, 132. Local roads and traffic congestion, difficult intersections, hills, curves or straightaways also have potential for deadly accidents. Local police are expected to respond to highway accidents before the State Police arrive. A State Police barracks is stationed in Concord. As vehicular traffic increases or as the weather turns bad, there is the greater likelihood that **transportation accidents** will occur in these and other areas.

The City of Concord owns the Concord Municipal Airport which generates a fair amount of air traffic. The local National Guard also uses small planes and helicopters. Both are in close proximity to the Manchester airport. The New Hampshire International Speedway and events at St. Paul's regularly generate a fair amount of local air traffic at certain times of the year.

Holiday traffic causes numerous small traffic accidents. The NHMS Race days do not add significant accident numbers. Numerous tractor trailer accidents block the interstates, which can cause chain accidents and cause significant delays. In August 2015, in the I-93 north travel lane developed a sudden "sinkhole" exposing underground pipes between Exits 13 & 14. No injuries were reported but the repairs took a day or so.

The railroad line has experienced car derailment next to the Merrimack River near Constitution Avenue. Events such as these could harm people or release hazardous materials being transported in the railcars.

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 described in this section for convenience. No magnitude scales were defined for these types of non-natural fires.

Fire in Concord

The Fire Department annually reports all fires to the NH Fire Marshal's office. Over the four-year period of **2010-2013**, a total of **494** fires were reported in Concord, although the **2011** figures seemed incomplete. In **2010**, **163** fires were reported: 63 structure fires, 13 vehicle fires, 62 brush fires, 21 rubbish fires and 4 special outside fires. In **2011**, **11** fires were reported: 10 structure fires, 1 special outside fire. In **2012**, **161** fires were reported: 79 structure fires, 15 vehicle fires, 46 brush fires, 20 rubbish fires, 1 special outside fire. In **2013**, **159** fires were reported: 74 structure fires, 26 vehicle fires, 36 brush fires, 24 outside rubbish

fires, 1 special outside fire. Now that the reporting systems have changed, this composite data is not readily available in the same format.

The majority of fires experienced were **structure fires** and outdoor fires (**wildfire** and **brush fire**). A list of **hazardous materials** facilities which could cause fire or explosions in City is available in **APPENDIX A Critical and Community Facility Vulnerability Assessment**. Also available from these **APPENDIX A** tables are a listing of vulnerable populations that are living in close quarters.

Hazardous Materials Spills

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.

Hazardous Materials Spills in Concord

Transportation of hazardous materials on the Interstates and major Routes is likely an everyday occurrence. These trucks could rollover and spill their contents onto these significant roadways. The *New Hampshire Hazardous Material Commodity Flow Study 2016* and its accompanying maps may provide some enlightening data the City can use to help protect the community from spills. The City is the organizer of the Central NH Emergency Planning Committee which develops plans and procedures for the Capital Area Fire Compact Mutual Aid communities.

There are several health care, school, manufacturing and occupational facilities in City that handle, store, or use hazardous materials. Any of these facilities could have a spill or an incident at their location. A listing of known facilities which store or could use hazardous materials has been inventoried in **APPENDIX A Critical and Community Vulnerability Assessment**.

Concord is not in either the evacuation area or the plume area of the Seabrook and Vermont Yankee facilities. Major transportation routes convey trucking carrying radioactive materials through the City. No

accidents to date are known. Construction waste and medical community (low) waste are considered low risk. The Wheelabrator MSW Incinerator likely scans materials incoming, as does Advanced Recycling and other metal recycling facilities.

As the City has concentrated populations, infrastructure, and businesses, it is likely that traffic accidents will continue in addition to the possibility of other more common hazards such as power/utility failure and a hazardous material release. Particular areas of concern are the Eversource power generation plant (in Bow) use of anhydrous ammonia on the rail lines.

HUMAN HAZARD EVENTS

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.

There are several types of **Human** hazards examined in the **Hazard Risk Assessment**:

- Public Health Epidemics**
- Terrorism**
- Sabotage/Vandalism**
- Hostage Situation**
- Civil Disturbance/Public Unrest**

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

Public Health Epidemics

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**, rotovirus, Lyme disease, EEE, West Nile, and any could occur in Concord. The City has swampy areas around its wetlands and brooks which are prime breeding ground for **mosquitoes**. Large deer herds that roam can carry **deer ticks** in the City’s heavily forested sections and into State Forests. Water quality degradation (failing septic systems, flooding, pipes breaking) could sicken residents using the public water supplies (those serving over 25 people), dug wells or bedrock wells or cause aquatic and wildlife deaths.

Public Health Epidemics in Concord

Reported widespread **public health** issues have occurred recently in Concord and were resolved. The highest risk pick-up or transfer facilities in City are the Concord Elementary School, daycare facilities, the 55+ living facilities and senior programs, recreational facilities and gathering places (see **APPENDIX A**). The same populations identified as particularly susceptible to **Excessive Heat** would be most vulnerable to public health issues and epidemics.

To help combat local and area public health issues, Concord is nearby a regional Point of Dispensing (POD) site at the NH Technical Institute (NHTI) in Concord, a location where vaccines or other medicines are disseminated to people during an emergency.

Students are quite vulnerable to health outbreaks as they tend to congregate in large numbers and in shared environments where physical contact is common. If Avian Influenza was present in New Hampshire, people coming in contact with infected birds would be at greatest risk of contracting the virus. It is otherwise difficult to predict where a biological hazard would be potentially dangerous because of human and wildlife mobility.

The City's conservation land and recreation land holdings are growing and could lead to the public being more exposed to more EEE and West Nile. The most vulnerable populations include residents of retirement communities and school populations.

The City is an active member of the Capital Area Public Health Network and is prepared to enact pandemic flu and H1n1 protocols.

Terrorism

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.

Terrorism in Concord

It is unlikely that the City would be the target of any act of international terrorism. Domestic terrorism has occurred within the last 15 years in Concord and regionally, including pipe bombs at the City Library. Possible targets could be the City Hall, the Concord Schools, Post Office, all City governmental facilities, numerous State buildings, the Federal Building or churches.

First Night activities have been cancelled as a result of terrorism following an event, such as the 1998 bombs. Chemical, biological, explosive, radiological events are possible terrorist tactics. Bomb threats are received at the High School regularly, but these are not publicized. Concord Hospital receives bomb threats regularly as well, but they have internal procedures in place to handle the situation and do not contact the Police Department every time.

The State House, NH Office Park South, the NH Supreme Court, Federal District Court, Merrimack County Superior Court, Concord District Court, and potentially City Hall would be a potential risk for terrorism or bomb threats, as would be the State Office Complex on Hazen Drive and the Concord Feminist Health Care Center.

Sabotage/Vandalism

Sabotage is a deliberate action aimed at someone or some institution in order 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.

Sabotage /Vandalism in Concord

Any incident of **sabotage** in Concord could come from within Concord or any nearby City, or outside of the State or country, but some sabotage efforts would require perpetrators to be on site. Technological systems such as computer systems at the 5 Elementary Schools, Rudlett Middle High School, Concord High School, City Hall, Post Office, all City governmental facilities, State offices, churches, utilities, telecommunications towers or the community water systems could be vulnerable. Many other significant facilities in Concord could be subject to sabotage including the powerlines, transmission lines, railroad, transformers and utility substations.

Vandalism can also be present at cemeteries, vacant buildings and under bridges. While a nuisance, vandalism has a lower potential to harm than sabotage.

Hostage Situation

A hostage situation is an incident where an innocent civilian is held by someone or some group of persons demanding something from another person or group of persons not related to the person or persons being held hostage. The person or persons held are done so pending the fulfillment of certain terms.

Hostage Situations in Concord

Hostage situations can occur anywhere, are isolated events and are nearly impossible to predict; none have been reported for this Plan. The Concord sites where this potential mainly exists are the City Office, the Elementary School, and everyday domestic situations.

Hostage situations are isolated events and are therefore nearly impossible to predict. The NH State Correctional Facility on Route 3 (North State Street) and the Merrimack County Jail in Boscawen on Route 3 could be likely targets. The City Hall, Courtrooms, and the Federal Building could be likely targets. The Elementary Schools, Middle School, or High School could be host to hostage situations. These events could occur on private property or in homes, and the Police Department would have to adapt to each unique situation.

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 the Central New Hampshire region are at the State House in Concord and the NH Technical Institute (NHTI). Statewide, disturbances have also occurred at political locations such as feminist health centers or political party headquarters.

Civil Disturbance/Public Unrest in Concord

None have been reported and large scale incidents of civil disturbance and public unrest are unlikely in Concord. Locally, the highest potential for **public unrest** could take place during City Meetings and School Meetings, on voting day or during visits from political candidates, or at large events such as Main Street Events, Parades or School events. Locations where civil unrest could occur include the 5 Elementary Schools, Rudlett Middle High School, Concord High School, City Hall, Downtown, Main Street, Capital Center for the Arts, Federal Building or at restaurants and establishments serving alcohol, recreational facilities, apartment complexes and high density population areas.

Quiet, nonviolent protests and picketing which do not cause alarm or disruption regularly occur in Concord. As the seat of State, county and some federal government offices, there is a potential for civil unrest scenarios to occur. Demonstrations in front of the State House regularly occur, although to date they have been peaceful. The Legislative Office Building and State Library are located Downtown near City Hall and the City Library.

Existing and Potential Future Hazards

After the inventory of hazards types and past hazards in City, hazards that currently exist or that need to be monitored in Concord has been completed along with potential future hazards that could occur in other areas. This unique listing of **Existing and Potential Future Hazards** was compiled so the City 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 Risk Assessment**. 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 City.

Included in **Table 27** is the **Overall Risk** score between **1-16** from the **Hazard Risk Assessment** for **16** natural hazards. The name of the magnitude or extent scale of the natural hazard is represented for ease of reference. Technological and human hazards were not rated for their **Overall Risk** to retain the importance of maintaining a natural hazard perspective for the **Hazard Mitigation Plan 2017**.

Table 27
Existing and Potential Future Hazards

Hazard Risk Assessment Hazards	Overall Risk	Hazard Locations in the City – Existing (Susceptible) From Hazard Risk Assessment	Potential Future Hazards	Magnitude/ Extent Measurement Scale
Flooding Floods and Flash Floods	6.7	Floodplains of Turkey River, Soucook River, Merrimack River and the Contoocook River and Rattlesnake Brook. These watercourses result in expanded flooding. The City is susceptible to flooding because of the close proximity of these rivers. Homes near the Merrimack and Contoocook Rivers, especially in low-lying areas, are at risk. Other water systems, such as the Turkey River, Turkey Pond, Little Turkey Pond, Burnham Brook, Hayward Brook, Woods Brook, Snow’s Brook, Hackett Brook, Hoyt Road Marsh, Mill Brook, Bela Brook, Turree Brook, Bow Brook (May 2006), Millstream Brook (May 2006), and Rattlesnake Brook (May 2006) are also prone to flooding. Areas which are susceptible to regular flooding include the Merrimack River’s edge at the former Christian Mutual Building, along Shaw’s Fort Eddy Road, the NH Technical College fields, at Hall Street in the Amoskeag Beverages area, and Long Meadow Drive manufactured housing park. Runoff from roadways or heavy rain can cause floods over the Entire City. Lincoln Street, low catchment	Lincoln Street, low catchment area catch basin & hydraulic capacity of area is deficient, floods during flash storm. Kimball Jenkins Estate - water from I 393 and Main Street cascades down over retaining wall (waterfall). Velocity eroded the north side of the pavement and washes out the area. Driveway and foundation near building keep eroding. Currently (Oct 2016) the City is working on a solution for placement of new pipe system into Horseshoe Pond to divert water. The existing hazard locations are still potentially hazardous in the future. A lot of 1800s vintage brick pipe and clay pipe stormwater infrastructure, susceptible to high velocity and heavy scour flooding, supporting the most unpredictable.	Special Flood Hazard Areas (SFHAs) on 2009 Digital Flood Rate Insurance Maps (Zones A, AE, X)

Hazard Risk Assessment Hazards		Overall Risk	Hazard Locations in the City – Existing (Susceptible) From Hazard Risk Assessment	Potential Future Hazards	Magnitude/ Extent Measurement Scale
			area catch basin & hydraulic capacity of area is deficient, floods during flash storm. Kimball Jenkins Estate - water from I-393 and Main Street cascades down over retaining wall (waterfall). Velocity eroded the north side of the pavement and washes out the area. Driveway and foundation near building keep eroding. A lot of 1800s vintage brick pipe and clay pipe, susceptible to high velocity and heavy scour flooding, supporting the most unpredictable. South end trunkline stormwater system under existing homes, not an ideal situation when waterline is at the basin height.		
Flooding	Rapid Snow Pack Melt	1.0	Entire City. Melt runoff from impervious surfaces and roadways or from tree cover and fields can cause floods over the entire City. Most of the melt water flooding is away from residential areas except for Fort Eddy Road and any facilities along the bank of the Merrimack River. The Soucook River on North Pembroke Road may be susceptible to rapid snow pack flooding on the west side of the river.	The other the regular flooding locations in the City, including storm drainage systems, could also be subject to rapid snow pack melt flooding.	None specific known but can use SFHAs
	River Ice Jams	3.0	Turkey River, Soucook River, Merrimack River and the Contoocook River and Rattlesnake Brook would be at greatest risk for flooding due to ice jams. The Soucook River has had ice jams in the past and could endanger the North Pembroke Road bridge. River ice jams cause debris impacted infrastructure - sites susceptible to ice jam debris impacted infrastructure (bridges and dams) include St. Paul's, which could sustain significant building damage from the Turkey River because of the dam's open spillway.	A major hydropower dam is above Island Shores in Penacook at the Contoocook River and any ice jam would prove problematic. St. Paul's School could have significant building damage from the Turkey River because of the dam's open spillway.	No known widely-used scale measuring the magnitude of river ice jams
Flooding	Riverine (Merrimack, Contoocook, Soucook, Turkey) Scouring, Erosion, Channel Movement	5.3	Floodplains of Turkey River, Soucook River, Merrimack River and the Contoocook River and Rattlesnake Brook. These are the largest watercourses in the City and run through urban and rural locations alike. Bank erosion and scouring is most prevalent on the banks of the four Rivers. Soucook River off of Route 106 (near the mall), large slope slip at one of the s-curves owned by the City. Nearby house owned by on a bluff behind the mall, nearby paving blasting is also felt there. Sinkholes around the property occurring.	There is a potential for scouring on the Merrimack behind the NH DOT and Shaws on Fort Eddy Road. More trees have fallen into the River at the Shaws. Erosion from the Contoocook River occurs on Broad Cove Road area, some of which has been riprapped. Soucook River off of Route 106 (near the mall), large slope erosion at one of the meanders. House owned by City of Concord sits on a bluff behind the mall, and nearby blasting by Continental Paving is felt there. Sinkholes around the property.	EPA Bank Erosion Risk Index

Hazard Risk Assessment Hazards		Overall Risk	Hazard Locations in the City – Existing (Susceptible) From Hazard Risk Assessment	Potential Future Hazards	Magnitude/ Extent Measurement Scale
Wind	Tornadoes	4.0	Entire City. Areas of particular concern include dams, bridges, vulnerable populations, Schools, manufactured housing parks as listed in Appendix C. Roadways (fallen trees), electrical power utilities, communications network, local government operations are susceptible to damage from trees and power lines down because of tornadoes. Rollins Park contains legacy pine trees. Rural roads - Shaker Road, Snow Pond Road, Oak Hill Road, Dunbarton Road (private St. Paul's), Fisk Road, Carter Hill Road, West Parish Road, Broad Cove Road, River Road, Bog Road, Elm Street, Horsehill Road, Iron Works Road, Currier Road, Silk Farm Road, Long Pond Road, Hoit Road, Mountain Road (Route 132), Graham Road, District Five Road, Runnells Road, Weir Road, Blackwater Road, Warner Road, Garvins Falls Road, Portsmouth Street.	Areas of high density including Downtown, Concord Heights, and Penacook would be the most vulnerable in Concord, in addition to senior housing, schools, and apartments. These types of facilities are scattered throughout the City. Disturbance of communications towers would cause the most difficulty in the City.	Enhanced Fujita (EF) Tornado Scale
	Downbursts	8.0	Entire City. The rural road areas, Schools and populated areas with trees would be most vulnerable to downburst. Vulnerable populations include manufactured housing parks from Appendix C. Wooded and forested sections of City: Rollins Park contains legacy pine trees; rural roads - Shaker Road, Snow Pond Road, Oak Hill Road, Dunbarton Road (private St. Paul's), Fisk Road, Carter Hill Road, West Parish Road, Broad Cove Road, River Road, Bog Road, Elm Street, Horsehill Road, Iron Works Road, Currier Road, Silk Farm Road, Long Pond Road, Hoit Road, Mountain Road (Route 132), Graham Road, District Five Road, Runnells Road, Weir Road, Blackwater Road, Warner Road, Garvins Falls Road, Portsmouth Street. would be most subject to tree and home damage from downbursts. Taller buildings, telecommunications towers, and aboveground utilities are particularly vulnerable (see Appendix C).	Areas of high density including Downtown, Concord Heights, and Penacook would be the most vulnerable in Concord, in addition to senior housing, schools, and apartments. These types of facilities are scattered throughout the City. Disturbance of communications towers would cause the most difficulty in the City.	Enhanced Fujita (EF) Tornado Scale
	Hurricanes and Tropical Storms	5.0	Entire City. Areas of particular concern include dams, bridges, vulnerable populations, schools, manufactured housing parks, hotels. Roadways (fallen trees), electrical power utilities, communications network, local government operations are susceptible to damage to trees and power lines down because of hurricanes. Rollins Park contains legacy pine trees. Rural roads - Shaker Road, Snow Pond Road, Oak Hill Road, Dunbarton Road (private St. Paul's), Fisk Road, Carter Hill Road, West Parish Road, Broad Cove Road, River Road, Bog Road, Elm Street, Horsehill	All critical facilities would be vulnerable to hurricanes, including water treatment, sewer treatment, and pumping stations. All of the country roads (see existing hazard location list). Rollins Park (legacy pine trees).	Saffir-Simpson Hurricane Wind Scale

Hazard Risk Assessment Hazards		Overall Risk	Hazard Locations in the City – Existing (Susceptible) From Hazard Risk Assessment	Potential Future Hazards	Magnitude/ Extent Measurement Scale
			Road, Iron Works Road, Currier Road, Silk Farm Road, Long Pond Road, Hoit Road, Mountain Road (Route 132), Graham Road, District Five Road, Runnells Road, Weir Road, Blackwater Road, Warner Road, Garvins Falls Road, Portsmouth Street.		
Wind	Severe Winds, Rainstorms and Thunder Storms	5.3	Entire City. Areas of particular concern include dams, bridges, vulnerable populations, schools, manufactured housing parks. The rural roadways (fallen trees), electrical power utilities, communications network, local government operations are susceptible to damage from debris impacted infrastructure. The close proximity to the Merrimack River, Contoocook River, and Soucook River and Turkey River makes areas of the City susceptible to flooding during heavy rain storms. The storm drain system is the oldest infrastructure in the City.	With the large square mile area of the City and high density of buildings in areas with higher elevation (such as Concord Heights, Penacook Street, West Parish Road, Carter Hill), the likelihood of damage from severe thunderstorms is High. Wind can cause Downtown power loss which would be economically disastrous, traffic light outage can cause accidents. Barricades are set out to help with traffic control. Access to Concord Hospital and emergency care could be restricted or difficult if the roads were blocked by flooding, trees or wires down, etc.	Accuweather Thunderstorm Criteria Scale, Hail Size Scale
Fire	Lightning	5.3	Entire City. Areas most susceptible to lightning include areas with higher elevation (such as Concord Heights, Penacook Street, West Parish Road, Carter Hill), forested and conservation areas, open recreation fields, locations difficult to access by vehicle. Susceptible structures to lightning include aboveground utilities, transformers, telecommunications towers, churches and tall buildings.	Concord Hospital because of its elevation is particularly vulnerable. Church steeples, communications towers, water and wastewater facilities and pumping stations could be susceptible to lightning strikes. Loudon Road/Concord Heights area is particularly susceptible because it is flat. The Wheelabrator smoke stack may be vulnerable.	Lightning Activity Level (LAL)
Fire	Wildfire	5.3	Rural Areas. Areas most susceptible include areas with higher elevation (such as Concord Heights, Penacook Street, West Parish Road, Carter Hill), forested and conservation areas, open recreation fields, and remote locations: Garvins Falls Road, Shaker Road, Hoit Road, District 5 Road, Lakeview Road, Little Pond Road, Carter Hill Road, Fiske Road, Whitney Road, Curtisville Road, Elm Street in Penacook, and many others are rural roads with many homes set in the trees and have greater susceptibility to wildfire. Susceptible structures to fire include aboveground utilities, transformers, telecommunications towers, churches and tall buildings.	New housing developments in rural areas would be particularly vulnerable. Also, rural roads - Garvins Falls Road, Shaker Road, Hoit Road, District 5 Road, Lakeview Road, Little Pond Road, Carter Hill Road, Fiske Road, Whitney Road, Curtisville Road, Elm Street in Penacook, and many others are rural roads with many homes set in the trees and have susceptibility to fire.	NWCG Wildfire Classification
Extreme	Severe Winter Weather, Cold and Ice Storms	6.7	Entire City. Areas of particular concern include the dams, bridges, vulnerable populations, schools, manufactured housing parks listed in Appendix C. Roadways (fallen trees), electrical power utilities, communications network, local government operations are susceptible to damage. Particular roof collapse concerns	Building risk is considered due to snow load on buildings. General Services keeps up with plowing, salting, and sanding roads and sidewalks. When sidewalks not cleared fast enough, people are vulnerable to injury. Red listed bridges are kept clear of snow and	NWS Windchill Index, Sperry-Piltz Ice Accumulation

Hazard Risk Assessment Hazards		Overall Risk	Hazard Locations in the City – Existing (Susceptible) From Hazard Risk Assessment	Potential Future Hazards	Magnitude/ Extent Measurement Scale
			include the Gas House. Rural roads in the City include: Shaker Road, Snow Pond Road, Oak Hill Road, Dunbarton Road (private St. Paul's), Fisk Road, Carter Hill Road, West Parish Road, Broad Cove Road, River Road, Bog Road, Elm Street, Horsehill Road, Iron Works Road, Currier Road, Silk Farm Road, Long Pond Road, Hoit Road, Mountain Road (Route 132), Graham Road, District Five Road, Runnells Road, Weir Road, Blackwater Road, Warner Road, Garvins Falls Road, Portsmouth Street and many others are rural roads with homes set in the trees, resulting in greater susceptibility to severe winter weather conditions and may be more difficult to access and/or be without power (including heat) for a longer period of time. Most vulnerable populations include assisted living facilities, 55+ older residential communities and others in Appendix C may be subject to cold temperature, snow isolation, transportation accidents, power failure and communications failure.	ice. No particular problematic areas were identified. Areas that are particularly vulnerable would be the northern elevations and remote locations, where alternate access may not be possible. Historic resource Gas House has structural deficiencies.	on (SPIA), NCDC Regional Snowfall Index (RSI) for Northeast
Extreme Temp	Drought	6.7	Entire City / Region. Areas susceptible include farms, orchards: Dimond Hill Farm, Rossvie Farm, Carter Hill Orchard and others. Also vulnerable are those residences with private dug wells outside of the City water supply. The City water supply at Penacook Lake has been fluctuating, but the City has a backup drinking water source (Contoocook River) so low levels are not considered an issue. Drought means increased risk of brush fire with dry vegetation (see Wildfire for areas). No drought was declared in 2010 despite the dry weather. Current 10-16 reports of severe drought from NHDES.	The City has a Drought Management Plan in place which lists condition levels after the State triggers a drought watch or emergency. General Services undertook a substantial water savings promotion/public awareness campaign in summer 2016 to encourage people to use water more efficiently, purchase more efficient fixtures. Have been pumping from the Contoocook River since June 6, 2016 to supplement Penacook Lake supply, and began pumping on weekends to help replenish water level. GS will look into developing ordinances to reduce usage. The rural wells might be going dry in the future.	Palmer Hydrological Drought Index (PHDI)
Extreme Temp	Excessive Heat	4.0	Entire City. Vulnerable populations most susceptible to extreme heat include the assisted living facilities, 55+ older residential communities and schools. Shelters will need to be opened for cooling centers during extended heat conditions. Transportation to cooling center may be a limiting factor to people being able to use them.	Excessive heat will continue to be a factor in the City's mitigation and response measures. Cooling centers are anticipated to be opened as needed, with phone calls to residents when the facilities are opened.	NWS Heat Index
Earth Hazards	Earthquake	4.0	Entire City. The Central NH Region is seismically active and earthquakes are regularly felt from area epicenters. Damage to utility poles and wires, major roadways, the underground aged waterlines and sewer lines, Waste Water Treatment Facility, bridges and	Building Code requirements for old buildings that are being refurbished would take earthquakes into account. Abandoned buildings may be most prone to earthquakes, such as those that off of Langdon Street, Poplar	Richter Magnitude Scale

Hazard Risk Assessment Hazards		Overall Risk	Hazard Locations in the City – Existing (Susceptible) From Hazard Risk Assessment	Potential Future Hazards	Magnitude/ Extent Measurement Scale
			dams can be significant. The Downtown conflagration area contains older, taller buildings could likely be the most vulnerable for building collapse as they were not built to earthquake standards.	Avenue, and the old Boston and Maine buildings. Underground utilities such as 1800 brick pipes, Concord Stream infrastructure 1880s but shutting down May 2017.	
Earth	Landslide	3.3	Along the Merrimack, Soucook and Turkey Rivers. Slopes greater than 15%, including roads with steep ditching or embankments are most vulnerable to landslide. River and brook banks can also slide, usually known as erosion, such as Broad Cove Road along the Contoocook River. The Soucook River maps indicate fluvial geomorphic features that include areas of erosion along the banks. Unique soil conditions on Concord Heights and sandy banks of the plateau are susceptible to landslide. NHDOT (Merrimack River) is at the top of one of these plateaus. Concord Airport (Merrimack & Soucook) facilities are located on slopes steep and sandy; the airport has an active drainage failure currently, grant being sought to correct.	Development in close proximity to the Merrimack River is most commonly at risk for these landslide (erosion) events due to the steep slopes along the banks. Soucook River maps indicate fluvial geomorphic features that include areas of erosion along the banks. Unique soil conditions on Concord Heights and sandy banks of the plateau are susceptible to landslide.	No known widely-used scale measuring the magnitude of landslides
Technological	Dam Failure	4.0	Dams on the Turkey River, Soucook River, Merrimack River and the Contoocook River. Some dams in the City have been breached, such as Sewalls Falls, but were not large enough to have caused a problem. Other dams have a High hazard classification that if failed, could present a problem to those downstream or directly nearby: Penacook Lake Dam (fed by Rattlesnake Brook) could flow over North State Street and residences, Turkey Pond Dam at St. Paul's has an open spillway. The City's 2 Significant Hazard dams are located on the Contoocook River: the York Dam (NHDES) and the Penacook Upper Falls Dam (Briar Hydro Association).	The Penacook Upper Falls Dam would be considered the highest priority dam because of the nearby residential facilities and power loss potential. However, the Penacook Lake Dam has a High hazard potential, and each of the other two Significant hazard potential dams, Turkey Pond Dam at St. Paul's School and York Dam on Contoocook River, also pose a concern.	NHDES Dam Hazard Classification <i>either/or criteria</i> *Dam Failure causes flooding and therefore is included as natural in this instance
Technological	Power/ Utility Failure	NR	Entire City. Utilities and vulnerable populations could be at greatest risk (see Appendix C). The wooded, rural roads in the City include: Shaker Road, Snow Pond Road, Oak Hill Road, Dunbarton Road (private St. Paul's), Fisk Road, Carter Hill Road, West Parish Road, Broad Cove Road, River Road, Bog Road, Elm Street, Horsehill Road, Iron Works Road, Currier Road, Silk Farm Road, Long Pond Road, Hoit Road, Mountain Road (Route 132), Graham Road, District Five Road, Runnells Road, Weir Road, Blackwater Road, Warner Road, Garvins Falls Road, Portsmouth	Electric companies continue (Eversource, Unitil) proactive tree trimming to reduce hazardous trees and limbs encroaching along power lines. Outages will continue to occur although the duration of power failure is shorter than in the past.	N/A

Hazard Risk Assessment Hazards		Overall Risk	Hazard Locations in the City – Existing (Susceptible) From Hazard Risk Assessment	Potential Future Hazards	Magnitude/ Extent Measurement Scale
			Street and many others are rural roads with homes set in the trees, resulting in greater susceptibility to power failure from any natural hazard, may be more difficult to access, and/or may be without power (including heat) for a longer period of time.		
Technological	Communications Systems Failure	NR	Entire City, Telecommunications Towers. Telephone lines often go down with power. Communications are detailed in Appendix C. Communications failure would be worse if it occurred at the Fire and Police Depts, Highway Department or City Offices, especially during a holiday, or inhibited emergency dispatch and EOC operations.	In Concord, minor communications failures occurs even where backup systems were in place. In some events, both land line and cell phone service fails. Due to a severe weather event, sometimes a remote communications tower comes down which affects the ability to communicate. Redundant systems are in place, and towers are placed in other areas. However, when one goes down, a black hole exists in certain spots. In Concord and NH, residents are used to normal wind/ice storm events, many of which cause communications and power failure for a number of hours or a couple of days. Residents use generators, wood or gas stoves, and have supplies on hand until the power is restored. The City will open its shelter when needed.	N/A
	Debris Impacted Infrastructure	NR	Entire City. Most dams, bridges, culverts, drainage structures, roadways and overhead powerlines could experience debris impacted infrastructure. Culverts that regularly washout (including those in need of upgrade) include: School Street, Warren Street, Pleasant, State Hospital, Clinton Street, South Street, Rockingham Street. The City received federal money to repair Pleasant and Warren Street drainage. Bow Brook originates at Thayer Pond has the potential to overflow because of debris. Soucook River Bridges on North Pembroke Road could be overtopped and the roadway made impassible. Prominent state routes, commuter roadways or residential roads that are commonly blocked or that would impact the greatest number of people if blocked by downed trees or power/utility lines: Route 106, Route 9, US Route 4/202, US Route 3, and the interstates I-89, I-93 and I-393.	Bow Brook originates at Thayer Pond has the potential to overflow and could be impacted by debris. School Street, Warren Street, Pleasant, State Hospital, Clinton Street, South Street, Rockingham Street washed out in the past and may again be impacted.	N/A

Hazard Risk Assessment Hazards	Overall Risk	Hazard Locations in the City – Existing (Susceptible) From Hazard Risk Assessment	Potential Future Hazards	Magnitude/ Extent Measurement Scale
Technological Transportation Accidents	NR	Entire City. I-89, I-93, I-393, US Route 202/9, interchanges and exit ramps, US Route 3, US Route 4, NH Route 9, NH Route 106, NH Route 132. Railroad accidents can occur as well as plane or helicopter crashes in the vicinity of Concord Airport. See Map 4 for regular accident locations - at certain intersections (W Main & School Street), curves, straightaways, hills.	Roundabouts in several locations in the City, including on Route 3 in Penacook, on North State Street and on Liberty/Auburn/Pleasant Streets have reduced the number of intersection accidents. Future accidents may be lessened by the strategic placement of other roundabouts. Railroad accidents may continue to occur from the Bow Town line to the Canterbury town line. Concord contains the Concord Municipal Airport and the NH Air National Guard, and is in close proximity to the Manchester airport. The New Hampshire International Speedway and events at St. Paul’s regularly generate a fair amount of local air traffic at certain times of the year. Any of these have the potential for future transportation accidents.	N/A
Technological Fire (Vehicle, Structure, Arson)	NR	Entire City. Areas most susceptible include: multi-unit housing, rural subdivisions, vacant or foreclosed homes in the City and buildings in densely populated areas or residential manufactured home parks. Vehicle fires could occur anywhere, parking lots, driveways, roadways.	Human-caused fire has occurred in the past and is likely to reoccur at recreational areas and in wooded sections of the City. The Downtown Conflagration area is considered dangerous due to close proximity of large numbers of businesses, old buildings, vehicles, and people.	N/A
Technological Hazardous and Radiological Materials Spills	NR	Entire City - transportation routes and occupational facilities. Major transportation routes convey trucking carrying radioactive materials through the City. No accidents to date are known: Route 106, Route 9, US Route 4/202, US Route 3, and the interstates I-89, I-93 and I-393. The railroad also transports materials that could be hazardous. Largest or most dangerous stationary sites that store and/or handle haz mat on site include those listed in Appendix C, locations that store or use fertilizer, pesticides, fuel, etc. Occupational haz mat /radiological sites where spills could occur include: Concord Hospitals, health clinics, Concord Schools, manufacturing sites, etc. Concord is not in either the evacuation area or the plume area of the Seabrook and Vermont Yankee facilities. Construction waste and medical community (low) waste are considered low risk. The Wheelabrator MSW Incinerator likely scans materials incoming, as does Advanced Recycling and other metal recycling facilities.	The City tracks Tier 2 facilities and the Central NH Hazardous Materials Team is based out of Concord, giving a faster response time to incidents. Future haz mat and/or radiological spills may occur on the rail lines, at occupational facilities, or in transit. One particular concern is the Eversource power generation plant's (in Bow) use of anhydrous ammonia on the rail lines.	N/A

Hazard Risk Assessment Hazards	Overall Risk	Hazard Locations in the City – Existing (Susceptible) From Hazard Risk Assessment	Potential Future Hazards	Magnitude/ Extent Measurement Scale
Human Public Health Epidemics	NR	Close Quarters Throughout City. Schools, health clinics, eating establishments, populated areas, large employers, senior apartments, stores and public assembly venues - all of these locations increase the risk of exposure to and transfer of illness. in the City, these locations include: [list]. Also, programs with public outreach such as: [list] (Meals-on-Wheels, VNA, Seniors-Helping-Seniors). The City is an active member of the Capital Area Public Health Network, and the NH Technical Institute (NHTI) was named a Point of Dispensing (POD). The City prepared to enact pandemic flu and H1n1 protocols. In 2009, Unitol filed a pandemic plan with the Public Utilities Commission (PUC). The City's conservation land and recreation land holdings are growing and could lead to the public being more exposed to more EEE and West Nile. The most vulnerable populations include residents of retirement communities and school populations.	The greatest risk of public health epidemics are locations of highest populations, where food is served and in shared environments where physical contact is common. If Avian Influenza was present in New Hampshire, people coming in contact with infected birds would be at greatest risk of contracting the virus. It is otherwise difficult to predict where a biological hazard would be potentially dangerous because of human and wildlife mobility. Locations where outbreaks would be most prevalent are noted in the Vulnerable Populations of Appendix C.	N/A
Human Terrorism	NR	Downtown (compact area). Most susceptible sites could include: Downtown area, Statehouse, Courthouses, Schools, major employers (especially those large quantities of haz materials), certain health clinics, high volume roadways, water supply infrastructure or dams, City Office, all Schools, Post Office, all governmental facilities, state facilities, locations of political offices or rallies, Churches, etc. First Night (Dec 31) activities have been cancelled as a result of terrorism following an event, such as the 1998 bombs. Chemical, biological, explosive, radiological events are possible terrorist tactics.	Bomb threats are received at the High School regularly, but these are not publicized. Concord Hospital receives bomb threats regularly as well, but they have internal procedures in place to handle the situation and do not contact the Police Department every time. The State House, NH Office Park South, the NH Supreme Court, Federal District Court, Merrimack County Superior Court, Concord District Court, and potentially City Hall would be a potential risk for terrorism or bomb threats, as would be the State Office Complex on Hazen Drive and the Concord Feminist Health Care Center.	N/A
Human Sabotage/ Vandalism	NR	City Facilities. Sabotage would be most likely to occur to: City Hall, City computer systems & website, City, County, State or Federal buildings, water supplies, Waste Water Treatment Facility, Cemeteries, Schools and gathering places, vacant buildings, under bridges. Facilities are located in Appendix C.	Any incident of sabotage in Concord could come from within Concord or any nearby town. Because of computer networks, sabotage could occur from any location in the world. No particular risk was identified, although it is acknowledged sabotage could occur at any time. The City runs on an intranet system, and has vast amounts of data they work with. This data is backed up, although sabotage would cause havoc and difficulty operating with the current data until the problem was fixed.	N/A
Human Hostage Situation	NR	Unlikely, Isolated Events. Hostage situations could occur at the Concord Elementary	Hostage situations are isolated events and are therefore nearly impossible to	N/A

Hazard Risk Assessment Hazards		Overall Risk	Hazard Locations in the City – Existing (Susceptible) From Hazard Risk Assessment	Potential Future Hazards	Magnitude/ Extent Measurement Scale
			Schools, Middle School and High School, Bishop Brady School, NH Technical College, St. Paul's School and daycares. They could also occur at City Hall, the Federal Building, Banks, Post Office, Merrimack County Courthouse, Concord District Courthouse, workplaces, and other state, federal and county facilities. Hostage situations could also occur in high density residential areas as noted in Appendix C or in a single family home as domestic home hostage situations.	predict. Being the capital city of NH, we are frequented by many heads of state and dignitaries to include POTUS, VPOTUS and potential political candidates. Attempts may be made directly against the individual or an unrelated group to be used as leverage to converse with these parties (EX. Rochester NH Clinton Headquarters). The NH State Correctional Facility on Route 3 (North State Street) and the Merrimack County Jail in Boscawen on Route 3 could be likely targets. The City Hall, Courtrooms, and the Federal Building could be likely targets. The Elementary Schools, Middle School, or High School could be host to hostage situations. These events could occur on private property or in homes, and the Police Department would have to adapt to each unique situation. Domestic hostage situations could also occur.	
Human	Civil Disturbance/ Public Unrest	NR	Downtown (compact area). Locations where civil disturbance could occur should be limited, however more likely in the compact area of the city. Occasions include: City Meetings, voting day, during visits from political candidates, at large events such as High School, St. Paul's or NH Technical College graduations. sporting events, Locations include: Concord Schools, City Hall, stores, restaurants, establishments serving alcohol, high density population areas (Main Street, Downtown, manufactured housing parks, neighborhoods), Police/Fire Stations, Courthouses, health clinics, State House.	Quiet, nonviolent protests and picketing which do not cause alarm or disruption regularly occur in Concord. As the seat of State, county and some federal government offices, there is a potential for civil unrest scenarios to occur. Demonstrations in front of the State House regularly occur, although to date they have been peaceful.	N/A

Source: Concord Hazard Mitigation Committee

Although there are many potential hazards in Concord’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**.

Concord's Built Environment Changes Since the 2012 Plan

The locations of where people and buildings are concentrated now or where new lands may be developed should be compared to the changing locations of potential natural hazards in order to best mitigate potential property damage, personal injury or loss of life. The overall vulnerability of the City to natural disasters is believed to have increased because of the built environment (development) increases.

The City's Statement of Vulnerability Change to Natural Disasters

Since 2012, the overall vulnerability of the City to natural disasters is believed to have increased with the development changes (housing and non-residential increases) experienced by the City over the last 5 years. Although no extensive natural disasters occurred during this timeframe that risked life, property or infrastructure, the City Departments effectively handled the impacts of those incidents which did occur, including wildfires, severe winter weather, severe wind events, etc. The City continues to apply for and receive federal Public Assistance funding to help offset some of the costs of declared disasters or emergency declarations and actively works to improve City infrastructure to better resist these events.



AREAS OF HIGHEST DENSITIES

The area of highest density in Concord is Downtown and Main Street. However, Concord contains several hubs of dense development around the City, including Loudon Road/Concord Heights, and Route 3 (Fisherville Road)/Penacook. The entire City is surrounded by wooded areas and forests and a large percentage of the City's **64** square miles is permanently protected open space. The **wildfire** threat is present as is **debris impacted infrastructure** from **severe wind events** and **winter weather events**. Several major rivers are close enough to pose a **flooding** threat to populated areas, although **floodwater runoff** from **rapid snow pack melt**, **debris impacted infrastructure** (culverts) or **severe storms** can occur in locations outside of the floodplain. The populated areas experience **wind events** and **snow and ice** events, sometimes resulting in **power failure**, downed tree limbs, and **debris impacted infrastructure** (roads). **Lightning** may pose a threat to the churches and other tall buildings in Downtown due to their height.

Areas of high density in the City remain the Main Street/Downtown area, Nearly **50** apartment complexes and multi-unit housing are located in Concord, in addition to about **10** manufactured housing parks and multiple senior housing facilities. Of major concern are those areas of the City that contain a high number of people, vehicles, and structures. Some of the most concentrated areas will be examined to determine their relation to natural hazards.

Main Street and Downtown Concord (US 3)

Main Street in downtown Concord is the main street through the most concentrated area of Concord. There are many commercial, residential, and state government buildings located in the downtown area. The downtown area would be susceptible to all hazards, including wind, snow and ice, human, technological, and fire. Main Street serves as a crucial secondary evacuation route, and it normally carries a relatively high volume of traffic.

Residential Areas Surrounding Downtown and the Opportunity Corridor

In the surrounding Downtown proper, high-density residential mixed and mixed use areas as well as redevelopment occurring in the Opportunity Corridor to the east of Main Street exists as an area of high density in downtown Concord.

Loudon Road and Concord Heights (NH 9, US 202, I-393)

Concord Heights is a second area of high density, located in the area surrounding Loudon Road (Route 9). This is an area of a high concentration of commercial businesses, State offices, restaurants, employment centers, and shopping, as well as residential homes and multi-unit housing. Loudon Road is laden with heavy traffic. As a result, accidents are frequent on the stretch of Loudon Road from the intersection with Hazen Drive and Airport Road northeast to the area near Wal-Mart. Loudon Road is considered a secondary evacuation route. Some areas on the outside edges of Concord Heights may be at risk for wildfires. Since Loudon Road ascends a hill before Hazen Drive and Airport Road, flooding is not a particular concern. All other hazards should be considered.

Penacook (US 3)

Penacook, a village located in the northern-most portion of Concord to the west of the Merrimack River and I-93, is the third area in Concord with high density. Most of Penacook is not in any specific hazard area, although a small part of the northern part of Penacook is in the vicinity of the Contocook River and has dealt with flooding problems in the past. Like any areas of high density, Penacook would be particularly vulnerable to all hazards, including wind, snow and ice, human, technological, and fire events. Village Street (Route 3), the major road in the village which serves as a secondary evacuation route, additionally runs the risk of traffic congestion and accidents.

Changes Since the 2012 Plan

The changes since the **2012 Plan** primarily involve the addition of single family homes in neighborhoods along Fisherville Road. Many of these areas may be susceptible to **flooding** due to surrounding wetlands and areas of poor drainage. Additional development has also occurred in the Gateway Performance District near Steeplegate Mall with new construction of a multi-family senior housing development.

VULNERABLE POPULATIONS

There are several population groups throughout the City and specific geographic areas of vulnerable populations in Concord. Vulnerable populations are more subject to hazard events such as **wildfire** or **fire**, **severe snow**, **power failure**, **extreme heat**, **public health** or **human** hazard events.

Certain population groups are at a higher risk of exposure to or impact from natural and human hazards. These particularly vulnerable populations will be examined in the context of their geographic location and their likelihood of sustaining damage to certain disaster types.

Schools and Child Care Facilities

Schools are located in **APPENDIX A**. Over twenty public and private schools are situated in Concord, ranging from preschools to colleges. For kindergarten through high school, mass transportation of children versus the sheltering of children at the school should be factors to consider when developing an evacuation plan. Any hazard could befall schools, but they are perhaps most vulnerable to human hazards.

Two schools, the NH Police Academy and New Hampshire Technical Institute, are located within the 100-year floodplain of the Merrimack River. The NH Fire Academy falls inside the 100-year floodplain of the Soucook River.

Because of its prominence, University of New Hampshire Law Center is likely to be at risk from human hazards. The Law Center draws many people from a diverse number of ethnic backgrounds. Since the incidents on September 11, 2001, any institution such as UNHLC could be at risk from terrorists. Situated in a residential neighborhood next to the largest City Park, civilian casualties could be high if a human disaster were to occur at UNHLC.

Over **30** child care facilities are identified in **APPENDIX A**. They are situated throughout Concord and several are located within other significant sites, such as at Concord Hospital, NH Odd Fellow's Home, NH Technical College, and the YMCA. Special considerations of child care facilities during or following a disaster include an influx of parents trying to pick up their children, the adult-child ratio, and perhaps the lack of disaster safety training of daycare workers.

Multi-Unit Housing

As indicated in **APPENDIX A**, there are nearly 50 apartment complexes and multi-unit housing units (such as condominiums) identified in Concord. All complexes, like manufactured housing parks, run the risk of being impacted by disasters because even if they do not lie in a hazard area, unpredictable and extremely localized hazards such as tornadoes, microbursts, and lightning could cause extensive damage and/or loss of life due to the density of population.

There are about **12** multi-unit housing complexes in the Penacook and West Concord villages, and none are in any specific hazard areas. There are **5** complexes located in the area of Manchester Street and Airport Road, and although none are in defined hazard areas, they are close to the boundary of the wildfire hazard areas. Approximately **14** complexes exist in the Concord Heights/Loudon Road area. None are in any hazard areas but some are located close to wildfire hazard areas. One complex, South Concord Meadows, is located in the South Concord and is not nearby to any hazard areas. In the event of a disaster, plans should be made to quickly and efficiently evacuate these areas via the evacuation routes.

There is a multi-unit apartment building on Route 3/North State Street near Knight Street that was damaged in the 2006 flooding and is still located in a high-hazard area. This building was a mill conversion, and Rattlesnake Brook flows right next to the building.

Kennedy Apartments is located on Thompson Street. The Crutchfield Apartments are also located on Montgomery Street. Both are Section 8 Housing operated by Concord Housing Authority. The building stands eight stories tall and is the tallest residential structure in Concord. Fire in the building is a primary concern due to the difficulty in Fire Department accessibility. Special planning must be undertaken to ensure efficient evacuation in the event of an emergency.

Manufactured Housing

There were **9** manufactured housing parks identified in **APPENDIX A**. Manufactured housing parks are at particular risk because the areas are densely populated, there are few access roads, and the structures are not as stable as buildings set on foundations. Even if a hazard event was very localized, it could cause extensive damage and/or loss of life in manufactured housing parks. Manufactured housing parks in Concord are vulnerable to all hazards, including wind, wildfire, flooding due to rain storms, human hazards, and ice and snow even if they are not located in a specific hazard area.

Foxcroft Estates and Green Meadows Manufactured Home Park are located in West Concord (to the south of Penacook), and are not in or near any specific hazard areas. Alosa's Mobile Homes and Crestwood Estates are not in any specific hazard risk areas, but the borders to both **wildfire** and **flooding** areas are quite close to each. Riverview Landing and Valley Stream Estates Inc. are both located close to the Merrimack River, and both lie well within the 100-year floodplain and within the City's regulated floodplain. Green Acres Mobile Home Park, along the Merrimack intervale, has flooded in the past. If **heavy rain, rapid snow pack melting, or ice jams** caused the Merrimack River to overflow its banks, these parks could be inundated. Concord Terrace and Princess Mobile Homes in Penacook are susceptible to all hazards. All nine major parks, whether in defined hazard areas or not, lie in close proximity to, and in many cases are connected to, primary or secondary evacuation routes.

Alosa's parks are located at 69 Manchester Street; Park Plaza is at 83-87 Manchester Street, Hilltop is at 190 Manchester Street, and Hillcrest is at 192 Manchester Street. The 155 Manchester Street facility is a mixed commercial/residential building where the Alosa office is located. All of these parks, except for Hillcrest at 192 Manchester Street and its office, are somewhat remote from flood zones and are probably a minimum of 70' – 80' above the City's regulatory flood elevations.

Senior Housing

As listed in **APPENDIX A**, there are several senior housing facilities throughout Concord. Five (5) of them, Endicott Hotel (Main Street), Boucher Apartments (Center Street in Penacook), Harris Hill Nursing Home (Maitland Street) and Havenwood-Heritage Heights (Christian Avenue) are not in the Merrimack River 100-year floodplain but are within the City’s regulated floodplain. As Havenwood and Heritage Heights sit over 100 feet vertically above the river, The Endicott some 25 feet above the outer limit of the floodplain, and Boucher and Harris Hill Nursing Homes are both vertically and horizontally separate from the flood hazard areas, **flooding** should not be an issue for these facilities.

Horseshoe Pond Place, however, on Commercial Street, lies within the 100-year floodplain of the Merrimack River. The physical limitations of the elderly will require higher levels of assistance in the event of a disaster. All of the residents live on the upper floors above the ground floor, above the **flooding** hazard.

Cobblestone Point is a new, 65+ older independent living community of 140 units are behind Home Depot in Concord Heights. Located in the wooded pine barrens area, the development could be subject to **wildfire**.

Riverside Development

Since the largest river in New Hampshire bisects Concord and runs close to many developed areas, flooding from the Merrimack River is always a concern. The Wastewater Treatment Plant, located to the south of Riverview Landing, is well within the 100-year floodplain of the Merrimack River and could easily be flooded. Two previously mentioned manufactured housing parks, Riverview Landing and Valley Stream Estates Inc. (Green Acres), lie very close to the river and adjacent to the 100-year floodplain but within the City’s regulated floodplain.

The New Hampshire Technical Institute (NHTI) is located adjacent to the 100-year floodplain but within the City’s regulated flood plain of the Merrimack, and the college has plans of continued growth. Any new buildings constructed on the campus could be inundated in the event that the Merrimack River overflows its banks. The flooding risk cannot be avoided unless the new buildings were built on higher ground at a significant distance from the rest of the campus.

In Penacook, there are several old buildings nearby the Contoocook River. Although the buildings are not in the floodplain, they do lie along the Contoocook River, and in some circumstances flooding, such as through dam breach, may be a legitimate concern. Some of the buildings are actually in Boscawen, but they run the same risk as those in Concord.

The Penacook Wastewater Treatment Plant is also in the floodplain but has been elevated and is in no danger of flooding.

Interstates I-93 and I-393

Interstates I-93 and I-393 are susceptible to natural hazards as well as human hazards. Because I-93 is the major corridor that is used by traffic traveling through Concord from north to south, impediments could paralyze traffic flow in and out of the City. I-393 serves as the main corridor for traffic east/westbound east of I-93. A section of I-93 between Exit 13 and Exit 14 is susceptible to flooding. This section is in the FEMA 500-year floodplain and the City’s 100-year floodplain.

Since these interstate highways are flat, wide and are constructed higher than the surrounding ground, wind is always a hazard for traffic, as well as snow and ice. The wide-open corridors allow wind to move relatively unrestricted, and as a result it can reach higher speeds than it normally would in more forested areas. In areas where highways rise well above the landscape, crosswinds can be dangerous. These winds are especially dangerous to taller vehicles such as vans and semis, and can cause falling snow to drift, reducing visibility and causing snowdrifts. Human and technological hazards, such as vehicle accidents, chemical spills or bridge failure, can also reduce the free-flow nature of interstate highways.

One area of dense commercial concentration is the east end of Loudon Road, where the Steeplegate Mall is located. There are several dozen retail stores inside the mall, and surrounding the mall are many other high-volume businesses. During the holiday season, there may be tens of thousands of shoppers in this area. Some of these businesses also can contain hazardous materials. The majority of Loudon Road residents and shoppers will evacuate via I-393, which at the junction of Route 106 also serves as the single evacuation point for those coming from Loudon and Pembroke. It is imperative that I-393 and its two bridges remain unimpeded during a disaster event so a safe evacuation can occur.

Changes Since the 2012 Plan

The only change since the last Plan is the addition of the newly constructed multi-family senior housing development, Cobblestone Point (140 units of 65+ older) near the Steeplegate Mall on the Heights. The other vulnerable populations remain.

FUTURE DEVELOPMENT IN CONCORD

The Concord Planning Board approves the new subdivision homes and site plan developments in the City. As of early 2017, there were three large scale ongoing residential projects in Concord, and planned new medical office developments, and redevelopment of several major commercial properties. New developments will be susceptible to any number of hazards, ranging from specific areas of identified hazards to those which could occur at any locality to those that are specific to the site of new construction.

The locations of where people are concentrated or where new lands may be developed should be compared to areas of potential natural hazards. These location comparisons can assist with planning regulations to help alleviate potential dangers to the existing populations and encourages mitigation planning during the early development stages of new construction.

Housing Developments

There are **3** large housing developments still under construction in the Penacook/West Concord area, including The Vineyards North on Bog Road (**60** units), Sandwood Crossing on Borough Road (**102** units), and Oxbow Bluff on Manor Road (**66** units). They are all partially complete as of March 2017. These developments would not be in any immediate hazard area, although portions of Borough Road may be susceptible to **flooding** of the Contoocook River and extreme western Bog Road may also be at risk of flooding.

Commercial and Industrial Developments

A number of parcels in the downtown core are currently vacant or underutilized. The entire Opportunity Corridor District running between downtown and the I-93 corridor is envisioned as a higher density mixed use extension of downtown with a new multi-modal transportation center. Plans for the implementation of these visions are on hold until the State DOT I-93 widening planning project comes to a close and a new highway alternative is chosen. Depending on the new configuration of the highway and the relationship of development and the elevation of the new roadway to the Merrimack River, **flooding, ice jams** and other river-related natural disasters could become significant hazards for the new development and for the new highway.

The Garvins Falls and Whitney Road areas are envisioned as new centers of either office, commercial, residential, mixed use, or industrial development. Both locations would carry risks from **flooding** due to close proximity to the Merrimack. Both locations would also require significant infrastructure investment that could create new evacuation routes for the City.

Significant medical and office development may be enabled along the Langley Parkway corridor once the road extension is constructed. The new road will also improve evacuation and access to the hospital for emergencies.

Changes Since the 2012 Plan

The main hazards for Concord’s future development remain **wildfire, severe wind events, severe winter weather, traffic accidents, and power outages**.

Since the last Plan, large housing developments have been partially built-out in the Penacook/West Concord area including The Vineyards (Bog Road), Sandwood Crossing (Borough Road) and Oxbow Bluff (Manor Road) but many units still remain. This area still has potential **flooding** issues. Vineyards North is a new development that is only just starting construction. Abbott Village is a senior housing development located across from Swenson Granite Co. on Route 3 in close proximity to, but some 70 feet above, the floodplain area. The 45 multi-family apartments of Menino Place (51 Storrs Street) by Concord Area Trust for Community Housing (CATCH) may be vulnerable to the congested **fire conflagration** area which is in downtown Concord.

Significant commercial and industrial projects have continued along Concord Heights, Regional Drive and Industrial Drive also in the Heights vicinity. In this area near the Concord Pine Barrens, the primary concerns are **wildfires**, although most buildings are constructed with non-combustible exterior walls, have significant paved separation from natural vegetation, and have interior sprinkler protection, all in accordance with the non-residential building codes.

On South Main Street, the Duprey Center is a new multi-level office building constructed on a vacant lot. The building is situated in Downtown Concord, host to pedestrians, travelers and shoppers. Significant Main Street redevelopment has occurred since the last Plan to rearrange traffic flow and enhance the walkability of Downtown. These projects are at risk of **fires, severe wind events, explosions, traffic accidents** and **human hazards**.

Off Interstate 93 at Exit 17, commercial development has occurred Whitney Road off of Exit 17 at the Canterbury/Boscawen town line. Hazard concerns could be **human hazards, hazardous materials, severe winter weather**. Finally, the former Penacook Tannery site, a former brownfield site, on East Street in Penacook is to host a newly constructed mixed-use facility. It lies at the along the Contocook River, and could be at risk of **flooding** through **dam failure**.

5 COMMUNITY VULNERABILITY ASSESSMENT AND LOSS ESTIMATION

The Hazard Mitigation Committee developed and/or updated the critical and community facilities within this Chapter. Sites were added or removed, and contact information was revised and structure replacement value \$ was added. 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. The Plan’s maps were updated from the **Concord Hazard Mitigation Plan 2012**.

The identification of Critical and Community Facilities within Concord is integral to determining what facilities may be at risk from a natural disaster. Every facility could be damaged by multiple hazards listed in **4 HAZARD RISK ASSESSMENT**. A tabular inventory of facilities in Concord is provided in **APPENDIX A Critical and Community Facilities Vulnerability Assessment**. The **911 Street Address** and **Phone** number of each facility are 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) because of their significant impacts on the community (**power failure, debris impacted infrastructure**).

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

Potential dollar losses for each of the facilities’ **Structure Replacement Value \$** (not land) have been obtained through the City’s Vision Appraisal assessment System 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 Concord from flooding and other natural hazards are provided using the methods described in the chapter. The City’s participation in the National Flood Insurance Program (NFIP) offers a way for individuals to obtain insurance coverage for flooding. The City’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 Assessment**:

Facility Name	Street Address (911)	Phone	Structure Replacement Value* \$	Primary Hazard Vulnerabilities
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Critical Facilities

Critical facilities are categorized as those City or state buildings or services that are first-responders in a disaster. The Fire Department, Police Department, Public Works Department, and City Offices are crucial in providing and coordinating the emergency services. Other critical facilities would include educational facilities, hospitals, and emergency shelters. Utilities or utility features, such as cisterns, culverts, dry hydrants, pump stations, water and sewer lines, and electric transmission lines are included because of communication and power/water services provided.

Many such facilities are located in Concord. 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. To view the detailed Critical Facilities sites and tables, see **APPENDIX A**. Most of these critical facilities sites appear on the *Map 3 Community and Critical Facilities Series*.

Essential City Facilities include: Broadway Fire Station, Central Fire Station, City Hall, Concord Public Library, Fire Department Headquarters, General Services Department, Heights Fire Station, Manor Fire Station, Police Headquarters. Assessed structure (only) replacement values for these essential City facilities total at least **\$30.2m**.

Essential Government Facilities include: Meldrim Thompson Office Park East, Merrimack County Court House/Offices, NH Department of Health and Human Services, NH Department of Transportation, NH Homeland Security and Emergency Management, NH Legislative Office Building, NH Military Reservation, NH State Fire Training Facility, NH State House, NH State Office Park South, NH State Police Headquarters, NH State Prison, NH Supreme Court, Shea Farm, US Federal Building. Assessed structure (only) replacement values for these essential government facilities total at least **\$334m**.

Transportation Facilities include: Concord Airport, Concord Area Transit, Concord Coach Lines (Bus), Concord Coach Lines Maintenance Facility, Concord Hospital Heliport, Concord School Bus Transportation Dept., Merrimack Valley School District, NH Civil Air Patrol, NH National Guard Heliport. Assessed structure (only) replacement values for these essential transportation facilities total at least **\$6.6m**.

Utilities include: B&M NE Southern Railroad, City Sewer Mains, City Water Mains, Comcast (Cable) Communications Equipment, Concord Steam Corp. Office, Fairpoint Central Switching Station, Fairpoint (Telephone) Maintenance Facility, Fairpoint Warehouse, Powerline Corridors, PSNH Substation 1, St Paul's Central Heating Plant, Tennessee Gas Pipeline, Unitol- Concord Electric Office, Unitol Substation 1-BR, Unitol Substation 2-WC, Unitol Substation 3-GU, Unitol Substation 4-PE, Unitol Substation 6-PL, Unitol Substation 8-HO, Unitol Substation 14-LA, Unitol Substation 15-WP, Unitol Substation 16-TP, Unitol Substation 21-ST, Unitol Substation 22-IW, Unitol Substation 23-MO, Unitol Substation 24-HA, Wastewater Pump Station (Merrimack River) (g), Wastewater Pumping Station (Penacook), Wastewater Treatment Plant (Concord) (g), Wastewater Treatment Plant (Penacook), Water Storage Tank (Heights), Water Storage Tank

(Penacook), Water Storage Tank (Snow Pond), Water Storage Tank (West Concord), Water Storage Tank and Pump Station, Water Supply - Audubon Society of NH, Water Supply - Bancraft Products, Inc, Water Supply - Camp Spaulding, Water Supply - Contoocook River Recharge, Water Supply - Jimmie's Seafood Restaurant, Water Supply - Kids Kampus, Water Supply - Makris Lobster Pool, Water Supply - Penacook Lake, Water Supply - Shaker Road Child Care Center, Water Supply - Treatment Plant, Water Supply - Youth with a Mission (Well #1), Water Supply - Youth with a Mission (Well #2), Water Supply Pump Station (Contoocook River), Water Treatment Plant, Water Well Fields, Wheelabrator Trash to Energy Incinerator. Assessed values for these utilities in the City total at least **\$75m**.

Communication Facilities include: 2 Pillsbury Street LLC Antenna/Tower, Associate Enterprises Inc Antenna/Tower, AT&T Wireless Services/Cingular Wireless/Telecorp Realty LLC Antenna/Tower, Capital Broadcasting INC/ DBA WKXL AM Broadcasting Tower, Capital Broadcasting INC DBA WKXL AM Broadcasting Tower, Capital Broadcasting INC/ DBA WKXL AM Broadcasting Tower, Capital Center for the Arts/ Nextel Communications Tower/Antenna, CCTV (Television), Cingular Wireless Antenna/Tower, Cingular Wireless Tower/Antenna, Cingular Wireless/ Tower Resource Management, Inc. Antenna/ Monopole (2), City of Concord, NH COMF Antenna/Tower, City of Concord, NH Fire Headquarters/ Sprint/ Nextel Antenna/Tower, City of Concord/ NH Water Department Antenna/Pole, City of Concord Tower/ Antenna (located in the Town of Pembroke, NH), City of Concord Tower, Concord VDR Tower (Aircraft), Concord Hospital Broadcast Tower/ Antenna Structure, Crown Atlantic Company, LLC Crown Communications/ Dapergolas, John Tower/Antenna, Fire Station (City of Concord, NH) Antenna/Tower, Fire Station (City of Concord, NH) Roof Mounted Antenna/Tower, Fire Station Tower / Antennas, Hodges Development Corp Antenna/Tower, Hodges Properties Inc Antenna/Tower, Independent Wireless One/ West Tower Communication/US Cellular Antenna & Equipment, Independent Wireless One, M & P Partners LP/ Reit Mngmnt/Omipoint Tower/ Antenna, Miskoe, William & Sylvia/Granite State Public Radio Tower, Miskoe, William & Sylvia/US Cellular Antenna, Nextel Antenna, Nextel Communications Antenna/ Tower, Nextel Communications/Green Mountain Communications tower/ antenna, NH Dept. of Resources & Economic Development (State of NH) Antenna/Tower, NH State Police/ Fish & Game (State of NH) Antenna, NH State Police/ NH State Hospital OEM Roof Top Antenna, NH State Police (State of NH) Antenna Structure, NH State Police (State of NH) Roof Top Building Mast, NHPR (Radio), NH Public Radio Inc Broadcast Tower (2), NH RSA 2 partnership Pole/Antenna, NH State Police (State of NH) Building Mast, Omnipoint Holdings Lattace Tower, Omnipoint Holdings/Thomas R. Murphy Monopole & Equipment, Omnipoint Holdings Inc./Thomas R. Murphy Monopole/Equipment, Omnipoint, Voice Stream Wireless/ DMA Contactors Tower/ Equipment/ Antenna (2), PFP Associates LTD Partnership Antenna/Tower, Pillsbury LLB/ Tower resource management II Antenna, Police Headquarters Antenna/Tower (City of Concord, NH)/ Former use of Police- Currently Inactive, Police Radio Site (City of Concord, NH) Antenna/ Tower, Public Safety-Central Fire Station (city of Concord) Antenna/Tower, Sprint Spectrum/ Bechtel Telecommunications Tower/ Antenna, Sprint Spectrum LP Cell Antenna/Tower (4), Sprint Spectrum Antenna/Tower, Star Granite Co. Tower/ Antenna, Telecorp Realty, Telecorp Realty LLC Antenna & Radio Equipment (2), Telecorp Realty LLC/Cingular Wireless/ Omnipoint Communications/ Purchase Realty Trust Antenna, Tower Resources for Cingular Wireless, US Cellular/ Holland & Knight LLP Antenna, US Cellular/KJK Wireless Tower, US Cellular/KJK Wireless Equipment/Monopole, US Cellular Monopine Tower, US Cellular Tower/Antenna, Verizon New England Inc., Verizon Northern New England Tel Opsl/

Chamberlin Construction Antenna/Tower, Verizon NE Inc Transformer, Verizon Wireless Antenna, Verizon Wireless/Eastern Communications Tower, Verizon Wireless/Ocean builders Tower/ Antenna, Verizon Wireless/ Todd White Flag Pole/Equipment, Voicestream Wireless, WEVO Radio/Roland Paquette Equipment, Wireless Communication Companies Tower/ Antenna, Wirelesco LP Tower/ Antenna, Wirelesco LP Tower/ Antenna, WKXL (Radio), WNHI – 93.3 FM (Radio), WSPS (Radio), WVNH – 91.1 FM (Radio), Capital Area Mutual Aid Fire Compact (CAMAFC). Assessed structure (only) replacement values for these communication facilities is Not Available (**\$N/A**) as they are not structures for which replacement valuation is readily available.

Dams include: D051.002 York Dam Contoocook River (NHDES), D051.004 Briar Pipe Dam (Briar Pipe Assoc), D051.006 Penacook Upper Falls Dam (Briar Hydro Assoc), D051.011 Cider Mill Dam (Smith), D051.012 Lower St. Pauls School Pond Dam (St Pauls School), D051.013 Penacook Lake Dam (City of Concord), D051.016 Snow Pond Dam (City of Concord), D051.017 Fisk Hill Pond (St Pauls School), D051.018 Thayers Pond Dam (Everett), D051.019 Quarry Dam (Swenson Granite Co Inc), D051.021 Turtle Pond Dam (City of Concord), D051.023 Farm Pond (Farnum Hill Orchard), D051.025 Turkey Pond Dam (St Pauls School), D051.026 Farm Pond (Dutton), D051.027 Recreation Pond (Davis), D051.028 Hoit Road Marsh Dam (NHF&G), D051.030 Farm Pond Dam (Lewis), D051.034 Reflecting Pond (Chubb Lifeamerica), D051.036 Farm Pond (Unknown), D051.037 Farm Pond Dam (Ekstrom), D051.039 Detention Basin Dam (Dejager), D051.040 Recreation Pond (Copoco Inc), D051.041 Woods Brook Dam (City of Concord), D051.043 Rolfe Canal Gate Structure (NHDES), D051.046 Rolfe Canal Penstock Intake Dam (Briar Hydro Assoc), D051.053 Lewis Farm Pond (Lewis), D051.056 Beaver Meadow Golf Course Pond (City of Concord), D051.057 Beaver Meadow Brook (City of Concord), D051.062 Sheep Davis Rd. Dam (City of Concord), D051.063 Integra Drive Det Pond (Gold Eagle Contracting), D051.064 Hitchcock Clinic Det Pond (Dartmouth Hitchcock-Concord). Estimated structure (only) rehabilitation values for these dams total at least **\$15.5m**.

Bridges include: 040/090 (City), 041/121 (State), 041/123 (State), 042/121 (State), 045/085 (City), 048/082 (City), 053/071 (City), 053/139 (City), 059/127 (State), 062/123 (State), 066/121 (State), 068/121 (State), 068/122 (State), 069/052 (City), 070/117 (City), 125/118 (State), 130/019 (City), 136/116 (State), 136/117 (State), 139/116 (State), 140/113 (City), 142/113 (City), 142/116 (State), 150/107 (State), 152/104 (State), 152/107 (State), 152/108 (State), 152/115 (State), 153/149 (State), 154/121 (State), 154/123 (State), 154/150 (State), 156/138 (State), 160/103 (City), 160/188 (State), 161/184 (State), 162/184 (State), 163/024 (State), 163/056 (Private- St Pauls), 163/106 (State), 163/111 (City), 164/024 (State), 164/167 (State), 165/029 (State), 165/177 (State), 166/029 (State), 167/029 (State), 167/042 (State), 173/170 (City), 175/051 (State), 176/051 (State), 180/063 (State), 180/100 (City), 181/055 (State), 182/055 (State), 183/156 (City), 184/103 (State), 185/104 (City), 187/036 (State), 188/029 (State), 190/067 (City), 193/027 (City), 198/146 (State), 200/015 (City), 201/096 (State), 201/097 (State), 203/087 (State), 203/089 (State), 203/090 (State), 215/124 (State). These include over Interstates 89, 93 & 393, over the Merrimack River, Soucook River, Turkey River, Contoocook River, Turkey Pond and large brooks, and more. Estimated structure (only) rehabilitation values for these bridges total at least **\$227m**.

Medical Facilities include: Concentra Medical Center, Concord Family Medicine, Equality Health Center, Concord Hospital, Concord Hospital at Horseshoe Pond, Concord OB-GYN, Concord Orthopedics, Concord Otolaryngology, Dartmouth-Hitchcock Clinic, Eye Center of Concord, Family Tree Health Care, HealthSouth Rehabilitation Hospital, Memorial Medical Office Building, New Hampshire Hospital, Penacook Family Physicians, Pillsbury Medical Office, Pleasant Street Family Medicine, St. Pauls Infirmary. Assessed structure (only) replacement values for these schools, medical facilities and shelters total at least **\$215m**.

CRITICAL FACILITIES PROBLEM STATEMENTS

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**.

Essential City Facilities

- ⊙ Old buildings such as the Fire Stations, City Library, Fire Dept Headquarters, City Hall, 3d floor of the Police Department, may be not be up to current seismic and wind load building code requirements.
- ⊙ The City Hall Annex is not sprinklered, nor is the Library, so they are vulnerable to fire. The City has just completed retrofitting sprinkler systems at the Broadway, Heights and Manor Fire Stations. Central Station is not yet sprinklered.

Essential Government Facilities

- ⊙ Older State buildings may not be up to current seismic, fire suppression and wind building codes.
- ⊙ There is a concern about slope erosion on the Soucook River north of the Smokey Bear complex.

Transportation Facilities

- ⊙ Concord Airport has older hangar buildings that could be subject to failure by earthquake, all wind events, and winter weather snow load on the roof.
- ⊙ There is not an emergency backup generator at the Airport in the event of power failure.
- ⊙ The Concord Municipal airport serves as a NWS/NOAA weather monitoring station and its facilities have not been upgraded for protection from the elements since the time it was built.

Utilities

- ⊙ The condition of Concord Steam power plant is at a point where failure or building collapse could be catastrophic. The facility is vulnerable to fire, snow, wind, earthquake events. Will close on May 31, 2017.
- ⊙ The City's water supply is susceptible to flooding and drought. Currently, water is pumped from the Contoocook River into Penacook Lake (since 1981) to help maintain levels.
- ⊙ The City's Aquifer Ordinance includes an area overlay of the City wells; they are working with Pembroke respectfully to protect both community's aquifer interests.
- ⊙ Although the facilities are modern (1980s), the Hall Street Wastewater Treatment Facility is constructed in the Merrimack River floodplain but has been elevated and is not in danger of flooding. Penacook WWTF is an older facility and is within the Merrimack River floodplain but has been elevated and is not in danger of flooding.
- ⊙ The age of many of the City's storm drains date to the 1880s and are made of brick and clay.
- ⊙ The Downtown and Penacook Village may be particularly vulnerable to storm drain flooding because of undersized pipes in these oldest areas of the City.

Communication Facilities

- ⊙ Wind, lightning, ice are major problems on communications towers (Kearsarge Tower in Warner), impacts infrastructure in Concord and the communities it serves.
- ⊙ Concord FD hosts Capital Area Mutual Aid Fire Compact (CAMAFC) for 21 communities and the towers are located throughout the Central NH region.
- ⊙ Mutual Aid communications building is subject to weather impacts (newest building in the complex, 1966), such as lightning, heavy snow loads and earthquake.

Dams

- ⊙ A Penacook Lake High Hazard dam feeds into Rattlesnake Brook spillway. During the 2006 floods, at 278 North Street, water jumped the spillway and channeled water through the Mill Place West apartment building. Flooding on this brook could significantly damage infrastructure and property and endanger lives below the breach. North State Street and its utilities under the road (water, sewer, gas) could be destroyed as well as neighborhood homes.

Bridges

- ⊙ Redlisted North Pembroke Road bridge 183/156 (Soucook River)- vulnerable to debris impacted infrastructure, ice jams, flooding, has scour potential with old footings. Heavily traveled truck route. Bridge is being proposed for full replacement; jointly owned with Pembroke.

- ⊙ Both Redlisted Birchdale Road (Bela Brook) 193/027 and Hooksett Turnpike (Bela Brook) 200/015 are scheduled for replacement in 2018.
- ⊙ Some Merrimack River bridges have river height gages; Engineering checks for debris at the bridges when monitoring gages.
- ⊙ Redlisted Loudon Road bridge (Merrimack River) 163/111 is on schedule for 2021 bridge deck replacement.

Medical Facilities

- ⊙ The access to Concord Hospital/DHMC is flood prone on Warren Street, Clinton Street, and Pleasant Street. The City lost access during 2006 floods; people in need of services needed to drive the long way around to obtain help. Completing Langley Parkway would provide this necessary secondary access in case the Hospital streets were flooded.
- ⊙ Concord Hospital's Urgent Care facility on Commercial Street and the Convenient MD Urgent Care Facility on Loudon Road are both in the floodplain; the roads could be flooded when care is necessary.
- ⊙ Power failure from any natural hazard could limit services at medical facilities unless health care providers had emergency generators.

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

The City has a Stormwater Management Plan with extensive drainage facility upgrades anticipated around the community as designated by area. Culverts, underground pipes, detention ponds, and other drainage facilities in need of upgrade do not appear with the **Community Facility Vulnerability Assessment** but are included here within this section. Culverts are responsible for carrying volumes of water safely under roadways, and with the prior severe flooding events it is necessary to keep City infrastructure in adequate condition. **Table 28** displays the drainage facility locations in need of upgrade and approximately when the upgrades can occur. The approximate cost for replacement of all these culverts is **\$21.1m** for materials, design, permitting, and some contracted labor; most labor is performed by City staff and is considered an in-kind cost.

**Table 28
Drainage Areas to be Upgraded**

Subcatchment Area of Drainage Facilities	Location	Estimated Upgrade Year from 2017	Total Approximate \$ Cost for All
Fisherville Road	Fisherville Road area, includes wide network of local streets (Bog Road to Beaver Meadow Brook watershed)	4-5 years	\$1,500,000
Heights	Concord Heights area, includes wide network of local streets (East Side Drive to Soucook River, Loudon Road-Merrimack Road)	4-5 years	\$3,500,000
Hoit Road	Mountain Road, Sanborn Road, Hoit Road	4-5 years	\$600,000
Horseshoe Pond	Horseshoe Pond, Upper Auburn Street, Washington Street to Merrimack River, Commercial Street	4-5 years	\$2,000,000
Concord Hospital	Concord Hospital, Bow Brook Watershed (Langley Parkway to Outfalls to Turkey River, Upper West Concord)	4-5 years	\$1,500,000
Oak Hill	Oak Hill, Oak Hill Road, East Concord Village, Loudon Town line	4-5 years	\$3,000,000
Penacook	Penacook, Along Route 3, Boscawen Town line, Contoocook River, Merrimack River	4-5 years	\$2,000,000
Downtown "Terrible Trapezoid"	Downtown, Washington Street, Auburn Street to Merrimack River, Perley Street, South Main Street, Manchester Street.	4-5 years	\$4,000,000
Turkey River	Turkey River area, Clinton Street, St Paul's School, Iron Works Road, South Street	4-5 years	\$750,000
Washington Street	Washington Street, between Horseshoe Pond and Terrible Trapezoid (Downtown), North of Center Street	4-5 years	\$1,500,000
West Concord	West Concord, Penacook Street West, Carter Hill, West Parish, Hutchins Street	4-5 years	\$750,000
TOTALS			\$21,100,000

Source: Community Development- Engineering Department, Stormwater Management Plan excerpts

A listing of the necessary upgrades to drainage facilities in the community can form the basis of the Stormwater Management Plan. Knowing the location and condition of all culverts to help guide their

replacement, maintenance, and monitoring regularly will help alleviate some of the run-off and overtop flooding conditions in Concord, particularly those related to washouts.

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

Community Facilities

The Community Facilities inventoried in **APPENDIX A** generally vulnerable to disasters and in need of careful consideration. Some facilities are vulnerable populations, places where people gather, the economic assets of the community, contain the history of the City, or 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 during a hazard event disaster.

Vulnerable Populations Schools include: Beaver Meadow School, Bishop Brady High School, Broken Ground School & Mill Brook School, Christa McAuliffe School, College for Lifelong Learning, Conant School -> Abbott Downing School, Concord High School, Dame School, Eastman School – Closed 6/11, Hesser College, Merrimack Valley High School, Merrimack Valley Middle School, NH Fire Academy, NH Police Academy, New Hampshire Technical Institute, Penacook Elementary, Rumford School, Rundlett Middle School, Second Start, Shaker Road Private School (K-8), St. Paul’s School, Trinity Baptist Church Private School K-12, University of New Hampshire Law Center, Walker School. Some structure values were not available. Assessed structure (only) replacement values for schools total at least **\$250m**.

Vulnerable Populations Multi-Unit Housing include: Alton Woods (384 apartments), Beaver Meadow Village (46 apts), Boucher Apartments (16 apts), Briar Pipe Apartments (77 apts), Brickstone Commons/Morningstar (172 apts), Canterbury Meadows Townhouse (60 apts), Capitol Plaza/Crutchfield Apartments (105 apts), Centerstone Residence (60 apts), Cobblestone Pointe Senior Village (140 apts), Concord Commons Condominiums (60 apts), Concord Gardens/Royal Gardens (300 apts), Parkview Place (76 apts), Concord Park North (36 apts), Cranmore Ridge (200 apts), Eagles Bluff (63 apts), East Side Village/Eastern Ave Apartments (30 apts), Edgewood Heights (120 apts), Endicott Hotel Apartments (24 apts), Family Village 1 (5 apts), Family Village 2 (5 apts), Fire House Block Apartments (68 apts), Penacook Place (150 apts), Florence V. Hodges Apartments (50 apts), Franklin Square (60 apts), Friedman Court I & II (86 apts), Havenwood (113 apts), Heritage Heights (186 apts), Hillside View Apartments (108 apts), Hollis Commons Apartments (60 apts), Horseshoe Pond Place (77 apts), Island Shores Condominiums (265 apts), Kennedy Apartments (82 apts), Farmhouse Apartments (29 apts), Mast Yard West Condominiums (144 apts), McKenna’s Purchase Condominiums (148 apts), Meadow Brook Apartments (120 apts), Mulberry Village Condos (60 apts), Oak Bridge Condominiums (180 apts), Oak Creek (72 apts), Parmenter Place (25 apts), Pembroke Place Apartments (113 apts), Penwood Apts (108 apts), Perley Place (11 apts), Pinewood Village Apartments (68 apts), Pleasant View Retirement Home (72 apts), Prescott Place Apartments (72 apts),

Regency Hill Estates (95 apts), Riverhill Condos (28 apts), Salisbury Green Apartments (226 apts), South Concord Meadows (180 apts), The Pines Apartments (66 apts), Village At Thirty Pines (90 apts), William Haller Apartments (50 apts), Willow Crossing (24 apts), Windsor Estates (18 apts), Prescott Street Apartments (18 apts), Vineyard Terrace (24 apts), Mill Place West (21 apts), Ormond Street Apartments (21 apts), Cirillo Apartments (9 apts), GAA Plaza/Alosa Rentals (58 apts), The Vineyards of Concord (120 apts), Menino Place (45 apts). Many structure values were not available. Assessed structure (only) replacement values for multi-unit housing buildings total at least **\$450m**.

Vulnerable Populations Manufactured Housing Parks include: Alosa's Mobile Homes (65 homes), Concord Terrace (139 homes), Crestwood Estates/ Jensen's Inc (320 homes), Fisherville Co-op (56 homes), Foxcroft Estates (117 homes), Green Acres Mobile Homes/Valley Stream Estates (119 homes), Green Meadows Manufactured Home Park (108 homes), Princess Mobile Homes (6 homes), Riverview Landing (86 homes), Neighboring Pines (22 homes). Assessed structure (only) replacement values for these manufactured housing parks total at least **\$42m**.

Vulnerable Populations Congregate Care Facilities include: Granite Ledges of Concord (70 bed/units), Harris Hill Nursing Home (80 beds/units), Havenwood-Heritage Heights (226 beds/units), Hospice Care at Concord Hospital (10 beds/units), John H. Whitaker Assisted Care (54 beds/units), Pleasant View Center (174 beds/units), Presidential Oaks (290 beds/units), The Birches at Concord (53 beds/units), TLC Medical Daycare for Adults (31 patients). Assessed structure (only) replacement values for these congregate care facilities total at least **\$84m**.

Vulnerable Populations Child Care Facilities include: After School Program – Abbott-Downing School (82 students + 13 staff), After School Program – Beaver Meadow School (38 students + 6 staff), After School Program – Broken Ground School (110 students + 12 staff), After School Program – Christa McAuliffe School/Concord Boys and Girls Club (70 students + 6 staff), After School Program – Concord High School (98 students + 7 staff), After School Program – Mill Brook School (40 students + 8 staff), After School Program – Penacook Elementary School/Penacook Community Center (30 students + 3 staff), After School Program – Rundlett Middle School (95 students + 7 staff), Concord Boys and Girls Club (220 students + 30 staff), Concord Family YMCA Child Center (126 students + 28 staff), Concord Head Start (114 students + 32 staff), Concord High School Child Care Center at Abbott-Downing School (13 students + 3 staff), Discovery Village Early Learning Center (17 students + 4 staff), East Side Learning Center (250 students + 32 staff), Emerson School for Preschoolers (52 students + 4 staff), Second Start (110 students + 55 staff), Second Start (20 students + 7 staff), Girls Inc. of NH (58 students + 6 staff), Head 2 Toe Learning Center (25 students + 4 staff), Merrimack Valley Day Care (50 students + 5 staff), Merrimack Valley DC @ Eagles Bluff (24 students + 4 staff), Merrimack Valley DC @ Jennings Dr. (18 students + 2 staff), Merrimack Valley DC @ NH Hospital (20 students + 4 staff), Presidential Oaks Children's Center (25 students + 5 staff), NHTI Child & Family Development Center (62 students + 20 staff), Penacook Community Center (30 students + 3 staff), Shaker Road Child Care Center (54 students + 10 staff), Step Ahead Learning Center (66 students + 10 staff), Woodside @ St. Paul's School (57 students + 17 staff), The Children's Place (80 students + 5 staff), The Early Enrichment Center (65 students + 14 staff), The Learning Center @ Concord

Hospital (120 students + 27 staff), Woodside School (126 students + 20 staff), The Tot Spot (43 students + 7 staff). Assessed structure (only) replacement values for these child care facilities total at least **\$169m**.

Vulnerable Populations Public Assistance Facilities include: American Red Cross, Colonial Arms Rooming House (21 beds/units), Concord Coalition to End Homelessness Resource Center, Families in Transition (6 beds/units), Families in Transition (10 beds/units), First Baptist Church Food Pantry, First Congregational Church Food Pantry, Friendly Soup Kitchen, Friends Emergency Housing (30 beds/units), Immaculate Conception Church Food Pantry, Jobin Rooming House (3 beds/units), McKenna House Shelter/Group Home (42 beds/units), Oakstream Rooming House – South Street (14 beds/units), Oakstream Rooming House – Warren Street (15 beds/units), Rape and Domestic Violence Shelter (7 beds/units), Rollins Street Rooms (9 beds/units), Salvation Army, St. John’s Church Food Pantry, St. Paul’s Church Food Pantry, Stearns Rooming House (11 beds/units), Whitfield House (11 beds/units). Assessed structure (only) replacement values for these public assistance facilities total at least **\$31m**.

Economic Assets include: those businesses and services that employ a large number of people or contribute to the local economy. Airport Road Industrial Area, Banks Chevrolet-Cadillac-Oldsmobile Inc, (250 employees), Beede Electric, Capitol Shopping Center Area, (~x employees), Granite State College, (80 employees), Concord Center, (100 employees) , Concord Hospital Complex Area, Concord Litho Group, (122 employees), Concord Monitor, (109 employees), D’Amante Drive Commercial Area, Exit 17 Industrial Area, Fort Eddy Road Commercial Area, Gateway Commercial Area, Hood Plant, (147 employees), Horseshoe Pond Development Area, Hoyt Electric, (37 employees), King’s Plaza (formerly) Area, Hall Street Industrial Area, Lincoln Financial, (400 employees), Locke Road/Exit 16 Industrial/Commercial Area, Loudon Road Commercial Area, Manchester Street Commercial Area, NH State Office Park East Area, (~5100 employees), NH State Office Park South Area, (~3425 employees), NH Technical Institute, (184 employees), Opportunity Corridor (Downtown), Sam’s Club, (140 employees), St. Paul’s School, (350 employees), Terrill Park Drive Area, Thirty Pines Area, The Concord Group Insurance Companies, (210 employees), University of NH Law Center, (70 employees) , Wal-Mart, (310 employees), Heights Industrial/Commercial Area. Assessed structure (only) replacement values for these economic assets total at least **\$1.2b**.

Churches include: Blazing Star Eureka Lodge, Carmelite Monastery, Centerpoint Church, Child Evangelism Fellowship, Church of Christ , Church of Jesus Christ of Latter Day Saints, Concord Bible Fellowship, Concordia Lutheran Church , Destiny Christian Church, Dormition of the Theotokos Orthodox, East Congregational Church, Episcopal Diocesan House, Faith Tabernacle Church , First Church of Christ Scientist, First Congregational Church, Gospel Light of God, Grace Episcopal Church, Grace Evangelical Church, Granite State Baptist Church, Holy Trinity Greek Orthodox Church, Immaculate Conception Church, Immaculate Heart of Mary, Immanuel Community Church , Jehovah’s Witnesses Kingdom Hall, New Chapel (SPS), New Life Fellowship, Oasis Christian Church, Old Chapel (SPS), Salvation Army, Seventh-Day Adventist Church , South Congregational Church, St. John’s Church, St. Paul’s Church, St. Peter’s Church, Temple Beth Jacob, Trinity Baptist Church , Unitarian Universal Church , United Baptist Church, United Church of Penacook, Wesley United Methodist Church, West Congregational Church, Word of Life Christian Fellowship. Assessed structure (only) replacement values for these churches total at least **\$85m**.

Cemeteries include: Blossom Hill Cemetery, Calvary Cemetery, Catholic Portion of Woodlawn Cemetery, Hardy Cemetery, Maple Grove Cemetery, Millville Cemetery, NH Hospital Cemetery, Old Fort Cemetery, Old North Cemetery, Pine Grove Cemetery, Soucook Cemetery, Stickney Hill Cemetery, Woodlawn Cemetery. As cemeteries do not generally contain structures, the estimated headstone, mausoleum or columbarium repair value was provided instead. Assessed structure replacement values for these cemeteries total at least **\$4.0m**.

Hazardous Materials Facilities include: 7-Eleven, AASF/National Guard, Advanced Recycling, American Brake Service, Angelo's Concord Car Care, ASA Automotive Supply Assoc., AT&T Broadband, AT&T Wireless, AT&T Wireless, AT&T Wireless, B&G Sheet Metal, Beauregard Equipment, Beaver Meadow Golf Course, Beede Electric, Bow Finishing Co., Boyce Highlands, Bradford Networks, Brownfield Site, Capital Offset Co. Inc. - VACANT, Capitol Farms, Carter Hill Orchard, CED-Twin State Electric Supply, Chadwick-Baross Western Division, Cohen Steel Supply, Comcast of Concord, Comfort Inn, Concord Airport, Concord Coach Lines, Concord Country Club, Concord Hospital, Concord Hospital at Horseshoe Pond, Concord Irving Heating Oil, Concord Litho Group, Concord Monitor, Concord Paper & Chemicals, Concord Photo Engraving, Concord Water Treatment Facility, Cumberland Farms, Cumberland Farms, Cumberland Farms, Cumberland Farms, Duncraft, East Concord Mobil, Eastern Analytical, Electropac, Energy North Propane, Evans Printing, Everett Arena, Exxon Station, Fairpoint, Fairpoint Concord, Fairpoint Garage, Fairpoint Penacook, Grand Central Printing, Guinard's Texaco, Hannaford, HealthSouth Rehab Hospital, Hess Gas Station, Hoyt Electrical, HP Hood LLC, Irving Oil, Johnny Prescott & Son Oil Co, Inc., Johnson & Dix Fuel Corp., LAD Welding and Fabrication, Loudon Rd. Sunoco, Lowes Of Concord, NH, Manchester St. Sunoco, Market Basket, Market Basket, Melexis, Merrill's, Merrimack Sheet Metal, Mobil Service Station, National Grid LNG Facility, NE Motor Freight, New England Positioning Systems, NH Bureau of Radiological Health, NH Dept. of Environmental Services, NH Dept. of Public Health Labs, NH Dept of Transportation, NH Fire Academy, NH State Police Forensic Lab, NH Technical Institute, NHTI Police Standards, Northeast Delta Dental, Pan Am Railway/ Maine Central Railway/ Boston & Maine Railway, Penacook Fiber and Tannery Building, Praxair Surface Technologies, PSNH Oak Hill Substation, Regional MFG Specialists INC, Riverhill Market, Sabbow & Co, Inc – NH Wilbert Vault, Sam's Club, Sanel's Auto Parts, Schwan's Sales Enterprises Inc., Seacoast Scaffold & Equipment, Sears Auto Center, Shaw's Supermarket, Shaw's Supermarket, Shell Service Station, Shell Service Station, Snow Dump Site Airport Road, Snow Dump Site Loudon Road, South Main Mobil, Sprint Inc., St. Paul's Anhydrous Ammonia Systems, St Paul's (Bulk #6 Heating Fuel Storage), St Paul's (Heating Plant), St. Paul's (Hockey Rink), St. Paul's (Science Lab), Star Granite Co., State of NH DOT Sign Shops, Stowe-Woodward Co., Swenson Granite Co., Tennessee Gas Line Dump Station, Tennessee Gas Pipeline, The Home Depot, Thermal Technology, Thirty Pines Market, Transformer Services Inc (TSI), Unital, W.D. Matthews Machinery Co., W.E. Aubuchon, Wheelabrator, White Farm, White Mountain Imaging, Woodpro, WWTP, WWTP #1, WWTP#2, WWTP#3, WWTP#4, WWTP#5. Many of Haz Mat facilities could also be considered Economic Assets. Many structure values were not available. Assessed structure (only) replacement values for hazardous material facilities total at least **\$581m**.

Historic Sites and Buildings include: 2 1/2 Beacon Street (NRHP), Beaver Meadow Brook Archaeological Site (NRHP), Capitol Center for the Arts, Carrigan Commons, Carter Hill Orchard, Chamberlin House (NRHP), Chase Block, Concord City Hall, Concord Civic District (NRHP), Concord Theatre, Downtown

Historic Area, Eagle Hotel (NRHP), Eagle Stable Complex, Eastman Street Historic Area, Endicott Hotel (NRHP), Farrington House (NRHP), Fire Department Headquarters, Franklin Pierce (UNH School of Law), Gas House, Gov. Frank West Rollins House (aka Governor's Mansion) (NRHP), Henry J. Crippen House (NRHP), Leavitt Farm (NRHP), Lewis Downing Jr. House (NRHP), Merrimack County Bank (NRHP), Merrimack County Court House (NRHP), Millville School (NRHP), Morrill Brothers Building, Museum of NH History, NH Division of Historical Resources, NH Historical Society, NH Records and Archives, NH Savings Bank Building (NRHP), NH State House, NH State Library, North Main Street Historic District, Old Post Office – LOB (NRHP), Penacook Historic Area, Phenix Hall, Pierce Manse, Pleasant View Home (NRHP), Reuben Foster House and Perley Cleaves House (NRHP), Rolfe Barn, Sheraton Building, St. Paul's School Complex Area, Upham-Walker House (NRHP), White Farm (NRHP), White Park (NRHP). Many structure values were not available. Assessed structure (only) replacement values for selected historic sites total at least **\$147m**.

Recreational Sites include: Beaver Meadow Golf Course, Beaver Meadow Park, Bicentennial Square, Concord Country Club, Contoocook Park, Eagle Square, Everett Arena/ Skate Park, Fletcher-Murphy Playground, Garrison Park, Grappone Park, Keach Park, Kimball Park, Kiwanis Riverfront Park, Memorial Field, Merrill Park, Reed Park, Rolfe Park, Rollins Park, Russell Martin Park, Sanel Park, Sewalls Falls State Rec. Area, St Paul's Athletic Facility, Terrell Park/Rotary Park, White Park, William P. Thompson Playground, Winant Park, West Street Playground. Some of these are businesses, economic assets to the City. In most cases, assessed structure (only) replacement values for these recreational facilities is Not Available (**\$N/A**). For structures with valuation readily accessible, replacement value of selected recreational sites total at least **\$11.3m**.

Places of Assembly include: Abbott Village Club House, American Legion #21 (90 people), American Legion #31, (~100 people), Annicchiarico Theater, Bektash Shriner's Temple, (~700 people), Bishop Brady High School (~720 people), Camp Spaulding (~192 people), Canterbury Meadows Community Bldg, Capitol Center for the Arts (~1,899 people), City Auditorium (~986 people), Community Players Bldg, Concord Boys and Girls Club (~865 people), Concord (Green St) Community Center (~667 people), Concord Country Club (~332 people), Crestwood Community Center (~180 people), Eagles Club (~220 people), East Side Community Center, Everett Arena (~1,679 people), First Baptist Church Recreation Fields, Grappone Conference Center (~1,544 people), Heights Community Center (~270 people), IBEW Hall (~558 people), Kimball Jenkins Carriage House (~226 people), Knights of Columbus (~125 people), Main Street Conflagration Area, Masonic Temple (~166 people), McAuliffe-Shepard Discovery Center (~1,464 people), Moose Club (~95 people), NH Fire Academy, NH National Guard Armory (~680 people), NH State House, NHTI Farnum Hall, Odd Fellows Hall (~226 people), Penacook Community Center (~369 people), Racquet Club of Concord, Regal Cinema (~1,874 people), Salvation Army (~277 people), Snowshoe Club, St Paul's Blass Club House, St Paul's Gymnasium (~726 people), St Paul's Hockey Center (~1,602 people), St Paul's Memorial Hall (~866 people), St Paul's Tracy Memorial Theatre, VFW Post 1631 (~99 people), West Street Ward House (~192 people), YMCA of Concord, (~300 people). Many structure values were not available. Assessed structure (only) replacement values for places of assembly total at least **\$100m**.

Future Development includes: Thirteen **13** existing approved but unbuilt developments, Abbott Village, Concord Hospital, Oxbow Bluff, Penacook Tannery, The Vineyards, Club 55, Penacook Community Center, Vintage Estates, Bienvenue, Hoit Rd SD, Rivco, State Records Office, John H Whitaker Place. Four (**4**) parcels with potential for industrial, mixed use or single family development, Garvins Falls, Whitney Rd extension, South/North Opportunity Corridor, Angela Way. Many possible future development opportunities lie in the existing large lots for sale, Mountain Road Lots, 86 Bog Road Lot, 63 Bog Road Lot, Snow Pond Road Lot, Sheep Davis Rd- Premier Properties, Stickney Hill Rd Lot, Horse Hill Road Lot. Although the existing future development values are unavailable, the large lots for sale total at least **\$4.2m** for purchase.

COMMUNITY FACILITIES PROBLEM STATEMENTS

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**.

Vulnerable Populations: Schools

- ⊙ Mass evacuations of schools could be problematic; snowloading on roofs, natural gas leak, watermain break, flood could be the most likely causes for mass evacuation. 27 buses available for quick response, send students home. Active snow measuring program.
- ⊙ Some public and private schools would not meet current building codes for earthquake and severe wind events. Three new elementary schools have been built in the last 5 years that do meet these codes.
- ⊙ Parts of the NH Technical College school and property are in the floodplain and could be flooded by the Merrimack River or rapid snow pack melt. Evacuations of staff and faculty would be necessary.

Vulnerable Populations: Multi-Unit Housing

- ⊙ Old mill buildings such as Horseshoe Pond Place, Briar Pipe, Mill Place West plus Pleasant View can have structural issues subject to earthquakes, flooding, wind and snow loading. Some do not have fire suppression.
- ⊙ Excessive heat and cold temperatures can have a negative effect on occupants without air conditioning or who require heat.

Vulnerable Populations: Manufactured Housing Parks

- ⊙ Green Acres and Riverview Landing are subject to flooding from the Merrimack River and Fisherville Co-op is subject to flooding from Beaver Meadow Brook.

- ⊙ All manufactured homes are vulnerable to wind events and severe winter weather (snow, ice load).

Vulnerable Populations: Congregate Care Facilities

- ⊙ Flooding can occur at Horseshoe Pond Place which resides in the floodplain with limited drainage capacity. Lightning, severe winds, severe winter weather, and storms can cause power failure.
- ⊙ Excessive heat is a concern for occupants of those facilities without air conditioners.
- ⊙ Presidential Oaks is over 100 years old and may be subject to earthquakes, severe wind events, severe winter weather (snow).

Vulnerable Populations: Child Care Facilities

- ⊙ Public health is a great concern at child care facilities. If an event occurred, school operations could be suspended, children kept at home and isolated to prevent transmission.

Vulnerable Populations: Public Assistance Facilities

- ⊙ Getting emergency services to public assistance facilities or evacuating people/goods from PA facilities could be problematic if flooding, severe rainstorms, severe winter weather or snow storms occur.
- ⊙ Public health is a great concern at public assistance facilities. If an event occurred, operations could be suspended, people to be sheltered in place and isolated to prevent transmission.

Economic Assets

- ⊙ Disruption of economic assets can have a negative impact on employment and income for large numbers of people, requiring additional social services.
- ⊙ The NH State Office Parks and (Concord Steam to be CLOSED May 31) may not have continuity of operations plans (COOPs) during natural disasters.

Churches

- ⊙ Houses of worship are an important community, historical, and cultural resource and they are irreplaceable should lightning, severe winter weather or severe wind events occur to damage the buildings.
- ⊙ Several faith organizations provide key community support services and vulnerable members of the community would lose a key resource if damaged by fire, earthquake or lightning.
- ⊙ South Church was struck by lightning recently with minor damage.

Cemeteries

- ⊙ Cemeteries are a crucial community and historical resource and many grave markers are very old and in brittle condition subject to natural disasters such as severe winds, tree debris, snow loads.
- ⊙ Blossom Hill Cemetery regularly suffers from vandalism, where headstones are spray-painted, displaced and sometimes broken; mausoleum break-ins also occur.

Hazardous Materials Facilities

- ⊙ Farm stores (Agway on Route 106) can be especially subject to fires and lightning because of the pesticides and fertilizers on site.
- ⊙ Fires at hazardous materials facilities create detrimental air quality to thousands of Concord residents (Stratham Tire, April 15).
- ⊙ Wildfire, heavy snowload and earthquake could create significant life safety hazards at the historic White Farm during their auctions (~300 people).

Historic Sites and Buildings

- ⊙ In addition to their historic value, many of these resources house key government and nonprofit operations which would be displaced if severe winter weather (ice storms), wildfire, severe wind events, impeded traffic/evacuation, utilities and communications (COOPs).
- ⊙ The age of these structures makes them more vulnerable to destruction by fire, earthquake, and other natural hazards.
- ⊙ The downtown conflagration area is filled with historic multi-story buildings (brick, wood) and is vulnerable to fire (lightning) because of age and proximity to one another. Evacuation problems may result as well as difficulty responding adequately to such a congested area.
- ⊙ The Gas House is structurally unsound; if an earthquake, heavy snow load or wind events occur, portions of the building might collapse.

Recreational Sites

- ⊙ Beaver Meadow Golf Course has had many reported tornado- like and microburst events occurring on the green.
- ⊙ Open area parks are hazardous during lightning strikes and thunder storms.
- ⊙ Heely Park (Basin St, Exit 13), Reed Park (Hall) and Kiwanis Parks are subject to severe Merrimack River flooding and the riverbank is subject to erosion.

Places of Assembly

- ⊙ Places of assembly are a key component of the health and vitality of community organizations which would be negatively impacted if they are lost or damaged.

- ⊙ Some of the facilities (West Street Ward House) are historical buildings and are vulnerable to severe winter weather effects such as snowloading.
- ⊙ The NH State House could be subject to lightning strikes with its gold leafing and high spires and severe winter weather, hurricane & wind events, and earthquake could compromise its structural stability.

Future Development

- ⊙ Many of the residential properties for sale along Bog Road and Borough Road are subject to flooding and resulting property damage.
- ⊙ Cobblestone Point, 65+ older independent living, 140 units are behind Home Depot in the wooded area and could be subject to wildfire.
- ⊙ Tannery site has been mitigated, underground material was removed through EPA grants.

Many of these problem statements were developed into Actions discussed later in **7 POTENTIAL ACTION EVALUATION** 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 Concord. This section estimates City-wide structure/building damage in City 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 Concord 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. Concord 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 City 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 *Vision Appraisal* and the Central NH Regional Planning Commission.

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 February 2017 is **14,793**, including condominium units. **Using the City’s February 2017 Vision Appraisal assessment System, the total assessed value of all residential and non-residential structures in Concord (\$3,731,220,000) is the basis for loss estimation calculations.**

Potential Building Dollar Losses by SFHA Flooding

Assessing records were linked to parcels in the Geographic Information System (GIS) and floodplain data developed by City Planning Division. Building type was characterized into one of five categories. The categories are single-family homes, multi-family homes, manufactured homes (residential buildings), manufacturing/industrial and retail/commercial/non-profit governmental buildings (non-residential buildings). **Land value, building content value and infrastructure were not considered in these calculations.** **Table 29** illustrates this data.

Table 29
Building Value in the Special Flood Hazard Areas (SFHAs)

Building Type	Number of Buildings	Total Value of Buildings	Average Replacement Value
Single Family Homes	146	\$12,767,200	\$87,447
Multi-family Homes	13	\$4,978,000	\$382,923
Manufactured Homes	182	\$4,534,200	\$24,913
Manufacturing/Industrial Business	10	\$9,120,400	\$912,040
Retail/Commercial/ Non-Profit/Governmental	110	\$210,136,400	\$1,910,331
Totals	461	\$241,536,200	-----

Sources: City of Concord Assessing records linked to parcels in GIS and floodplain developed by City Planning Division, 02-17; 2010 DFIRMs

In **Table 29**, **146** single family residential homes, **13** multi-family homes, **182** manufactured homes, **10** manufacturing/industrial business buildings and **110** retail/commercial/non-profit/governmental buildings were considered to be situated the Special Flood Hazard Areas (SFHAs), totaling **461** buildings. The average replacement value is **\$87,000** for a single-family home and **\$25,000** for a manufactured home, while a retail building is **\$1.9m**. The total value of all buildings in the Special Flood Hazard Areas is about **\$241.5m** for the **461** structures.

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, and land value and the contents of structures have not been included in these estimates in the following figures.

Table 30 represents the **worst case scenario of all** building types within the Special Flood Hazard Area that are damaged by a flood hazard event.

Table 30

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	\$12,767,200	\$6,255,928	\$3,574,816	\$2,553,440
Multi-family Homes	\$4,978,000	\$2,439,220	\$1,393,840	\$995,600
Manufactured Homes	\$4,534,200	\$2,221,758	\$1,269,576	\$906,840
Manufacturing/Industrial Business	\$9,120,400	\$4,468,996	\$2,553,712	\$1,824,080
Retail/Commercial/ Non-Profit/Governmental	\$210,136,400	\$102,966,836	\$58,838,192	\$42,027,280

Sources: See **Table 29**; FEMA

If all of the **146** single family homes were damaged by a **Two-Foot Flood (20% Damage)**, the dollar damage to the buildings *only* could be **\$2.6m** while an **Eight-Foot Flood (49% Damage)** could yield **\$6.3m** in damage. If all of the **110** non-residential buildings were damaged in the same **Two-Foot Flood (20% Damage)**, replacement costs could total **\$42.0m** versus an **Eight-Foot Flood (49% Damage)** of **\$103.0m** in damage. Dollar damage estimations vary according to the standard percentages of damage levels associated with flooding levels set by FEMA. **Content, land and infrastructure values are not included.**

Table 31 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 31
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	\$87,447	\$42,849	\$24,485	\$17,489
Multi-family Homes	\$382,923	\$187,632	\$107,218	\$76,585
Manufactured Homes	\$24,913	\$12,207	\$6,976	\$4,983
Manufacturing/Industrial Business	\$912,040	\$446,900	\$255,371	\$182,408
Retail/Commercial/Non-Profit/Governmental	\$1,910,331	\$936,062	\$534,893	\$382,066

Sources: See Table 29; FEMA

If one single family home was damaged by a **Two-Foot Flood (20% Damage)**, the projected dollar damage to the building *only* could be about **\$17,500** while an **Eight-Foot Flood (49% Damage)** could yield over **\$43,000** in damage. If damage was sustained to one retail/commercial building, the projected dollar damage could be **\$382,000** from a **Two-Foot Flood (20% Damage)** up to **\$1.9** for an **Eight-Foot Flood (49% Damage)**. *Content, land and infrastructure values are not included.*

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 SFHA.

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 City. **The assessed value of all residential, commercial, and industrial structures in Concord is \$3,731,220,000 (no land).** Disaster damages are often illustrated in the following section utilizing a percentage range of City-wide building damage. At **18,852** housing units in Concord from the US Census 2010, disaster impact to **10%** of them would yield **1,885** damaged units.

The inventory of City 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 City 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.

Wind Events

Damage caused by wind events such as **tropical storms & hurricanes, downbursts, tornadoes** and **severe wind storms** can be both excessive and expensive. The assessed value of all residential, commercial, and industrial structures in Concord is **\$3,731,220,000** (no land).

With a scenario range of **1% to 5%** of buildings damaged by wind events throughout the City, a wind event could potentially cause up to **\$37.3m (for more localized downburst, high winds, or tornadoes)** to **\$186.6m (for more damaging and widespread tropical storms and hurricanes)** in building-only damage costs alone, not including contents, infrastructure, or land.

Severe 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 Concord in the past. These hazards and secondary impacts are a risk to the community, including isolation, more falls, (especially by the older residents), and the potential for roof collapse. Damage caused by this type of hazard varies according to wind velocity, snow accumulation, and duration.

With a scenario range of **1% to 5%** of buildings damaged throughout the City, **severe winter storms** could potentially cause up to **\$37.3m to \$186.6m** in building-only damage costs.

Rapid Snow Pack Melt

Flooding caused by **rapid snow pack melt** is often found along roadways and from watercourses such as rivers like the Merrimack River, Soucook River, Contocook River, Turkey River and brooks in the City. Those locations which are particularly susceptible would be the floodplain, wetlands, along roadways, and especially along hilly roads, but anywhere the water cannot yet percolate into the frozen ground could be vulnerable.

With a scenario of **0.5%** of buildings flooded throughout the City, **rapid snow pack melt flooding** could potentially cause over **\$18.7m** in building-only damage costs alone, not including contents, infrastructure, or land.

River Ice Jams and Debris Impacted Infrastructure

Ice jams on the Merrimack River, Soucook River, Contoocook River, Turkey River would be the major causes of **ice jam flooding** and **debris impacted infrastructure** in Concord. Multiple bridges on I-93, I-89, I-93 and state and local roads that rest on top of these watercourses were identified previously. Multiple additional small streams culverts and drainage systems abound. The **2017-2026 NH Department of Transportation Ten Year Plan (TYP)** provides many examples of basic cost estimates bridge replacement and rehabilitation. Within or near the Central NH Region rehabilitation of small local bridges can average **\$450,000** while replacement of small local bridges can average over **\$600,000**.

This average figure of **\$600,000** can be used for one (1) local bridge replacement in Concord 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 **\$450,000**.

Or, if half of the **146 (73)** 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 **\$1.3m** in building damage costs.

Earthquake or Landslide

Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric, and phone lines and are often associated with landslides and flash floods. Older buildings that are not built to a high seismic design level could be susceptible to structural damage. Downtown and Penacook could be more vulnerable to earthquakes as more buildings are older, have wooden frames, are built on rock foundations or are not built to modern codes. 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**.

With a scenario of **0.5%** of buildings damaged throughout the City, an **earthquake** or **landslide** could potentially cause up to **\$18.7m** in building-only damage costs alone, not including contents, infrastructure, or land.

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. Fire danger is generally universal and could occur at any time. 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 City, a **wildfire** could potentially cause up to **\$37.3m** in building-only damage costs alone, not including contents, infrastructure, or land.

Lightning

Damage caused by **lightning** would not be City-wide because it typically strikes in smaller areas. Few places in Concord are at specific risk but lightning strikes can cause fires or harm people in open spaces. Damage costs will vary according to the value of the structure and the contents inside, and scale of damage would depend on if the hazard hit an area with a high density of buildings.

With a scenario of **0.5%** of buildings damaged throughout the City, a **lightning** strike could potentially cause up to **\$18.7m** in building-only damage costs alone, not including contents, infrastructure, or land, through fire spreading.

Drought

Drought is often declared on state-wide or region-wide basis, and sometimes by individual City. 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, orchards, farms, and nurseries would be most affected. Concord has a number of popular farms and orchards that sell their produce and products seasonally.

As physical damage is usually isolated to specific locations, the effects of potential disasters at certain facilities could be researched utilizing the City's assessor's database for valuation on targeted land. Agricultural land may be among the most affected by drought. People in the less urban areas who rely on well water, which is nearly all of the community, might find their wells running dry during long periods of extreme drought, especially dug wells. The City has about **3,100** acres, or **7%** of its land, in agricultural use which could be physically and economically damaged by a **drought**.

Severe Winds, Rainstorms and Thunder Storms

This general **storm** hazard crosses into other hazards previously mentioned, including the **wind events**, **flooding** and **lightning**. 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.

When buildings are damaged, any of the separate hazard events (**wind**, **flood**, **hail** or **lightning**) could have debilitated the structures. With a scenario of **0.5%** of buildings damaged throughout the City, a **rainstorm** or **thunderstorm** could potentially cause up to **\$1.0m** in building-only damage costs alone, not including contents, infrastructure, land or through **fire** spreading from **lightning**.

Extreme Heat

Similar to **drought** cataloged above, **extreme heat** can harm landscaping and agriculture. 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. In this manner, extreme heat is not measurable for dollar damage. An inventory of **Vulnerable Populations** was undertaken which can be used by emergency responders to ensure susceptible people remain healthy.

Critical Facilities Buildings

These dozens of essential facilities, utilities, dams, bridges, and shelters and medical facilities inventoried in **APPENDIX A Critical and Community Facilities Vulnerability Assessment** provide the **Structure Only Value \$** from the City's February 2017 Vision Appraisal assessment System. Multiple hazards are identified which may damage each inventoried building. Therefore, if the City wanted to ascertain the damage cost from any natural hazard to an individual critical facility, this dollar value is available for evaluation.

Community Facilities Buildings

Dozens of community facilities such as vulnerable populations, recreation and gathering sites, historic sites, economic assets, hazardous materials facilities, and more are inventoried in **APPENDIX A Critical and Community Facilities Vulnerability Assessment** provide the **Structure Only Value \$** from the City's February 2017 Vision Appraisal assessment System. Multiple hazards are identified which may damage each inventoried building. Therefore, if the City wanted to ascertain the damage cost from any natural hazard to an individual critical facility, this dollar value is available for evaluation.

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 Concord 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/floodsmart/pages/about/nfip_overview.jsp.

Concord has been a participant in the National Flood Insurance Program (NFIP) since **March 1980**, the date of the City’s first effective National Flood Insurance Rate Maps (FIRMs). The original Flood Insurance Study (FIS) was also dated **September 1979**.

In the present day, Concord’s effective FIRMs are digital (DFIRMS) dated **April 19, 2010** as is the Merrimack County Flood Insurance Study (FIS) which includes Concord (community **#330110**); individual community FIS are not being developed. These newest documents were adopted by the City Council and supercede all previous FIRMs and FISs. **Table 32** summarizes the historical background of the City’s NFIP effective dates.

Table 32

NFIP History of Concord – Effective Dates

Flood Insurance Study (FIS)	Flood Insurance Rate Maps
September 1979	March 4, 1980
August 3, 1999	August 3, 1999
April 19, 2010	April 19, 2010

Source: Merrimack County Flood Insurance Study (FIS) Table 7, 2010; Bibliography p. 65

CONCORD’S NFIP STATISTICS

In **Table 33** 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 City. Three snapshots in time, one from each of Concord’s **Hazard Mitigation Plan** versions, display the number of NFIP policies in force and paid loss statistics between **January 2006 – December 2016**.

In December **January 2006**, the number of NFIP flood insurance policies in force was **84**, which rose slightly to **120** in **2012**, then fell to total **106** policies by **December 2016**. The increases between **2006** and **2011** can be explained by the significant flooding events damaging properties in Concord between **2005-2008**. The lack of additional purchase could be influenced by the recent changes in flood insurance regulation and cost, however only **14** policies were cancelled.

Over this same period of time, the number of paid losses to individuals through the NFIP since 1979 remained at **36** claimed losses (**\$233,000** paid) from **March 2011** to **December 2016**.

Table 33
History of NFIP Policy and Paid Loss Statistics

Date	Policies in Force	Insurance in Force	Number of Paid Losses (since 1980)	Total Losses Paid (since 1980)
January 2006	84	\$18,317,600	15	\$13,355
March 2011	120	\$27,718,400	36	\$232,736
December 2016	106	\$26,261,600	36	\$232,736

Source: Concord Hazard Mitigation Plans 2005 & 2012, FEMA last accessed 02-17

Table 33 also illustrates that while the entire City of Concord is eligible to purchase flood insurance, only **106** parcels out of the **14,793** total parcels in the community are insured against flooding. As described previously, a total of **461** homes and non-residential buildings are approximated to be situated in the Special Flood Hazard Areas (SFHA). This leaves many uninsured in the SFHA for when the next flooding event occurs in Concord. However, flooding conditions can occur anywhere in the community due to runoff, debris impacted infrastructure (culverts), drainage overflow, rapid snowpack melt, road washouts, etc. The vast majority of properties in City are uninsured for when the next flooding event occurs in Concord.

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**.

Concord has **3** repetitive loss properties, the latest claims of which were submitted for the **2006-2007** flooding events. (See **4 HAZARD RISK ASSESSMENT**). **Table 34** displays the repetitive loss data:

Table 34
Number of Repetitive Loss Properties

Building Type	Number of Repetitive Loss Properties as of 12-12
Single Family	2
Multi-Family	0
Non-Residential	1
Total Properties	3

Source: NH Office of Energy and Planning on behalf of FEMA, December 2012

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 Concord

A Community Assistance Visit (CAV) is a process required by the National Flood Insurance Program (NFIP) as a way of reviewing a City's compliance with established floodplain regulations to be sure that they meet NFIP requirements. If the City 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.

If the NH Office of Energy and Planning (NHOEP) identifies Concord as a repetitive loss community, which is based upon **Table 34** data, a new CAV will be undertaken every five years or if there is a severe flooding event. This would classify Concord as a Tier 1 community. Otherwise, a telephone call may be made to the community every 5-10 years or otherwise as needed (classified as a Tier 2 community).

Since three rivers run through or adjacent to Concord, a high risk of future flooding is present. Several steps have been taken to help plan for the flooding hazard in terms of life and property protection, and possibly provide necessary recovery assistance should such a flooding threat arise. The City contains **3** repetitive loss properties and is a Tier 1 community.

A NH Office of Energy and Planning representative conducted a Community Assistance Visit in Concord with City staff on **July 22, 2009**. The representative reviewed the ordinance and regulations, administration and enforcement, floodplain maps and study, and the City's floodplain management program, biennial report data. Procedural recommendations were made, including all development in the Special Flood Hazard Area requires a permit, keeping elevation certificates on file, and not making flood zone determinations for lenders or insurance agents.

This was the last known CAV as of NHOEP **2012** records. Although Concord is a repetitive loss community, there have been no significant flooding events since the last Plan. A follow-up CAV may have been made to the City by NHOEP before this Plan expires to review Community Development-Building Department procedures and the contents of the Floodplain Ordinance, Subdivision Regulations and Site Plan Review Regulations. Following this basic community assistance schedule, another CAV would be anticipated for **2017** or soon thereafter.

Floodplain Ordinance Amendments

The City of Concord has a Floodplain Development District (**Flood Hazard Overlay District**) that has adopted all the required FEMA revisions to its ordinance.

The City's first adoption of flood zone management was based on a study of the Merrimack River from the Bow town-line to the Sewalls Falls Dam performed by the Army Corp of Engineers and was adopted in **1973 or 1974**. The Federal Emergency Management Study (FEMA) and the Federal Insurance Administration (FIA) conducted additional flood insurance studies that were presented to the City of Concord in **September 1979** and in **August 1999**. The goal and purpose of the studies were to examine the risks and relevance of flooding risks to Concord. The two FEMA studies examined the three major rivers in Concord, the Soucook, Contoocook, and Merrimack in terms of their history of flooding, geography of the areas along their banks, and seasonal changes. The **1999** FEMA study also included the Turkey River, Little Turkey Pond, Great Turkey Pond the Hoyt Road Marsh, plus Hayward, Hackett, Snow's and Mill Brooks. This latest study uses the compiled information and converts it into flood insurance criteria. FEMA and FIA also promote the local and state governments to adopt flood plain management programs (dams for flood controlling, etc.).

The last Floodplain Zoning regulation revisions were in **March 2008** to correct and add language and in **2010**, when the City adopted the new FEMA effective Digital Flood Insurance Rate (DFIRM) maps dated **April 19, 2010**.

In the Concord Zoning Ordinance is a section regarding zoning in the **Flood Hazard District**. The district was established for several reasons, including the protection of the public and occupants of the floodplain from flooding damage; reduction of flooding hazards; and the maintenance and preservation of the floodplain areas so that they are optimal in their ability to hold, store, and release precipitation runoff. There are five floodplain zones in Concord, listed in order of highest risk of flooding to lowest: (1) the floodway and F2 Districts, (2) the 100-year and the F1 floodplain Districts, and (3) the 500-year floodplain Districts. Depending on the zones, many uses are prohibited (the closer to the river, the more uses are prohibited); storage of toxic or hazardous materials is not allowed in any of the aforementioned zones.

It should be noted that the City's Ordinances include regulations that exceed those of the NFIP. In the area along the Merrimack River from the Bow town-line to the breached Sewalls Falls Dam, the City adopted the recommendations of the Army Corps Engineers and requires minimum floor elevation averaging approximately 4 feet higher than the 1999 FEMA Study. In the area along the Merrimack River above the Sewalls Falls Dam, the City requires minimum floor elevations 2 feet higher than the 1999 FEMA Study. For areas adjacent to all other water bodies that were studied, the City requires minimum floor elevations 1 foot higher than the 1999 FEMA Study. Another significantly more conservative City regulation is the prohibition of dwelling units from being located in the FEMA 100 year floodplain and the F1 floodplain.

NFIP Familiarity in Concord

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 City staff and volunteers in top form. In order to reduce flood risks, the Building Inspector, City Planning staff, City Assessor, volunteer Planning Board members, and other City staff whose duties include review/inspection of development or construction, should be familiar with the Floodplain Ordinance and the NFIP. City staff is well-versed in managing the NFIP and **Flood Hazard District Ordinance** in Concord.

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 Energy and Planning (NHOEP) 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://www.training.fema.gov/is/searchis.aspx?search=Flood&all=true>.

An essential step in mitigating flood damage is City and property owner participation in the NFIP. Concord should work to consistently enforce NFIP compliant policies to continue its participation in this program. Property owners are often required by their mortgage lenders for proof that the properties in question are not located in a Special Flood Hazard Area. To determine whether NFIP flood insurance is required, property surveys are completed to obtain a Certificate of Elevation which is kept on file at City Hall. 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 City to ensure future flood maps are corrected.

When possible, City staff should try promote flood insurance to property owners in City; only **106** properties out of the **14,793** parcels in Concord are protected by flood insurance and currently take advantage of the NFIP insurance opportunity.

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 **Concord Hazard Mitigation Plan Update 2017**.

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**.

<u>Capability Assessment Types</u>
Planning & Regulatory
Administrative and Technical
Financial Resources
Education and Outreach

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 City; 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 **2012 Hazard Mitigation Plan**; and Future Improvements to the Capability.

City Capabilities

A summary of the items within the four Capability tables is provided here to offer a portrait of resources Concord 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 City’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 City 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

PLANNING AND REGULATORY CAPABILITIES

The planning and regulatory capabilities displayed in **Table 35** are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards. There are 3 categories: Plans, Codes, and Regulations. Most of the documents listed below are the City’s documents, but others are School, local, regional, state and federal which support the City’s the hazard mitigation goals, objectives, and/or Actions.

DEPARTMENT ABBREVIATION KEY:

CD	Community Development Department
CSD	Concord School District
FD	Fire Department
EM	Emergency Management
GS	General Services
IS	Information Services Department
LI	Library
MVSD	Merrimack Valley School District
PD	Police Department

Table 35

Planning and Regulatory Capabilities

Latest Adoption or Version Date	Capability Assessment: Planning and Regulatory Resources	Description Related to hazard mitigation planning and coordination	Location of Capability Entire City or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2012)	Future Improvements to Plans
PLANS							
March 2015	EM Emergency Operations Plan	City of Concord Emergency Operations Plan was adopted in 2015. Has Hazard specific annexes, Wind Events, Wildfires, Terrorist Acts, Earthquake.	Entire	High	Emergency Management Director	Updated from 2005 version in 2015	Continue to update about every two years. Working on an exercise schedule with HSEM.
October 2016	FD Facility Pre-Incident Plans Program	City wide program of facility preplans. Each of the 20 field officers is responsible for updating 4 per year (about 80 per year). Some facilities include those of the Appendix A- CCFVA. Have about ~300 Plans in program.	Entire	High	Fire Chief	Approximately 300 facilities added or updated since 2012.	Continue to update, add to Plans annually (~80 per year updated).
March 2015	EM EOP ESF-6 Mass Care and Shelter	Updated ESF-6 (Emergency Support Function), Mass Care/Shelters portion in conjunction with the Capital Area Public Health Network	Entire	High	Emergency Management Director	Updated in 2015	Continue to review and update through the public health network.
March 2015	FD Hazard Specific Annex for Wind Events (EOP)	March 2010 event spawned the development of the newest Plan based on national standards. More generic. Some overlap between the EOP Hazard Specific Annex.	Entire	Moderate	Emergency Management Director	Updated	Continually monitor and update.
June 2015	GS Water Treatment Plant Vulnerability Assessment Report and Emergency Response Plan	On file with NH DES and EPA. Plans provide continuity of operations during an emergency at the facility	Water Treatment Facility at Penacook Lake	Moderate	Water Superintendent	Updated in 2015	Update contact information with NH DES and EPA. Revise in 3 years.
June 2015	GS Wastewater Treatment Plant Vulnerability Assessment Report and Emergency Response Plan	On file with NH DES and EPA. Plans provide continuity of operations during an emergency at the facility	Wastewater Treatment Plant on Hall Street	Moderate	Wastewater Superintendent	Updated in 2015	Update contact information with NH DES and EPA. Revise in 3 years.

City of Concord, NH Hazard Mitigation Plan Update 2017

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 City or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2012)	Future Improvements to Plans
April 2012	EM Hazard Mitigation Plan Update 2012	FEMA-approved Plan to mitigate the risk of natural hazards	Entire	High	Emergency Management Director	Update began 09-16 to complete in 04-17	Complete regular updates to Action Plan annually, other sections.
June 2008	CD Open Space Plan	Makes recommendations for preservation of open space and identifies land for future preservation	Residential Open Space District	High	Community Development – Planning	Update began July 2016	Update as the Plan as implemented (purchase of parcels).
September 2016	EM Public Elementary Schools Emergency Management Plans (1 for each School)	Plans detail staff and admin responses to natural disaster and human events	1. Christa McAuliffe, 2. Abbott-Downing, 3. Beaver Meadow, 4. Penacook Elementary, 5. Mill Brook, 6. Broken Ground	High	Emergency Management Director	Updated in 2016, annually	Revisit plans in 2017
September 2016 (Rundlett), April 2012 (MVSD)	EM Public Middle Schools Emergency Management Plans	Plans detail staff and admin responses to natural disaster and human events	1. Rundlett Middle School, 2. Merrimack Valley Middle School	High	Emergency Management Director	Updated in 2016, annually (Rundlett)	Revisit plans in 2017
September 2016	EM Public High School Emergency Management Plans	Plans detail staff and admin responses to natural disaster and human events	1. Concord High School, 2. Merrimack Valley High School	High	Emergency Management Director	Updated in 2016, annually	Revisit plans in 2017
2011	EM Private School Emergency Management Plans	Provides staff and students with several response methods to critical incidents ranging from armed intruder to natural disasters	1. Bishop Brady, 2. St. Paul's School, 3. Concord Christian Academy, 4. Parker Academy, 5. Washington Street School, 6. Shaker Road School	High	Private School Boards, assistance of City Emergency Management Director	Current	Needs to be revisited by the individual schools for updating staff and training opportunities
June 2015	EM Soucook River Addendum to the	Study by the NH Geological Survey and compiled by CNHRPC.	Soucook River	Moderate	Emergency Management Director	Developed in 2015	Evaluate the Assessment and consider

City of Concord, NH Hazard Mitigation Plan Update 2017

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 City or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2012)	Future Improvements to Plans
	Hazard Mitigation Plan	Plan described conditions of the river, developed maps and actions developed by City.					undertaking relevant Actions
June 2015	EM Turkey River Addendum to the Hazard Mitigation Plan	Study by the NH Geological Survey and compiled by CNHRPC. Plan described conditions of the river, developed maps and actions developed by City.	Turkey River	Moderate	Emergency Management Director	Developed in 2015	Evaluate the Assessment and consider undertaking relevant Actions
June 2008	CD Master Plan	Identifies goals and objectives of the City regarding land use, transportation, open space, economics, housing	Entire	High	Community Development – Planning	Used by Planning Department during operations	Update the sections of the Master Plan within the next 5 years
2006	CD Concord Airport Master Plan	The purpose of the Airport Master Plan is to identify and inventory existing conditions, predict future aviation demands, and develop a plan to remedy existing deficiencies and anticipate future needs	Concord Municipal Airport	High	Community Development – Engineering	Used by Planning Department during operations	Update scheduled for 2020
BUILDING CODES, PERMITTING, INSPECTIONS							
2006	CD Building Code Provisions to Reduce Earthquake and Wind Damage	Continued use of building code provisions related to seismic and wind events.	Entire	High	Community Development – Code Administration	Codes used during permitting process	Continue the plan to adopt new codes
2015	FD Ordinance Updated the Fire Code to 2015 Edition	Provides regulations to safeguard people and property from the effects of hostile building fires	Entire	High	Fire Chief	New code adopted in 2015	Continue to revise and update ad new codes become available every 3 years
April 19, 2010	CD FEMA Flood Insurance Rate Maps	Adopted by City, used for Merrimack River, Soucook River, Contoocook River, Turkey River, streams, brooks	Floodplains	High	Community Development	FEMA has not provided new maps since then	Continue using maps in City offices and noting any substantial deviations

City of Concord, NH Hazard Mitigation Plan Update 2017

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 City or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2012)	Future Improvements to Plans
LAND USE	PLANNING,	ORDINANCES,	REGULATION				
2005	CD Zoning Regulation to Reduce Fire Risk	Continued use of Zoning Regulations to assist the Fire Department with access to help reduce the risk of fire from natural hazards.	Entire	High	Community Development – Code Enforcement and Planning Division	Updated to street construction requirement referred to by Zoning	Continue to update as needed per Fire Department equipment needs
July 2010	CD Zoning and Planning Regulations to Reduce Flood Risk	Continued use of Zoning and Planning Regulations, specifically floodplain / floodway regulations, aquifer protection, wetlands and drainage regulations.	Entire	High	Community Development – Code Enforcement and Planning Division	Used by Planning Department during operations	Continue to update as needed per DES and FEMA
July 2010	CD Zoning and Planning Regulation to Reduce Blockage of Transportation Network	Continued use of Zoning and Planning Regulations to ensure that roadways have adequate traffic flow and level of service so as emergency responders are not delayed.	Entire	High	Community Development – Planning Division	Used by Planning Department during normal operations	Continue to utilize and update
July 2010	CD Zoning and Planning Regulations to Reduce Landslides and Erosion Risk	Continued use of Zoning and Planning Regulations, specifically steep slope regulations, and bluff setbacks	Entire	High	Community Development – Planning Division	Used by Planning Department during normal operations	Possible revision to buffer to bluff regulations to account for all steep slopes and not only those adjacent to water bodies.
April 2010	CD Aquifer Protection Ordinance	Restricts/regulates hazardous materials in proximity to potable groundwater supplies. Reduces groundwater contamination risk.	Over Aquifers	High	Community Development – Planning Division	Used by Planning Department during normal operations	Revise as needed in response to updated information on hazardous materials and best management practices.

Source: Concord Hazard Mitigation Committee

ADMINISTRATIVE AND TECHNICAL CAPABILITIES

The administrative and technical capabilities in **Table 36** include staff, volunteers, and their 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: Admin Programs, Staffing, and Technical Capabilities.

Table 36

Administrative and Technical Capabilities

<u>Latest Adoption or Version Date</u>	<u>Capability Assessment: Administrative and Technical</u>	<u>Description Related to hazard mitigation planning and coordination</u>	<u>Location of Capability Entire City or Selected Areas</u>	<u>Level of Effectiveness</u>	<u>Responsibility</u>	<u>Changes Since Last Haz Mit Plan (2012)</u>	<u>Future Improvements to Procedures/Resources</u>
ADMINISTRATIVE		PROGRAMS , POLICIES	PROCEDURES	AND	MUTUAL	AID	
January 2016	FD Capital Area Fire Mutual Aid Compact	Participate with the Capital Area Fire Mutual Aid Compact. 23 agencies. Concord has dispatched resources during several recent events around the State.	Entire City, and resources to other communities	High	Fire Chief	Town of Hillsborough added in 2013	Continue to ensure the Compact has an active exercise schedule and mutual aid drills, and that the communications center supports subscribers.
October 2016	FD Central NH Hazardous Materials Response Team	Participate in regional Hazardous Materials Response Team. Covers 53+ communities.	Entire	High	Fire Chief	New members and equipment added to team.	Continue to participate in exercise schedule.
March 2010	FD Windstorm Preparation Procedures	Following February 2010 windstorm, the after action report (AAR) reported a number of steps to improve emergency response procedures and the recommend adoption of model procedures which align with best practices for storm response.	Entire	Moderate	Fire Chief	No changes, have not yet had another incident to apply	Incorporate into Fire Department procedures through adoption of the model. Continually monitor and update
Late 2016	FD Standard Operating Guidelines	Haz Mat response, tactical procedures, active shooter incidents, water rescue, rural and urban fire tactic policies, mass casualty, state prison response.	Entire	High	Fire Chief	Most been updated since last Plan, including active shooter	Continue to revise as changes in industries appear
2014	FD NH Federation of Mutual Aid's	Participate with the NH Federation of Mutual	Entire	Moderate	Fire Chief	New statewide	. Ongoing training and

City of Concord, NH Hazard Mitigation Plan Update 2017

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 City or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2012)	Future Improvements to Procedures/Resources
	Statewide Mutual Mobilization Program	Aid's statewide mutual aid program. Statewide Mutual Mobilization Program is currently being worked on. City participates in the update. The plan is for moving resources to the State to handle major fire emergencies.				mobilization plan adopted in 2014.	exercises in statewide mobilization plan.
Late 2016, certification updated	FD Mass Decontamination Policy and Program	Maintain a Mass decontamination policy and program. City can perform quickly. Every fire fighter is decontaminated. Large amount of time and resources put toward the program.	Entire	High	Fire Chief	Regular training was held on decontamination procedures	Continue refresher training for all FD employees.
2015	FD Response Policy for All Potential Incidents 2010	Response Policy for all potential incidents, updated in 2010. Specifies the level of resources committed to several potential incidents. The plan is the most revisited in the FD. Very detailed	Entire	High	Fire Chief	Updated in 2015, reviewed annually	Plan is under cost analysis and revision currently. Continually monitor and update.
October 2016	FD Hazardous Materials Response Plan & Inventory	Hazardous Materials Response plan and Inventory from Central NH Regional Haz Mat team	Entire	High	Fire Chief	Document was updated	Staff will continue to lead the Team and develop updates as needed
2006	FD Response Policy for State Prison Incidents	Response Policy for State Prison incidents	NHSP	High	Fire Chief	This stable procedure was followed when needed	Continue to review with NH DOC & update for changes
2016	FD Mass Casualty Incidents Policy	Department policy on Mass Casualty Incidents, updated along with active shooter	Entire	High	Fire Chief	Recently updated	Annually review and update.
2016	FD Emergency Recall of Personnel Program	Maintain a program for emergency recall of personnel	Entire	High	Fire Chief	Updated to reflect software for new personnel -	Continue to modify as technology evolves

City of Concord, NH Hazard Mitigation Plan Update 2017

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 City or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2012)	Future Improvements to Procedures/Resources
						IamResponding	
2016	FD Suspicious Package Protocols	Suspicious package protocols. Also adopted by Police Dept	Entire	High	Fire Chief	Updated in 2016	Continue to modify for effectiveness and revise as needed
Ranging from 1999 to 2013	PD Mutual Aid Compacts	Have mutual aid compacts with the surrounding police department to provide for additional police officers if needed.	Entire	High	Police Chief	MUAs with some communities have been updated since 2012.	Update the mutual aid compacts as needed. Covered under Limits of Authority-General Orders.
June 2013	PD Tactical Team Unit Mutual Aid Agreements	Our Tactical Team Unit has signed an agreement with all the other regional and local Special Response Teams to provide for additional Tactical Teams if needed	Entire	High	Police Chief	Updated with inception of Rescue Vehicle	As leadership changes, MOUs should be updated to reflect such.
January 2007	PD General Order on Evacuation GO 13-1	Department General Order for Evacuation of our Watch Commander office and dispatch center to go to Merrimack County Sheriff's Office. They have similar order to use our facility if needed.	Entire	High	Police Chief	No change, still use GO	Plan still accurate and exercised.
Summer 2016	EMD Emergency Sustainability/ Mass Vaccination at NHTI	Coordinate with NHTI for Emergency Sustainability (PD). NHTI is the primary location for the Mass Vaccination Clinic for the Concord Catchment area. In partnership with Capital Area Public Health Network	Entire	High	Emergency Management Director	Full scale POD exercise in 2016	Updated regularly by the Capital Area Public Health Network
November 2008	PD General Order on Motor Vehicles Pursuits and Suspect Apprehension 2008	General Order on Motor Vehicles Pursuits and apprehending fleeing suspects. Updated on 11/30/08.	Entire	High	Police Chief	PD uses Policy during normal operations	Policy is reviewed after every pursuit incident for compliance

City of Concord, NH Hazard Mitigation Plan Update 2017

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 City or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2012)	Future Improvements to Procedures/Resources
February 2007	PD General Order on Unusual Occurrences 2007	General Order on handling Unusual Occurrences. Updated on 02/25/07.	Entire	High	Police Chief	PD uses Policy during normal operations	Continue to review for necessary revisions
January 2002	PD General Order on Aircraft Accidents 2002	General Order on handling Aircraft Accidents. Last Updated 01/13/2002.	Entire	High	Police Chief	PD uses Policy during normal operations	Continue to review for necessary revisions
November 2001	PD General Order on Fire Scenes 2001	General Order on handling Fire Scenes. Last Updated 11/25/2001.	Entire	High	Police Chief	PD uses Policy during normal operations	Continue to review for necessary revisions
January 2002	PD General Order on Hazardous Material Incidents and WMD Training 2002	General Order on Hazardous Material Incidents and continuous training on Weapons of Mass Destruction as part of in-service training. GO Last Updated 01/13/2002 and training is done yearly on basic WMD.	Entire	High	Police Chief and Career Development Unit	PD uses Policy during normal operations	Continue to review for necessary revisions
January 2002	PD General Order on Concord Hospital Disasters 2002	General Order on responding to Concord Hospital Disasters. Last Updated 01/13/2002.	Concord Hospital and entire city	High	Police Chief and Hospital Admin	PD uses Policy during normal operations	Continue to review for necessary revisions
January 2002	PD General Order on COBRA Incidents 2002	General Order on dealing with COBRA incidents (Chemical, Ordinance, Biological and Radiological Incidents). Last Updated 01/13/2002.	Entire	High	Police Chief	PD uses Policy during normal operations	Continue to review for necessary revisions
February 2010	PD General Order on Mass Casualty Incidents 2010	General Order on Mass Casualty incidents. Updated on 02/2010.	Entire	High	Police Chief	PD uses Policy during normal operations	Continue to review for necessary revisions
October 2010	PD General Order on Emergency Preparedness 2010	General Order on Emergency Preparedness. Updated on 11/22/2010.	Entire	High	Police Chief	PD uses Policy during normal operations	Continue to review for necessary revisions
January 2002	PD General Order on Civil Disturbances 2002	General Order on Civil Disturbances. Last Updated 01/13/2002.	Entire	High	Police Chief	PD uses Policy during normal operations	Continue to review for necessary revisions
October 2010	PD General Order on Flood Control Emergencies	General Order on Flood Control	Entire	High	Police Chief	PD uses Policy during	Continue to review for

City of Concord, NH Hazard Mitigation Plan Update 2017

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 City or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2012)	Future Improvements to Procedures/Resources
	2010	Emergencies. Update on 10/3/10.				normal operations	necessary revisions
September 2010	PD General Order on Blackouts and Power Outages 2010	General Order on Blackouts and Power Outages. Updated on 09/12/2010.	Entire	High	Police Chief	PD uses Policy during normal operations	Continue to review for necessary revisions
April 1991	PD General Order on Bomb Threats and Bomb Disposal Incidents 1991	PD General Order on Bomb Threats and Bomb Disposal Incidents. Last Updated 04/19/1991	Entire	High	Police Chief	PD uses Policy during normal operations	Continue to review for necessary revisions
No date, pending as of 12-16	PD Mass Vaccination Clinic Procedure	Mass Vaccination Clinic for the Concord Hospital catchment area. Has been developed and submitted for approval to NHHSEM but have not received plan back for approval	Entire	High	Police Chief, with Concord Hospital and Health and Human Services	Still pending	Review once accepted
2016	GS Snow Removal Policy	Snow Removal Policy, 21 plow routes, Anticipating pre-treatment procedures. Routes are on City website.	Roadways	High	Highway & Utility Superintendent	Revised snow operations plan in 2016	Conduct yearly review of plow routes.
2016	GS Emergency Highway Mobilization Process	On-call Highway foreman mobilize staff to respond appropriately. Work with other emergency personnel; Police, Fire, Unutil Electric	Roadways	High	Highway & Utility Superintendent	On call communications protocol updated 2016	Yearly update of contact information.
2016	GS Emergency Water Mobilization Process	On-call Water foreman mobilize staff to respond appropriately. Work with other emergency personnel; Police, Fire. Notify the affected parties	City of Concord	High	Highway & Utility Superintendent	On call communications protocol updated 2016	Yearly update of contact information.
2016	GS Emergency Fire and Traffic Accident Mobilization Process	On-call Highway foreman mobilize staff to respond appropriately. Water foreman assist with water needs. Work with other emergency personnel; Police, Fire	City of Concord	High	Highway & Utility Superintendent	On call communications protocol updated 2016	Yearly update of contact information.
2016	GS Emergency Flooding	On-call Highway foreman mobilize staff to respond	City of Concord	High	Highway & Utility	On call communications	Yearly update of contact information.

City of Concord, NH Hazard Mitigation Plan Update 2017

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 City or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2012)	Future Improvements to Procedures/Resources
	Mobilization Process	appropriately. Work with other emergency personnel; Police, Fire			Superintendent	protocol updated 2016	
2016	GS Emergency Equipment for Severe Weather	Emergency equipment available to respond; generators, barricades, variable message boards, sand bags, etc.	City of Concord	High	Equipment and Highway & Utility Superintendents	On call communications protocol updated 2016	Refresh supplies.
2016	GS Penacook Lake Dam (High Hazard) Responsibility	General Services has control of the dam at the Lake, with a mitigation plan and yearly inspection process in place. 1-2 other dams are licensed by the City. No particular dam response plan.	Entire	Low	General Services Director	On call communications protocol updated 2016	Continually monitor and update
Summer 2016	GS Culvert Condition GPS Inventory	Engineering Services has visited all 18 inch and larger culverts in the city. Conditions, locations, and pictures are documented with the inventory	Citywide	High	City Engineer, General Services Director	Updated in summer 2016 by interns.	Complete inventory of all smaller culverts in rural areas.
November 2014	CD Reduction of Impact Fee for Contaminated Property in NH Brownfields Program	To encourage cleanup and redevelopment of contaminated properties, the City created an incentive whereby an impact fee for a contaminated property will be reduced if the property is enrolled in the NH Brownfields Program.	Opportunity Corridor	Not yet tested	Community Development	Used by Planning during normal operations	Update as needed in response to project evaluation
July 2010	CD Reviewed Drainage Areas of Previously Impacted Areas and Prepare Capital Plan for Mitigation of Any Potential Future Flooding	Recent experience from the May 2006 flooding discovered deficiencies in the City's aged infrastructure. To address these deficiencies, engineering services would be used to analyze and prioritize repairs before another flood impacted the City.	Entire	High	Community Development – Planning Division	Used by Engineering during normal operations	Updated as data become available

City of Concord, NH Hazard Mitigation Plan Update 2017

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 City or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2012)	Future Improvements to Procedures/Resources
2015	IS Information Recovery Plan	An Information Recovery Plan has been developed.	All City Facilities	High	Information Services Director	Plan updated in 2015	Additional improvements in back up data at a remote site in 2017
2016	IS Data Resource Protection Plan COMPLETED 2011	The City's data is critical to the City, county, and state. Much of the City's data is irreplaceable, such as the City Clerk's vital records. Robust protection of digital resources	All City Facilities	High	Information Services Director	Constantly updated to protect City data	Continuous need -Much of the paper data needs to be converted to digital mediums. There needs to be a plan for archiving and maintaining this data.
2016	LI Emergency Information for Immediate Distribution	"Emergency Packets" given to the Library Director and the two Division Heads and a copy is kept at the Reference Desk. Packets contain emergency contact information for a variety of emergency responders, City IT staff, public properties staff, utility and hospital contact numbers, and the Northeast Document Conservation Center, which provides help with damage to library materials. Contains floor plan maps and staff contact information.	Penacook and City Libraries	High	Library Director	Ongoing revisions as needed	Continue to review and revise as needed
2016	LI Emergency Safety Procedure Manual	Manual provides LI procedures for dealing with a variety of emergency situations, from weather situations to hazardous materials. Includes a safety policy that outlines how to deal with a variety of emergencies that is	Penacook and City Libraries	High	Library Director	Ongoing revisions as needed	Continue to review and revise as needed

City of Concord, NH Hazard Mitigation Plan Update 2017

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 City or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2012)	Future Improvements to Procedures/Resources
		given to staff members when they are hired.					
2016	LI Procedure for Innovative Interfaces Data	Procedure for Innovative Interfaces data. Data server is housed off-site (at City Hall). Library runs a weekly full tape backup that is taken off premises by the staff member in charge of automation. The system runs a daily tape backup that is kept for two weeks in the library computer room. Contract with Iron Mountain Intellectual Property Mgt. for a software escrow service for Innovative Interfaces system.	Penacook and City Libraries	High	Library Director	Update as needed	Moving to new backup in 2017
STAFF AND VOLUNTEERS							
# of Staff or Resources				Personnel #s Rating			
100 people	FD Fire & Rescue Department	Staff -100 Volunteers - 0	Fire Stations	High	Fire Chief	Administrative staff increased	Trying to add a few employees to match EMS demand
100 people	PD Police Department	Staff -73 Civilians - 27	Police Department	Low	Police Chief	Increased allotment of five officers	Actively recruiting to achieve full sworn staff allocation
32 people	CD Community Development Department	Admin Staff - 4 Professional Staff - 28	City Hall	Moderate	Deputy City Manager	Regular staffing changes	Monitor the need for potential additional staff
3 people	City Manager's Office	Staff - 3	City Hall	High	City Manager	Regular staffing changes	Monitor the need for potential additional staff
15 people	City Council + Mayor	Volunteers - 15	City Hall	High	City Manager	Elections have been held	Continue business as usual
124 people	GS General Services	Admin Staff - 14 Work Crew - 110	General Services	Low	Director	No change in staffing	No change in staffing

City of Concord, NH Hazard Mitigation Plan Update 2017

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 City or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2012)	Future Improvements to Procedures/Resources
9 people	GS Penacook Water Treatment Facility	Admin Staff 1 Work Crew - 8	Water Plant	Low	Superintendent	No change in staffing	No change in staffing
15 people	GS Hall Street Wastewater Treatment Facility	Admin Staff - 1 Work Crew - 14	Hall Street Plant	Low	Superintendent	No change in staffing	No change in staffing
7 people	IS Information Services	Admin Staff - 0 Tech Staff - 7	City facilities	High	Information Services Director	Updated to maintain currency on new developments and threats	Conduct regular assessments of communication infrastructure and improvements
8 people	Life Safety, Health, Code Enforcement	Staff - #8	City Hall Annex	High	CD- Code Administration	Updated to maintain consistency with regulatory changes.	Conduct regular review and implementation of service improvement opportunities
12 people	Planning Board	Volunteers - 12	Council Chambers	High	CD-Planning	Regular volunteer changes	Continue business as usual
9 people	Conservation Commission	Volunteers - 9	City Hall	High	CD-Planning	Regular volunteer changes	Continue business as usual
13 people	Concord School Board	1. Christa McAuliffe, 2. Abbott-Downing, 3. Beaver Meadow, 4. Penacook Elementary, 5. Mill Brook, 6. Broken Ground, 7. Rundlett Middle School 8. Concord High School: 13 members from schools meet at Old Dewey School	Concord School District, City wide (except Penacook)	High	CSD Superintendent	Elections have been held	Continue business as usual
11 people	Merrimack Valley School Board	Represent 5 towns (2 from each), + 1 at large	MVSD High School, also Middle School and 5 Elementary Schools	High	MVSD Superintendent	Elections have been held	Continue business as usual
TECHNICAL SKILLS AND RESOURCES							
# of Staff or Resources							
100 people	FD All Hazards Exercise Drills	Have completed several full-scale drills,	Entire City	High	Fire Department	Active shooter	High

City of Concord, NH Hazard Mitigation Plan Update 2017

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 City or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2012)	Future Improvements to Procedures/Resources
		but in the last few years have been focusing on table top and functional drills. Last full scale drill may have been State House dirty bomb scenario in 2008.			/ Police Department	drills have been held at Merrimack Valley High School, Concord High School, and Concord Hospital.	
FD- #90 portables, #30 mobiles, #4 base stations + dispatch enter (CAFMAC)	FD Digital Radios	Purchased 90 radios to replace older ones. Need be programmed. Receive analog signals	4 Stations – Manor, Central, Broadway Headquarters,	High	Fire Department	Replaced 90 portable that are lighter & easier to use	Radios are all set for now, replacements as needed
FD- #3 generators PD- #2 generators GS- #2 generators	All Dept Portable Generators	FD- 2 on tower trucks, 1, on heavy rescue. PD - In tactical van. GS – mobile in vehicles.	FD- 2 on tower trucks, 1, on heavy rescue. PD - In tactical van. GS – mobile in vehicles.	High	Department Heads	No changes, maintained as needed	Continue program, upgrades as needed
A few trained	PD Incident Command System (ICS) Training	Incident Command System training for all sworn personnel of the Concord Police Department. Policy 02/25/07 outlining roles and responsibilities	Entire City	Low	Police Chief and Career Development Unit	Has not had much progress in training program	Develop a standardized ICS training program for the PD
MVSD- #5 generators	MVSD Portable Generators	Smaller ones and 200,000 Kw mobile	High School Campus	High	MVSD Facilities Director	No changes, maintained as needed	Continue the program , no upgrades at this time
PD - #1 base station at Hospital	PD Radio Transmitter at Concord Hospital (Action COMPLETED Summer 2010)	Radio transmitter/ repeater available for emergencies. The PD can coordinate with Concord Hospital to ensure continued usability.	Concord Hospital	High	Police Chief	No changes-completed project	Continue the program , no upgrades at this time
#0 personnel dedicated, participants only	PD Member of the NH Intelligence and Analysis Center (IAC) (Action COMPLETED)	This relationship will ensure information and intelligence will be shared at a regional and cross functional level. Preventative	Entire City	High	Police Chief	Continued receiving emails daily	Assign a staff member to this program

City of Concord, NH Hazard Mitigation Plan Update 2017

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 City or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2012)	Future Improvements to Procedures/Resources
	October 2010)	monitoring and high-level coordination, threat assessments, international information provided.					
PD- #75 portables, #35 mobile radios, #4 base stations	PD Digital Radios	Received new radios with greater number of bands through EMPG grant. Have interoperability to dispatch for Merrimack County	Base stations cover the city	High	GS Communications Technician	Received new radios with greater number of bands	Radios are all set for now, replacements as needed
GS- #20 portables, #140+ mobiles	GS Digital & Analog Radios	Analog portables, limited communication with fire and Police. Vehicles have digital capability	Entire City	High	GS Director	Mobiles continuously upgraded as new vehicles are obtained	Purchase digital portable radios for interoperability
2013	PD Bearcat Rescue Vehicle	Resource dedicated to the Central NH Special Operations Unit. Could have lifespan of 20 years if kept indoors	20 member communities in Central NH	High	Police Department	Vehicle has been used several times, logged in. Maintained	Continue maintenance and upkeep of the vehicle
On all city computers, desktops, mobile vehicles	CD Access to GIS Maps on All Computers	Have GIS on desktop, laptop and website for access to maps and data about anything that has a fixed location in the city. GSD, FD, and Police have implemented vehicle locator systems	Entire	High	Various depending on responsibilities	Continued making map updates available to all, point and click	Continue program and revise as needed
2016 #2 dispatch stations	FD Capital Area Fire Compact Communications System	Area wide communications capability for Compact Towns and backup for Lakes Region communications center. 24,000 calls in 2016. Dispatch center	Fire Headquarters Building	High	FD Communications Director	Continually updating equipment for Compact communities	Continue to upgrade software and keep up with technological changes. Consider a new facility for new, more secure and additional space for 1+ more dispatchers
2016	IS City Communication Technology	IS handles all communications in the City, including phone, cellular, modem, fiber optic, and wireless.	All City Facilities	High	Information Services Director	Continually updating equipment and software	Continue to upgrade software and keep up with

City of Concord, NH Hazard Mitigation Plan Update 2017

6 CAPABILITY ASSESSMENT

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							technological changes.
6 land lines	FD Dedicated Phone Lines and Cellular Phones For Use in Emergencies COMPLETED Map 2006	Provide communications infrastructure for emergency operations.	EOC at Fire Department	High	Emergency Management Director	Periodic maintenance and testing	Maintenance and review of adequacy.
2016 upgrades	FD Enhanced Security at Fire Department Facilities COMPLETED June 2010	Several incidents of breaking and entering, and theft would be deterred or prevented by improving security at the stations. Prevention and deterrence methods would be minimal compared to the cost of losing critical equipment that could impact homeland security.	Fire Department Facilities	High	Fire Chief	Upgrade grant for \$16,667 was received in 2016 for security enhancements. Fire Headquarters, Heights, Broadway, and Manor Stations had fire sprinkler installations and fire alarm system upgrades and Central Station had an alarm system upgrade in 2016.	Actively considering facility improvements to increase security at all 4 stations
2016 upgrade	FD TEMSIS Reporting System (Action COMPLETED 2007)	TEMSIS enables the City and State to better collect, analyze and provide feedback on a wide range of medical quality control and quality improvement initiatives.	Entire	High	Fire Chief	A major upgrade to TEMSIS reporting occurred in 2016.	Continue enhancing facilities. Continually monitor and update reporting system procedures
#3 boats	FD Boat Inventory	Maintain an inventory of Boats within the Department. City owns 3 inflatables, plus 1 rigid hull rib inflatable. Have upgraded water rescue capability with acquisition of a rigid	Entire	High	Fire Chief	Several calls per year, resulting in the use of rescue boats. Have same boats since 2010.	A new boat will be acquired in 2017.

City of Concord, NH Hazard Mitigation Plan Update 2017

6 CAPABILITY ASSESSMENT

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		inflatable boat. Fire Dept can deploy boats quickly throughout the City. Have a diverse fleet. Boats are available to other Departments to utilize.					
30+ FD members trained	FD Current Computer Response and Reporting Programs- ALOHA, CAMEO, Tier II	Electronic Computer programs for CAMEO, ALOHA, Tier II reporting	Entire	High	Fire Chief	Regular updates as new software becomes available.	Annually review and update.
#5 Engines, #2 ladders, #3 forestry units	FD Fire Engines (Apparatus)	5 Engines, 2 ladders, 3 forestry units	Entire City, Mutual Aid area	High	Fire Chief	Updated inventory	Continue to upgrade vehicles
#1 computer at WW #1 computer at Water Treatment	GS Backup Operation Center for Water and Wastewater Treatment Plants COMPLETED Water – in July 2010 WW - in July 2009	Sites are presently operated via remote. An off-site facility that acts as a hot-site should the primary site becomes uninhabitable for normal business activities. The hot-site provides backup and houses a redundant server/client environment. SCADA software	Water and Wastewater Treatment Plants	High	General Services Director	Continued using backup services	Update technology as available
City system, network of servers	GS Off-Premises Data Storage for Water and Wastewater Treatment Plants COMPLETED Water – in July 2010 WW - in July 2009	Off-premises facility for storage of copies of critical data and 24/7 access during emergencies.	Water and Wastewater Treatment Plants	High	General Services Director	Continued using storage services	Continue data storage with GS
#~1,000	GS Sandbags	Purchased sandbags in mid-2000s in response to flooding events	General Services	Low	General Services Director	No new bags purchases, but no floods occurred resulting in their use	Need more for all Departments and to replace older, fraying bags
Current as of 01-17	CSD Drills and Lockdowns	Must have 10 fire drills per year, 2 must be lockdown. All Schools must meet this. Most	CSD Elementary Schools, CSD	High	CSD School Principals	Talk with students and staff about procedures	Want to work up to a full day of real-time drill and response

Latest Adoption or Version Date	Capability Assessment: Administrative and Technical	Description Related to hazard mitigation planning and coordination	Location of Capability Entire City or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2012)	Future Improvements to Procedures/Resources
		have their own lockdown and fire drills monthly. Work closely with Police Dept and Resource Officer. Changing tactics at each school, different scenarios & natural disasters to address.	Middle & High Schools			at breakout groups for greater success	
Current as of 01-17	MVSD Drills and Lockdowns	Must have 10 fire drills per year, 2 must be lockdown. All Schools must meet this. Most have their own lockdown and fire drills monthly. Work closely with Police Dept and Resource Officer	5 Elementary Schools & MVSD Middle & High Schools, Learning Center	High	MVSD School Principals	Drills constantly being run in schools	Additional training with emergency responders, maintain current procedures

Source: Concord Hazard Mitigation Committee

FINANCIAL CAPABILITIES

The financial resources in **Table 37** available for hazard mitigation projects are those the City 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), City Capital Improvements Program (CIP) Project Funding, Department Operating Budgets, Bonds and FEMA and NH Department of Transportation grants.

Table 37
Financial Capabilities

Latest Adoption or Version Date	Capability Assessment: Financial	Description Related to hazard mitigation planning and coordination	Location of Capability Entire City or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2012)	Future Improvements to Plans
FINANCIAL	PROGRAM OR	FUNDING RESOURCE	FOR	HAZARD	MITIGATION		
February 2013	GS FEMA Public Assistance Grants (Disaster Recovery Costs)	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 City	High	General Services, with City Admin	Used for PA-B Protective Measures	Continue to utilize the FEMA PA program to help with disaster costs
July 2016	FD Fire Department Operating Budget	Budget can contain funding for outreach programs. Often pay for training courses, wildland fire gear, protective clothing and fire supplies, search and rescue (windstorm) /shoring equipment.	Entire City	High	Fire Department	Continued developing the FD operating budget	Use FD Operating Budget to finance future hazard mitigation improvements
July 2016	CD City Capital Improvements Program (CIP) 2017 Project Funding	Sets aside funds for large equipment/projects for most Departments	Entire City	High	CIP Committee	Updated associated costs during annual updates	CIP is annually updated and could include expensive or long-term hazard mitigation projects
July 2016	GS Fire Department Operating Budget	Budget can contain funding for culvert and drainage infrastructure improvements	Entire City	High	General Services	Continued developing the GS operating budget and upgrade culverts, bridges and stream crossings	Use GS Operating Budget to finance future hazard mitigation improvements
July 2016	GS User Fees for Water, Sewer	Portions of water and sewer user fees are set aside to upgrade infrastructure.	Portion of the City has service (Downtown & Penacook)	High	General Services	Continued programs for upgrade of water and wastewater infrastructure	Continue to make ongoing improvements to water and sewer infrastructure.
July 2016	CD NH Department of Transportation (NH DOT) Bridge Program 80/20	The bridge program is an 80/20 funding opportunity, with only 20% required by towns. Using the CIP Capital Reserve Funds,	Currently have	Low	Community Development - Engineering	Raised funds for bridge replacement when state funds become available:	Place bridges on list several years before expected failure

City of Concord, NH Hazard Mitigation Plan Update 2017

6 CAPABILITY ASSESSMENT

<u>Latest Adoption or Version Date</u>	<u>Capability Assessment: Financial</u>	<u>Description Related to hazard mitigation planning and coordination</u>	<u>Location of Capability Entire City or Selected Areas</u>	<u>Level of Effectiveness</u>	<u>Responsibility</u>	<u>Changes Since Last Haz Mit Plan (2012)</u>	<u>Future Improvements to Plans</u>
		communities can set aside money for the several years it takes for the state to undertake the local bridge project.				Sewalls Falls, Loudon Road, North Pembroke Road, Iron Works	
2016	FD Assistance to Fire Fighters Grant 90/10	208,850 for sprinklerling (3 stations) and fire alarm upgrades (4 fire stations). 483,516 for new SCBA equipment (~100)	Stations, Entire City	High	Fire Department	Currently using grant for sprinklers and fire alarm upgrades	Continue to look at funding for firefighter health and safety and equipment upgrades
2016	CD Impact Fees for New Development	Fees assessed for new development to offset costs for transportation, Schools, and recreation facilities improvements.	New development Entire City	High	Planning Board	Roundabout at Exit 16 in 2016	Continue the impact fee programs
PROGRAM	POTENTIALLY	USED BY	THE CITY	FOR	FUTURE	PROJECTS	
Not yet used	FD Fire Mitigation Assistance (FMA) Grant 75/25	Available to States, local governments, for the mitigation, management, and control of fires on publicly or privately owned forests or grasslands, which threaten such destruction as would constitute a major disaster. May include expenses for field camps; equipment use, repair and replacement; tools, materials and supplies; mobilization and demobilization activities	Conservation Lands, Rural Areas, Wildland Urban Interface areas	High	Fire Department	A new grant writer was obtained and more grants could be written	Evaluate potential projects for grants

Source: Concord Hazard Mitigation Committee

EDUCATION AND OUTREACH CAPABILITIES

In **Table 38**, identifying City Department education and outreach programs and 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 38
Education and Outreach Capabilities

<u>Latest Adoption or Version Date</u>	<u>Capability Assessment: Education and Outreach Programs</u>	<u>Description</u> Related to hazard mitigation planning and coordination	<u>Location of Capability</u> Entire City or Selected Areas	<u>Level of Effectiveness</u>	<u>Responsibility</u>	<u>Changes Since Last Haz Mit Plan (2012)</u>	<u>Future Improvements to Plans</u>
PUBLIC	OUTREACH	PROGRAMS					
Current as of 01-17	City Website	Used by multiple City Depts, available to residents and visitors, hosts Zoning amendment changes. Vendor is City CivicPlus	Entire City, General Public	High	City Administration	Updated regularly with announcements, agendas, meeting notices, more, outreach and emergency warning	Make ongoing improvements to City website to accommodate user needs.
2014	Website Module for Emergency Communications	People can sign up to receive emergency notification emails or texts.	Entire City, General Public	High	Information Technology	New program	Continue to utilize, monitor, and evaluate program for necessary changes.
Current as of 01-17	FD/PD/GS/LI/ Recreation Department Facebook Page, Twitter, YouTube	City Facebook Page communication to engage the public, provide up to the moment information. About Waste Plant meters, leaf removal, leaking toilets, downtown snow removal, water conservation	Entire City, General Public	High	Individual Department Heads	Implemented new FB pages	Continue to utilize and update City Facebook pages to provide constant information.
2 officers total, FT	PD School Resource Officer (SRO)	Police presence in the school environment can handle discipline issues in school, encourages children to behave in appropriate manners, counseling, assaults.	Concord High and MVSD	High	Police Department	Continued the program and officer status in both schools	Add another officer to Concord High School to provide better coverage.
October 2016	City Depts Education and Outreach Programs	Several Depts: Fire Department Open House each fall, introduce fire safety to the community. All stations open to tours. Outreach to 2 nd grade classrooms each year. National Night Out, first	Entire City, General Public, NNO at Rollins Park	Moderate	Police Department	Open houses held annually, as is the classroom visits. Night Out is also annual event.	Continue the current program administration, which is extremely successful

City of Concord, NH Hazard Mitigation Plan Update 2017

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 City or Selected Areas	Level of Effectiveness	Responsibility	Changes Since Last Haz Mit Plan (2012)	Future Improvements to Plans
		week of August, planned by the PD but benefits FD & GS. Premiere event for safety education: introduces crime prevention, safety, community agencies (MADD, CAPHN, Hospital, military) & guests, ambulance service.					
August 2016	GS Household Hazardous Waste Disposal	Household hazardous material disposal program twice per year permits disposal of dangerous materials at the Arena: propane tanks, dried paint cans, waste oil, waste antifreeze, batteries, tires	Everett Arena	Moderate	Transfer Station	Held HHW disposal in 2016	Continue to provide annual household hazardous waste disposal day service
Currently in use as of 01-17	CSD Automated Calling System: Alert Now	Used only for emergencies. Automated phone, text, email service to parents for alert. Used for snow delays and snow days. A new version is being tested - text, then audio from superintendent. Each school has individual access and can use the system	Public Schools, Entire City	High	Concord Superintendent, School Principals	Used successfully	Update regularly when parents require notification
Currently in use as of 01-17	MVSD Automated Calling System: Call Multiplier	Used only for emergencies. Automated phone, text, email service to parents for alert. Used for snow delays and snow days. A new version is being tested - text, then audio from superintendent. Each school has individual access and can use the system	Public Schools, Entire City	High	MVSD Superintendent, School Principals	Used successfully	Update regularly when parents require notification. Continue to update the list when parents no longer have children in school.

Source: Concord 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, a number of additional documents not listed in the **Capability Assessment** are also utilized by the community and have a positive relationship to the **Hazard Mitigation Plan 2017**. Most of the documents below are not the City’s documents, but the hazard mitigation goals, objectives, and/or Actions in this Plan are in agreement with the **Mitigation Support and Resource Documents** listed below in **Table 39**.

Table 39
Mitigation Support and Resource Documents

Latest Adoption or Version Date Month & Year	Mitigation Support and Resource Documents Not Listed within Capability Assessment Tables
February 2015	Central NH Regional Plan
October 2013	State of NH Multi-Hazard Mitigation Plan Update
July 2015	NHHSEM NH Recovery Plan with RSFs
October 2016	CNHREPC Central New Hampshire Regional Emergency Planning Committee Regional Hazardous Materials Emergency Response Plan
August 2016	CAPHN Capital Area Public Health Network Public Health Emergency Preparedness and Response Plan for the Capital Area
April 2010	FEMA Flood Insurance Study for Merrimack County
August 2015	NH DOT Recommendations for the Ten-Year Transportation Improvement Plan (Projects) 2017-2026
August 2011	NH DHHS NH Excessive Heat Emergency Response Plan
July 2015	NH DHHS NH Arboviral Illness Surveillance, Prevention and Response Plan
February 2007	NH DHHS NH Influenza Pandemic Public Health Preparedness & Response Plan
Spring 2015	NH Geological Survey Suncook River Fluvial Geomorphic Assessment Discussion Guide
2014	NH Fire Statewide Mobilization Master Plan

Source: Concord Hazard Mitigation Committee

7 POTENTIAL ACTION EVALUATION

With the completion of the inventory of the **Overall Risks** of hazards in the **Hazard Risk Assessment**, the historical recording of hazard events and declared disasters occurring in Concord and what could happen in the future documented in the **Potential Future Hazards**, and the City's evaluation of its mitigation and support activities in the **Capability Assessment** have all provided the opportunity to develop mitigation Actions. These mitigation Actions can be evaluated using these tools to develop the **Potential Action Evaluation**.

Mitigation Actions developed emphasize both new and existing buildings and infrastructure to better protect populations, development and the natural environment of Concord.

The **Hazard Mitigation Plan Update 2012** provided a basis to begin Action development. A review of the **2012** Actions is provided by the Hazard Mitigation Committee, determining which Actions have been **Completed, Deleted, or Deferred** to the **2017 Plan**.

New Actions were evaluated using the **Problem Statements** discovered 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 evaluated and later developed into 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 City Departments, School District, and Stakeholders had available. Many of these were also evaluated but were not developed into **New** mitigation Actions because they were preparedness, response or recovery items.

The Chapter provides a summary discussion of the Actions the community can consider taking to help mitigate the effects of hazard events.

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. To accommodate the **2012 Plan's** original **81** Actions (which include Actions remaining from the **2007** Plan) in addition to the **New** Actions from the **2017 Plan**, there are **4** designated Action types to describe the detailed Actions following within the **7 POTENTIAL ACTION EVALUATION** and/or **8 MITIGATION ACTION PLAN**:

- Completed**
- Deleted**
- Deferred**
- New**

Actions which were **Completed** from the **2012 Plan** are listed in **Table 40**. The date of completion is provided.

Actions which were **Deleted** from the **2012 Plan** might have been no longer necessary or a priority to the City, no longer relevant to the City'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 Concord's activities. Deleted Actions are listed in **Table 41**.

Actions which were **Deferred** from the **2012 Plan** are still important to the City 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 42** and have been re-prioritized with the **New** Actions in the **Mitigation Action Plan**.

Changes in priority of the **Deferred** 2012 Actions occurred over the last five years. The **2012 Plan** also used the **12-36 Priority Score STAPLEE** system while the **2017 Plan** included both a **Ranking Score** and an **Action Timeframe** to determine priorities. Both methods are described.

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 **City Emergency Operations Plan**. The mitigation Actions are those which are carried forth in this **2017 Plan** into the **Mitigation Action Plan**.

Action Type	Time Frame	Definition or Characteristics
Mitigation	Long Term	Action supports sustained risk prevention or reduces long-term risk to people, property and infrastructure. ↳ Best suited for City Hazard Mitigation Plan.
Preparedness	Short Term	Actions assist/support planning, protection, training/exercise, and response personnel. ↳ Best suited for City Emergency Operations Plan.
Response, Recovery, Other Related	Short Term	Other Actions support preventative, response, recovery-related, repeated or deferred maintenance activities. ↳ Best suited for City Emergency Operations Plan.

Review of 2012 Actions

The **2012 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), 2012* became standardized and tailored by each FEMA Region over the years.

Concord’s **Completed** and **Deleted** Actions from **2007** were given **Action Numbers** for tracking purposes and are displayed in the following tables. Each **2012** Action was provided with an **Action Number** and its status was determined by the Hazard Mitigation Committee as either **Completed**, **Deleted** or **Deferred**.

The **2007 Plan** had previously identified **34** Actions and the **2012 Plan** identified **81** Actions, totaling **115** Actions. These **115** Actions were reviewed to ascertain their current **2017** status in **Table 40**, **Table 41** and **Table 42**.

Between both Plans, the City **Completed 26** Actions as shown in **Table 40**. Six (**6**) of the **Completed** Actions also appear as **Deferred** Actions (**Table 42**) within the **Mitigation Action Plan** because the Actions’ effectiveness is based upon ongoing activity.

**Table 40
Completed Mitigation Actions**

Priority Score	Action Number	Action	Completed By Date	Who is Responsible	Approximate Cost to City
12	#01- 2007	Locate a Backup Operation Center for Water and Wastewater Treatment Plants (IT). Sites are presently operated via remote.	Water – in July 2010 WW - in July 2009	General Services	\$200,000
12	#02- 2007	Create Off-Premises Data Storage for Water and Wastewater Treatment Plants (IT)	Water – in July 2010 WW - in July 2009	General Services	Included in Backup Operation Center above

City of Concord, NH Hazard Mitigation Plan Update 2017

7 POTENTIAL ACTION EVALUATION

Priority Score	Action Number	Action	Completed By Date	Who is Responsible	Approximate Cost to City
32	#03- 2007	Review Drainage Areas of Previously Impacted Areas and Prepare Capital Plan for Mitigation of Any Potential Future Flooding (HMC)	July 2010	Community Development	\$300,000
35	#04- 2007	Prepare a Flood Action Plan for the Wastewater Treatment Plants (GS)	2009	General Services	Staff Time
36	#05- 2007	Present Revisions to Subdivision Regulations for Residential Sprinkler Systems in New Homes As Appropriate (FD)	June 2010	Community Development	Staff Time
36	#06- 2007	Install a Radio Transmitter at Concord Hospital (PD)	Completed Summer 2010	Police Department	\$70,000
33	#07- 2007	Enhance Security at Fire Department Facilities (FD)	2007	Fire Department	\$100,000
33	#08- 2007	Develop Aquifer Protection Ordinance (CD)	April 2010	Community Development	\$15,000
36	#09- 2007	Provide GIS Software (CD-GIS)	Spring 2010	Community Development – Information Services	Staff Time
31	#10- 2007	Implement TEMSIS Reporting System (FD)	2007	Fire Department	Staff Time
36	#11- 2007	Secure Dedicated Phone Lines and Cellular Phones For Use in Emergencies (FD)	May 2006	Fire Department	\$15,000
36	#12- 2007	Establish a System for Public Notification and Information During a Disaster (PD)	May 2006	Police Department	\$35,000
36	#13- 2007	Develop a Coordinated Plan For Responding to Storms (FD)	2007	Fire Department	Staff Time
33	#14- 2007	Develop a Plan to Protect the City's Data and Resources (HMC)	2011	Community Development – Information Services	\$50,000
33	#15- 2007	Establish a Relationship with an Intelligence Fusion Center	October 2010	Police Department	\$0
33	#16- 2007	Enhance the Asset GIS Layers to Enable Instant Database Access for Use During Emergency Response	December 2006	Community Development – Information Services	\$2,000
35	#17- 2007	Coordinate with NHTI for Emergency Sustainability (PD) through the Capital Area Public Health Network	January 2010	Police Department	Staff Time
33	#18- 2007	Adopt Public Health Objectives from the Capital Area Public Health Plan (HMC)	September 2009	Fire Department	Staff Time
36	#35- 2012	Enforce Continued Floodplain Regulation (CD) with the ZO for Protection from the Floodway	Repeated and Continued during 5-year Plan duration	Community Development	Staff Time

Priority Score	Action Number	Action	Completed By Date	Who is Responsible	Approximate Cost to City
36	#36- 2012	Enforce Building Codes to Reduce Wind Load Damage (CD) to Reduce Structure Collapse	Repeated and Continued during 5-year Plan duration	Community Development	Staff Time
36	#40- 2012	Update the Floodplain Development Zoning Ordinance to Comply with NFIP Requirements and Planning Board Recommendation	Repeated and Continued during 5-year Plan duration	Planning Board	Staff Time
29	#50- 2012	Update Stormwater Management System at Bow Brook and South Street and Sunset Avenue	September 2013	General Services	\$118,325
29	#58- 2012	Update Stormwater Management System at Tanner Street and Village Street (Penacook)	November 2015	Community Development	\$337,205
35	#65- 2012	Enforce Municipal Fire Alarm and Fiber Optic Network (FD) Connection to Prevent Failure of Fire Alarm System	Repeated and Continued during 5-year Plan duration	Fire Department	Annual Costs of \$50,000 to \$100,000
33	#85- 2012	Enforce Road and Driveway Slope Subdivision Regulation Standards (CD) to Reduce Potential for Erosion and Road Washout	Repeated and Continued during 5-year Plan duration	Community Development	Staff time
30	#98- 2012	Enforce City Requirements for Underground Utilities (CD) to Mitigate Severe Wind and Winter Weather Event Damage	Repeated and Continued during 5-year Plan duration	Community Development	Staff time

Source: Concord Hazard Mitigation Committee

The pink highlighted rows indicate the **83 Deleted** Actions in **Table 41**. Many of the Actions were deleted because they were preparedness, response or recovery items and more appropriately belonged in the City's *Emergency Operations Plan*.

**Table 41
Deleted Mitigation Actions**

Priority Score	Action Number	Action	Deleted Date	Who is Responsible	Approx. Cost	Why Deleted? The Action...
30	#19- 2007	Install Remote Monitoring System at Penacook Lake Dam (PD)	June 2011	General Services	\$5,000	Was modified and incorporated into another Action.
24	#20- 2007	Encourage Floodproofing of Residential Structures in the Floodplain	June 2011	Community Development	\$2.8 million	Was not financially feasible as stated and was modified and incorporated into another Action.

City of Concord, NH Hazard Mitigation Plan Update 2017

7 POTENTIAL ACTION EVALUATION

Priority Score	Action Number	Action	Deleted Date	Who is Responsible	Approx. Cost	Why Deleted? The Action...
36	#21- 2007	Incorporate Police Department Mass-Call Back (PD)	June 2011	Police Department	Staff and \$2,500	Duplicates existing efforts.
35	#22- 2007	Target the Response for Accident Events on Selected Roadways (HMC)	June 2011	Police Department	Staff Time	Duplicates existing efforts.
34	#23- 2007	Enhance General Order on Flooding (PD)	June 2011	Police Department	Staff Time	Was modified and incorporated into another Action.
36	#24- 2007	Develop 911 Public Notification Procedures (TF)	June 2011	Police Department	Staff Time	Duplicates existing efforts.
35	#25- 2007	Create Public Notification System for Wildfires (PD)	June 2011	Fire Department	\$30,000	Duplicates existing efforts.
32	#26- 2007	Conduct ICS Training for All City Departments (FD)	June 2011	Fire Department	Staff Time	Is a duplicate Action.
35	#27- 2007	Encourage Flood Preparedness (GS)	June 2011	General Services	\$10,000	Was modified and incorporated into another Action.
36	#28- 2007	Develop a Plan for Minimizing Tree and Brush Buildup Near Utility Lines, Multi-Residential Facilities, and Private Residences Constructed on Slopes (FD)	June 2011	Fire Department	Staff Time	Duplicates existing efforts.
36	#29- 2007	Review Equipment Availability for Ice and Snow Events (GS)	June 2011	General Services	Staff Time	Was modified and incorporated into another Action.
34	#30- 2007	Identify and Plan for Ice Jams (TF)	June 2011	General Services	Staff Time	Was not relevant to the City's situation.
33	#31- 2007	Ensure that Selected Businesses Provide Emergency Plans to the City (TF)	June 2011	Fire Department	Staff Time	Could not realistically be undertaken.
28	#32- 2007	Develop Buffer Regulations for Homes and Developments (FD)	June 2011	Community Development	Staff Time	Duplicates existing efforts.
33	#33- 2007	Develop a Public Notification System for Significant Storms (FD)	June 2011	Fire Department	Staff Time	Duplicates existing efforts.
32	#34- 2007	Enact Public Notification System for Floods (PD)	June 2011	Fire Department	Staff Time	Duplicates existing efforts.
36	#37- 2012	Secure City Hall (PD)	December 2016	City Manager	\$25,000 + \$5,000	Is a preparedness,

City of Concord, NH Hazard Mitigation Plan Update 2017

7 POTENTIAL ACTION EVALUATION

Priority Score	Action Number	Action	Deleted Date	Who is Responsible	Approx. Cost	Why Deleted? The Action...
						response or recovery Action
36	#38- 2012	Install Security Monitoring System of Water Treatment Facility (PD)	December 2016	General Services	\$30,000	Is a preparedness, response or recovery Action
36	#39- 2012	Install Security Monitoring System of Waste Water Treatment Facility (PD)	December 2016	General Services	\$100,000	Is a preparedness, response or recovery Action
36	#41- 2012	Undertake Penacook Lake Dam Monitoring and Maintenance (GS)	December 2016	General Services	Staff Time	Is a preparedness, response or recovery Action
35	#42- 2012	Enhance Security to Concord High School (Non-City) (PD)	December 2016	Concord School Department	\$100,000	Is a preparedness, response or recovery Action
34	#43- 2012	Install a Surveillance System at City Facilities (IT)	December 2016	General Services	\$100,000	Is a preparedness, response or recovery Action
33	#44- 2012	Enhance Security at Memorial Field (PD)	December 2016	General Services	\$30,000	Is a preparedness, response or recovery Action
33	#45- 2012	Improve Building Security of Beaver Meadow Golf Course (Non-City) (GS)	December 2016	Parks and Recreation	\$25,000	Is a preparedness, response or recovery Action
33	#46- 2012	Undertake Roadway Monitoring and Maintenance Caused by City Dams (GS)	December 2016	General Services	Staff Time	Is a preparedness, response or recovery Action
32	#47- 2012	Enhance Security at Util Substations (Non-City) (PD)	December 2016	Emergency Management & Util Facilities Director	\$200,000	Is a preparedness, response or recovery Action
30	#48- 2012	Continue to Maintain Zoning Setback Regulations for Tall Structures (CD)	December 2016	Community Development	Staff Time	Is a preparedness, response or recovery Action
29	#51- 2012	Update Stormwater Management System at Concord Heights	December 2016	General Services	\$514,690	Was incorporated into another project or different Action
29	#52- 2012	Update Stormwater Management System at Ormond St, Christian Ave, Oriole Rd, East Side Dr and Partridge Rd	December 2016	General Services	\$2,198,174	Was incorporated into another project or different Action

City of Concord, NH Hazard Mitigation Plan Update 2017

7 POTENTIAL ACTION EVALUATION

Priority Score	Action Number	Action	Deleted Date	Who is Responsible	Approx. Cost	Why Deleted? The Action...
29	#53- 2012	Update Stormwater Management System at West Sugarball Road to Outfall on Merrimack River	December 2016	General Services	\$146,960	Was incorporated into another project or different Action
29	#54- 2012	Update Stormwater Management System at Concord Hospital, South of Redington Road/West of Fruit Street	December 2016	General Services	\$603,900	Was incorporated into another project or different Action
29	#55- 2012	Update Stormwater Management System at Charles Street and Contoocook River	December 2016	General Services	\$63,580	Was incorporated into another project or different Action
29	#56- 2012	Update Stormwater Management System at Pleasant Street and Miller's Brook	December 2016	General Services	\$22,044	Was incorporated into another project or different Action
29	#57- 2012	Update Stormwater Management System at Merrimack Street and Bye Street	December 2016	General Services	\$614,020	Was incorporated into another project or different Action
29	#59- 2012	Update Stormwater Management System at Noyes Street near Harvard Street	December 2016	General Services	\$63,580	Was incorporated into another project or different Action
29	#60- 2012	Update Stormwater Management System at Rumford Street between Penacook Street and Jennings Street	December 2016	General Services	\$148,225	Was incorporated into another project or different Action
29	#61- 2012	Update Stormwater Management System at Low Area at Borough, Washington and Fowler Triangle	December 2016	General Services	\$424,050	Was incorporated into another project or different Action
26	#62- 2012	Upgrade Radio System in Merrimack Valley High School (Non-City) (PD)	December 2016	Police Department and Merrimack Valley School System	\$20,000	Is a preparedness, response or recovery Action
36	#63- 2012	Enhance Security System of Police Headquarters (PD)	December 2016	Police Department	\$15,000	Is a preparedness, response or recovery Action
35	#64- 2012	Increase Direct Communications Among Departments and Non-City Entities (FD)	December 2016	Emergency Management	Staff Time	Is a preparedness, response or recovery Action

City of Concord, NH Hazard Mitigation Plan Update 2017

7 POTENTIAL ACTION EVALUATION

Priority Score	Action Number	Action	Deleted Date	Who is Responsible	Approx. Cost	Why Deleted? The Action...
34	#66- 2012	Develop Fire Dispatch Back-up Plan (FD)	December 2016	Fire Department	\$20,000	Is a preparedness, response or recovery Action
31	#67- 2012	Continue to Update Contact Information for Ice Storm Response (GS)	December 2016	General Services	Staff Time	Is a preparedness, response or recovery Action
29	#68- 2012	Maintain Dispatch Software and Hardware to Allow For AVL Capability and Priority Dispatching (FD)	December 2016	Fire Department	\$150,000	Is a preparedness, response or recovery Action
24	#69- 2012	Enhance the Security of WKXL (PD)	December 2016	Police Department	Staff Time	Is a preparedness, response or recovery Action
24	#70- 2012	Enhance the Security of WNHI (PD)	December 2016	Police Department	Staff Time	Is a preparedness, response or recovery Action
36	#72- 2012	Require Incident Command System (ICS) Training for City Personnel (PD)	December 2016	Fire Department	Staff Time	Is a preparedness, response or recovery Action
36	#73- 2012	Execute Mock Drills for Civil Disturbances (PD)	December 2016	Police Department	\$30,000	Is a preparedness, response or recovery Action
34	#74- 2012	Develop Policies for Ensuring State of Storm Readiness (FD) to	December 2016	Fire Department	Staff Time	Is a preparedness, response or recovery Action
33	#75- 2012	Undertake More Tabletop Exercises (FD)	December 2016	Fire Department	Staff Time	Is a preparedness, response or recovery Action
32	#76- 2012	Maintain GIS Software to Utilize Hazard Mitigation Maps in Emergency Response Vehicles (TF)	December 2016	Community Development	Staff Time	Is a preparedness, response or recovery Action
32	#77- 2012	Execute Mock Drills for Technological Disasters (IT)	December 2016	Police Department	\$50,000+	Is a preparedness, response or recovery Action
32	#78- 2012	Require NIMS Training for All Key Staff (GS)	December 2016	General Services	\$5,000	Is a preparedness, response or recovery Action
32	#79- 2012	Develop Coordinated Response to NH Military Reservation Emergencies (PD)	December 2016	Police Department	Staff Time	Is a preparedness, response or recovery Action

City of Concord, NH Hazard Mitigation Plan Update 2017

7 POTENTIAL ACTION EVALUATION

Priority Score	Action Number	Action	Deleted Date	Who is Responsible	Approx. Cost	Why Deleted? The Action...
29	#80- 2012	Conduct Hazardous Materials Operations Training for All City Departments (FD)	December 2016	Fire Department	Staff Time	Is a preparedness, response or recovery Action
25	#81- 2012	Participate in NFIP Training	December 2016	Director of Building Services	Staff Time	Is a preparedness, response or recovery Action
24	#82- 2012	Develop Coordinated Response to NH State Prison Disturbance (PD)	December 2016	Police Department	Staff Time	Is a preparedness, response or recovery Action
23	#83- 2012	Provide Ongoing GIS Training (CD-GIS)	December 2016	Community Development-GIS	Staff Time	Is a preparedness, response or recovery Action
36	#84- 2012	Develop and Implement a Response Plan for Special Operations Incidents (FD)	December 2016	Fire Department	Staff Time	Is a preparedness, response or recovery Action
33	#86- 2012	Update the 2005 Emergency Operations Plan (FD)	December 2016	Emergency Management	Staff Time	Is a preparedness, response or recovery Action
32	#87- 2012	Update GIS Critical Facilities Layer (CD-GIS)	December 2016	Community Development-GIS	Staff Time	Is a preparedness, response or recovery Action
32	#88- 2012	Devise Badge System for City Facilities (IT)	December 2016	Police Department	\$250,000	Is a preparedness, response or recovery Action
32	#90- 2012	Develop a Plan to Protect City Clerk's Records (TF)	December 2016	City Clerk	\$100,000	Is a preparedness, response or recovery Action
32	#92- 2012	Develop Windstorm Preparation Procedures	December 2016	Fire Department	Staff Time	Is a preparedness, response or recovery Action
32	#93- 2012	Update General Orders for Procedures as Needed (PD)	December 2016	Police Department	Staff Time	Is a preparedness, response or recovery Action
31	#94- 2012	Adopt the Capital Area Public Health Plan and Mass Vaccination Plan (TF)	December 2016	Fire Department, Police Department	Staff Time	Is a preparedness, response or recovery Action
31	#95- 2012	Enhance or Relocate the City's EOC (FD)	December 2016	Emergency Management	1.5 million	Is a preparedness, response or recovery Action

City of Concord, NH Hazard Mitigation Plan Update 2017

7 POTENTIAL ACTION EVALUATION

Priority Score	Action Number	Action	Deleted Date	Who is Responsible	Approx. Cost	Why Deleted? The Action...
31	#96- 2012	Maintain a Contingency Plan for City Hall Operations (TF)	December 2016	City Manager	Staff Time	Is a preparedness, response or recovery Action
31	#97- 2012	Improve an Alternative Communication Plan (IT)	December 2016	IS	\$500,000	Is a preparedness, response or recovery Action
30	#99- 2012	Review Material Availability for Ice and Snow Events (GS)	December 2016	General Services	Staff Time	Is a preparedness, response or recovery Action
30	#100-2012	Ensure Staff and Equipment Preparedness for Ice, Snow, and Wind Events (GS)	December 2016	General Services	Staff Time	Is a preparedness, response or recovery Action
30	#101-2012	Review and Document Ice, Snow, and Wind Storm Response Procedures (GS)	December 2016	General Services	Staff Time	Is a preparedness, response or recovery Action
30	#102-2012	Develop an Action Plan in Response to a Major Fire (GS)	December 2016	General Services	Staff Time	Is a preparedness, response or recovery Action
30	#103-2012	Utilize Resources of Concord Trailways During an Emergency (PD)	December 2016	Fire Department	\$30,000	Is a preparedness, response or recovery Action
30	#104-2012	Submit a Plan For a Full-Time Position for a Dedicated Emergency Management Director/Coordinator (FD)	December 2016	Emergency Management	130,000 annually	Is a preparedness, response or recovery Action
29	#106-2012	Identify Inaccessible Areas and Develop a Plan for Tanker Access (FD)	December 2016	Fire Department	Staff Time	Is a preparedness, response or recovery Action
29	#107-2012	Implement Pre-Construction Plan Review Process for Hazardous Materials Plan for All Properties within the Floodplain (TF)	December 2016	Fire Department	Staff Time	Is a preparedness, response or recovery Action
28	#108-2012	Develop a Plan to Improve Radio Coverage City-wide (FD)	December 2016	Fire Department	Staff Time	Is a preparedness, response or recovery Action
28	#110-2012	Coordinate Increased Security with Concord Airport (PD)	December 2016	Police Department	\$100,000	Is a preparedness, response or recovery Action

Priority Score	Action Number	Action	Deleted Date	Who is Responsible	Approx. Cost	Why Deleted? The Action...
28	#111-2012	Implement an Enterprise Resource System to Support City Services (FD)	December 2016	Finance Dept	1.75 million	Is a preparedness, response or recovery Action
27	#112-2012	Install Backup Power Sources for City Facilities (IT)	December 2016	General Services	\$275,000	Is a preparedness, response or recovery Action
26	#113-2012	Implement a Snow Drift Fencing Program (TF)	December 2016	General Services	Staff Time + \$2,000	Is a preparedness, response or recovery Action
25	#114-2012	Require Designation of Snow Storage Areas on Site Plans (CD)	December 2016	Community Development	Staff Time	Is a preparedness, response or recovery Action
24	#115-2012	Assess the Need for a Plan For Development in Urban Interface Areas (FD)	December 2016	Fire Department	Staff Time	Is a preparedness, response or recovery Action

Source: Concord Hazard Mitigation Committee

The tan highlighted rows in **Table 42** indicate the **12 Deferred** mitigation Actions which also appear in the forthcoming **Mitigation Action Plan for 2017**. The Action titles were revised to reflect the new focus on mitigation although the principle for each remains the same.

**Table 42
Deferred Mitigation Actions**

Priority Score	Action Number	Action	Deferred Date	Who is Responsible	Approx. Cost	Why Deferred? Because...	Hazards Addressed
36	#35-2012	Continue to Enforce Floodplain Regulation in the Zoning Ordinance for Protection from the Floodway (CD)	December 2016	Community Development	Staff Time	Action needs to be repeated to be effective	Flood
36	#36-2012	Continue to Enforce Building Codes to Reduce Wind & Snow Load Damage that Leads to Structure Collapse (CD)	December 2016	Community Development	Staff Time	Action needs to be repeated to be effective	Severe Wind Events (Tornado, Hurricane, Tropical Storm, Windstorm)
36	#40-2012	Update the Floodplain Development Zoning Ordinance to Comply with NFIP Requirements and Planning Board Recommendation (CD)	December 2016	Planning Board	Staff Time	Action needs to be repeated to be effective	Flood
30	#49-2012	Develop and Implement a Sprinkler Ordinance for the Conflagration Areas to	December 2016	Community Development	\$3 million	City did not have the staff capability to undertake Action	Wildfire, Lightning, Fire

City of Concord, NH Hazard Mitigation Plan Update 2017

7 POTENTIAL ACTION EVALUATION

Priority Score	Action Number	Action	Deferred Date	Who is Responsible	Approx. Cost	Why Deferred? Because...	Hazards Addressed
		Reduce the Risk of Fire (FD/PD)					
35	#65-2012	Continue to Enforce Municipal Fire Alarm and Fiber Optic Network Regulations to Prevent Failure of Regional Fire Alarm System (FD)	December 2016	Fire Department	Annual Costs of \$50,000 to \$100,000	Action needs to be repeated to be effective	Wildfire, Lightning, Fire
25	#71-2012	Develop NFIP Public Awareness Program and Publicize the Availability of Flood Insurance to Reduce the Impact of Flooding Event (HMC)	December 2016	Community Development	Staff Time	City did not have the staff capability to undertake Action	Flood, Rapid Snow Pack Melt, Severe Storms (Rain)
33	#85-2012	Continue to Enforce Road and Driveway Slope Subdivision Regulation Standards to Reduce Potential for Erosion and Road Washout (CD)	December 2016	Community Development	Staff time	Action needs to be repeated to be effective	Flood, Fluvial Erosion, Landslide, Bank Erosion & Bed Scouring, Rapid Snow Pack Melt
32	#89-2012	Construct a Sprinkler Program at Concord Gardens and Royal Gardens to Reduce the Risk of Lightning and Fire (FD)	December 2016	Fire Department	\$750,000 to multi-million dollars	City did not have the staff capability or funding to undertake Action	Wildfire, Lightning, Fire
32	#91-2012	Construct an Upgraded Fire Alarm System Program at All Multifamily Developments to Reduce the Risk of Lightning and Fire (FD)	December 2016	Fire Department	\$3-5 million	City did not have the funding to undertake Action	Wildfire, Lightning, Fire
30	#98-2012	Continue to Enforce City Requirements for Underground Utilities to Mitigate Severe Wind and Winter Weather Event Damage (CD)	December 2016	Community Development	Staff time	Action needs to be repeated to be effective	Severe Wind Events (Tornado, Hurricane, Tropical Storm, Windstorm), Severe Winter Weather, Debris Impacted Infrastructure
30	#105-2012	Implement Natural Fire Breaks in Areas of High Concern to Reduce Wildfire and Lighting Damage (FD)	December 2016	Fire Department	\$200,000 annually for about 5 years	City did not have the funding to undertake Action	Wildfire, Lightning
28	#109-2012	Review Regulations to Consider Tree Breaks During the Plan Review Process to Reduce the Impact of Wildfire (CD)	December 2016	Community Development	Staff Time	City did not have the staff capability to undertake Action	Wildfire, Lightning

Source: Concord Hazard Mitigation Committee

New Actions from Community Vulnerability Assessment

After determining the status of the existing Actions, **New** Actions can be determined. The Hazard Mitigation Committee reviewed the **Problem Statements** from the **Critical and Community Facility Vulnerability Assessment** and developed mitigation Actions out of several of them. The Committee also reviewed the **Capability Assessment's Future Improvements** to ascertain whether any mitigation Actions could be developed; however, nearly all yielded preparedness, response or recovery items ineligible for further consideration in the **Hazard Mitigation Plan**.

These **New** Actions (and the existing **Deferred** Actions from 2012) were assessed in **Potential Action Evaluation Tables**.

MITIGATION ACTION CATEGORIES

The **2012 Plan** used the following 5 Action categories when developing and categorizing their Actions. This grouping followed the general pattern of usage within the Central NH Region:

- **Prevention**
- **Property Protection**
- **Structural Protection**
- **Emergency Services**
- **Public Information and Involvement**

However, the **2017 Plan** utilizes a more standardized set of Action categories that follow FEMA's own guidelines and recommendation within mitigation handbooks:

Local Planning and Regulation
Structure and Infrastructure Projects
Natural Systems Protection
Education and Awareness

Preparedness, response and recovery 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 **2017 Plan**, most of these activities were not utilized as Actions since they are more appropriate for the City's **Emergency Operations Plan** recommendations. As a result, many **2012** Actions and potential **2017** Actions were not incorporated into this **Hazard Mitigation Plan** because they were not mitigation-oriented.

The remaining **Deferred** (2012) Concord mitigation Actions and its **New** (2017) mitigation Actions translate well over to these new Action categories which will be used for the **Potential Action Evaluation** and **Mitigation Action Plan**.

Potential Action Evaluation

A listing of **12 Deferred** mitigation Actions from **2012** and **16 New** mitigation Actions from **2017** important to the City of Concord was developed for evaluation. Each Potential Action is affiliated with at least one **Hazard Specific Objective**, a short **Description** is provided, and the **Affected Location** is provided to ensure easier understanding and reassessment of the Actions in the future during implementation.

The **Potential Action Evaluation** yields **28** mitigation Actions for the **Hazard Mitigation Plan 2017**. These are displayed in **Table 43**, **Table 44**, **Table 45** and **Table 46**. The tan items are **Deferred** Actions from **2012** and the light blue items are the Actions relating to the **Fluvial Geomorphic Assessments (FGA)** of the Soucook and Turkey Rivers from **2015**.

Table 43
Evaluation of Local Planning and Regulation Actions

Fulfills Hazard Objectives	Action Number	Name of Potential Action	Description of Potential Action	Affected Location
Flood	#35-2012	Continue to Enforce Floodplain Regulation in the Zoning Ordinance for Protection from the Floodway (CD)	Continue to employ floodplain / floodway ordinances and regulations in order to protect the public.	Floodplains of Rivers, Brooks, Ponds on DFIRMS
Severe Wind Events (Tornado, Hurricane, Tropical Storm, Windstorm), Severe Winter Weather	#36-2012	Continue to Enforce Building Codes to Reduce Wind & Snow Load Damage that Leads to Structure Collapse (CD)	Enforce building codes to consider wind load damage to the maximum extent possible to reduce future wind damage to structures.	New development and retrofits
Flood	#40-2012	Update the Floodplain Development Zoning Ordinance to Comply with NFIP Requirements and Planning Board Recommendation (CD)	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 the Code Enforcement Officer, etc. In 2010, the City adopted the latest required revisions.	Floodplains of Rivers, Brooks, Ponds on DFIRMS
Wildfire, Lightning, Fire	#49-2012	Develop and Implement a Sprinkler Ordinance for the Conflagration Areas to	Sprinkler systems should be considered in the Conflagration area buildings during renovations.	Downtown, Concord Heights, Penacook

7 POTENTIAL ACTION EVALUATION

Fulfills Hazard Objectives	Action Number	Name of Potential Action	Description of Potential Action	Affected Location
		Reduce the Risk of Fire (FD/PD)	Thousands of people live and commute through high density downtowns.	
Flood, Fluvial Erosion, Landslide, Bank Erosion & Bed Scouring, Rapid Snow Pack Melt	#85-2012	Continue to Enforce Road and Driveway Slope Subdivision Regulation Standards to Reduce Potential for Erosion and Road Washout (CD)	Continue to update street and driveway standards to govern slopes of roadways, reducing flooding, erosion or runoff emergencies in all locations of the City.	New development roads and driveways
Severe Wind Events (Tornado, Hurricane, Tropical Storm, Windstorm), Severe Winter Weather, Debris Impacted Infrastructure	#98-2012	Continue to Enforce City Requirements for Underground Utilities to Mitigate Severe Wind and Winter Weather Event Damage (CD)	Enforce regulations requiring placement of electrical and other overhead utilities underground for development projects wherever possible to reduce the risk of natural hazard events.	New development and retrofits
Wildfire, Lightning	#109-2012	Review Regulations to Consider Tree Breaks During the Plan Review Process to Reduce the Impact of Wildfire (CD)	Trees help to serve as wind and fire breaks and their landscaping placement should be considered during the development process	New development in rural areas
Flood, Fluvial Erosion, Landslide, Bank Erosion & Bed Scouring, Rapid Snow Pack Melt	#116-2017	Consider Developing a Fluvial Erosion Hazard (FEH) Zone for the Soucook River and Turkey River (FGA)	Ordinance limits future development along the designated fluvial erosion hazards areas ("zones"), providing setbacks from the river that result in the protection of life, property and infrastructure.	Soucook River, Turkey River

Source: Concord Hazard Mitigation Committee

Table 44

Evaluation of Structure and Infrastructure Projects

Fulfills Hazard Objectives	Action Number	Name of Potential Action	Description of Potential Action	Affected Location
Wildfire, Lightning, Fire	#65-2012	Continue to Enforce Municipal Fire Alarm and Fiber Optic Network Regulations to Prevent Failure of Regional Fire Alarm System (FD)	Replace and upgrade cabling to ensure system integrity and performance. The system supports the 22 community Capital Area Fire Mutual Aid Compact area and is the communications line for these towns and the City itself.	Citywide, some of the CAFMAC towns
Wildfire, Lightning, Fire	#89-2012	Construct a Sprinkler Program at Concord Gardens and Royal Gardens to Reduce the	FD works with owners to encourage installation of fire sprinklers at these locations. Structures are too old to fall under the multi-family sprinkler regulations; a few	Concord Gardens, Royal Gardens (Heights)

City of Concord, NH Hazard Mitigation Plan Update 2017

7 POTENTIAL ACTION EVALUATION

Fulfills Hazard Objectives	Action Number	Name of Potential Action	Description of Potential Action	Affected Location
		Risk of Lightning and Fire (FD)	hundred people live in these apartment buildings.	
Wildfire, Lightning, Fire	#91-2012	Construct an Upgraded Fire Alarm System Program at All Multifamily Developments to Reduce the Risk of Lightning and Fire (FD)	FD works with owners to encourage installation of fire alarms at these locations. Structures are too old to fall under the multi-family fire alarm regulations; thousands of people live in these apartment buildings.	Citywide
Wildfire, Lightning, Fire	#117-2017	Retrofit the Downtown City Library with a Sprinkler System to Reduce Vulnerability to Fire (FD)	Old, popular City building that hosts multiple programs for the public and is open 7 days per week. With the abundance of flammable paper material and the lack of a sprinkler system, potential for fire hazards are significant.	City Library, surrounding buildings (Downtown)
Flooding, Rapid Snow Pack Melt, Erosion/Scouring, Severe Rainstorms, Hurricanes and Tropical Storms	#118-2017	Upgrade Stormwater Management Systems at the Fisherville Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	Design, permitting, and construction of stormwater infrastructure to address flooding and upgrading aging infrastructure that is at a threat of failure. The Fisherville Road area is a populous location and a main commuter route (Route 3).	Fisherville Road area, includes wide network of local streets (Bog Road to Beaver Meadow Brook watershed)
Flooding, Rapid Snow Pack Melt, Erosion/Scouring, Severe Rainstorms, Hurricanes and Tropical Storms	#119-2017	Upgrade Stormwater Management System at the Heights Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	Design, permitting, and construction of stormwater infrastructure to address flooding and upgrading aging infrastructure that is at a threat of failure. The Heights area is a populous location and a main commuter route (Loudon Road, Route 9).	Concord Heights area, includes wide network of local streets (East Side Drive to Soucook River, Loudon Road-Merrimack Road)
Flooding, Rapid Snow Pack Melt, Erosion/Scouring, Severe Rainstorms, Hurricanes and Tropical Storms	#120-2017	Upgrade Stormwater Management System at the Hoit Road Subcatchment Area to Eliminate Potential for Flooding, Erosion and Roadway Failure	Design, permitting, and construction of stormwater infrastructure to address flooding and upgrading aging infrastructure that is at a threat of failure. The Hoit area, although is rural currently, has newly developing areas that flow to a number of streams and brooks. within developed areas. I-93 and Route 3/4	(Mountain Road, Sanborn Road, Hoit Road).
Flooding, Rapid Snow Pack Melt, Erosion/Scouring, Severe Rainstorms, Hurricanes and Tropical Storms	#121-2017	Upgrade Stormwater Management System at Horseshoe Pond Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	Design, permitting, and construction of stormwater infrastructure to address flooding and upgrading aging infrastructure that is at a threat of failure. The Horseshoe Pond area (northern downtown watershed) is an urban, developed location that hosts several industrial and professional office parks. Route I-393	Horseshoe Pond, Upper Auburn Street, Washington Street to Merrimack River, Commercial Street

City of Concord, NH Hazard Mitigation Plan Update 2017

7 POTENTIAL ACTION EVALUATION

Fulfills Hazard Objectives	Action Number	Name of Potential Action	Description of Potential Action	Affected Location
Flooding, Rapid Snow Pack Melt, Erosion/Scouring, Severe Rainstorms, Hurricanes and Tropical Storms	#122-2017	Upgrade Stormwater Management System at the <u>Hospital</u> Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	Design, permitting, and construction of stormwater infrastructure to address flooding and upgrading aging infrastructure that is at a threat of failure. The Hospital area is mixed developed location that hosts several residential areas, institutional clusters, and professional office parks.	Concord Hospital, Bow Brook Watershed (Langley Parkway to Outfalls to Turkey River, Upper West Concord)
Flooding, Rapid Snow Pack Melt, Erosion/Scouring, Severe Rainstorms, Hurricanes and Tropical Storms	#123-2017	Upgrade Stormwater Management System at the <u>Oak Hill</u> Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	Design, permitting, and construction of stormwater infrastructure to address flooding and upgrading aging infrastructure that is at a threat of failure. The Oak Hill area is rural-residential.	Oak Hill, Oak Hill Road, East Concord Village, Loudon Town line
Flooding, Rapid Snow Pack Melt, Erosion/Scouring, Severe Rainstorms, Hurricanes and Tropical Storms	#124-2017	Upgrade Stormwater Management System at the <u>Penacook</u> Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	Design, permitting, and construction of stormwater infrastructure to address flooding and upgrading aging infrastructure that is at a threat of failure. The Penacook area is a populous location and a main commuter route (Route 3).	Penacook, Along Route 3, Boscawen Town line, Contoocook River, Merrimack River
Flooding, Rapid Snow Pack Melt, Erosion/Scouring, Severe Rainstorms, Hurricanes and Tropical Storms	#125-2017	Upgrade Stormwater Management System at the <u>Downtown (Terrible Trapezoid)</u> Drainage Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	Design, permitting, and construction of stormwater infrastructure to address flooding and upgrading aging infrastructure that is at a threat of failure. The Downtown trapezoid area (southern downtown watershed) is an urban, developed location that hosts several industrial, institutional, commercial, and professional office parks. Major traveling Route 3, Route 3A, Interstate 93, Route 9/202	Downtown, Washington Street, Auburn Street to Merrimack River, Perley Street, South Main Street, Manchester Street.
Flooding, Rapid Snow Pack Melt, Erosion/Scouring, Severe Rainstorms, Hurricanes and Tropical Storms	#126-2017	Upgrade Stormwater Management System at the <u>Turkey River</u> Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	Design, permitting, and construction of stormwater infrastructure to address flooding and upgrading aging infrastructure that is at a threat of failure. The Penacook area is a dense residential and institutional location and a main commuter route (Route 9/202, Route 13).	Turkey River area, Clinton Street, St Paul's School, Iron Works Road, South Street
Flooding, Rapid Snow Pack Melt, Erosion/Scouring, Severe Rainstorms, Hurricanes and Tropical Storms	#127-2017	Upgrade Stormwater Management System at <u>Washington</u> Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	Design, permitting, and construction of stormwater infrastructure to address flooding and upgrading aging infrastructure that is at a threat of failure. The Washington Street area is mixed developed location that hosts	Washington Street, between Horseshoe Pond and Terrible Trapezoid (Downtown),

7 POTENTIAL ACTION EVALUATION

Fulfills Hazard Objectives	Action Number	Name of Potential Action	Description of Potential Action	Affected Location
			dense residential areas, UNH Law Center.	North of Center Street
Flooding, Rapid Snow Pack Melt, Erosion/Scouring, Severe Rainstorms, Hurricanes and Tropical Storms	#128-2017	Upgrade Stormwater Management System at West Concord Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	Design, permitting, and construction of stormwater infrastructure to address flooding and upgrading aging infrastructure that is at a threat of failure. The West Concord area is primarily rural residential, the Penacook Lake watershed area.	West Concord, Penacook Street West, Carter Hill, West Parish, Hutchins Street
Lightning	#130-2017	Purchase Lightning Rods for Installation on Tall, Older City Buildings and Houses of Worship to Reduce the Risk of Lightning Damage	Some tall, older structures downtown may not have lightning protection and will benefit from installation of a lightning rod. Purchased and installed by private contractors paid by the City and/or grant funding.	Downtown, Conflagration area

Source: Concord Hazard Mitigation Committee

Table 45

Evaluation of Natural Systems Protection Actions

Fulfills Hazard Objectives	Action Number	Name of Potential Action	Description of Potential Action	Affected Location
Wildfire, Lightning	#105-2012	Implement Natural Fire Breaks in Areas of High Concern to Reduce Wildfire and Lightning Damage (FD)	Trail system parks require fire breaks. Work with CC & PB and their open space plan. Regulations applying to new development that respects both open space requirements and fire break tree safety.	City wide-extensive City Trail and Conservation easement land, new development
Fluvial Erosion, Landslide/Erosion	#131-2017	Evaluate the Streambank along the Merrimack River to Identify Areas Susceptible to Instability and Erosion in Public Spaces with the Goal of Stabilizing and Armoring Affected Areas	Evaluate the streambank conditions along the Merrimack River from Boscawen to Bow. Develop a detailed assessment that prioritizes locations in need of stabilization. Will preclude the final design of options. Thought to be 5-10 areas along the river, may not be on public spaces.	Merrimack River from Boscawen to Bow

Source: Concord Hazard Mitigation Committee

**Table 46
Evaluation of Education and Awareness Actions**

Fulfills Hazard Objectives	Action Number	Name of Potential Action	Description of Potential Action	Affected Location
Flood, Rapid Snow Pack Melt, Severe Storms (Rain)	#71-2012	Develop NFIP Public Awareness Program and Publicize the Availability of Flood Insurance to Reduce the Impact of Flooding Event (HMC)	Obtain selected FEMA publications on the NFIP and make the available to residents, developers, and business owners at City Hall, Permit Office, on the City website. Public service announcement on the CTV and a static announcement in between shows	Citywide, Floodplain buildings
Flood, Fluvial Erosion, Landslide, Bank Erosion & Bed Scouring	#129-2017	Educate the Riverside Landowners about the Implications of Soucook River & Turkey FGA Assessment to Reduce the Risk of Erosion and Impacts of Flooding (FGA)	Targeted outreach to residents, developers, and business owners along the riverside. Public service announcement on the CTV brochures, public education presentations about proper shoreland stewardship. Prepare the public for potential FEH zone adoption and if adopted, educate landowners about the ordinance restrictions.	Soucook River and Turkey River property owners

Source: Concord Hazard Mitigation Committee

Natural Hazards Evaluated for Which Specific Actions Were Not Identified

The Hazard Mitigation Committee assessed each of the 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 City.

Many Actions are general in nature and have the capacity to mitigate multiple types of natural hazards. Those hazards for which no specific or feasible Action was identified are displayed in **Table 47**.

Table 47

Committee Assessment of Natural Hazards with No Mitigation Actions

Natural Hazard	Committee Assessment
Tornadoes	The Committee felt Tornadoes would be an unlikely hazard event. Although if a Tornado were to occur, existing enforcement of the State Building Code, and policies for the City’s removal of hazardous trees and notification of Eversource are in place. They felt no additional Actions would be within the scope of their jurisdiction at this time.
Downbursts	The Committee's assessment of Downbursts is the same as Tornadoes . They did not feel specific mitigation Actions could be pursued.
Hurricanes and Tropical Storms	Hurricanes and Tropical Storms often carry heavy rains, debris, and flooding along with high winds. The Committee's assessment looks to the other wind and flood hazards and felt they could not further mitigate these hazards beyond what was being proposed for related hazards.
Drought	The Committee felt Drought is a wide-spread, long-term hazard for which no specific mitigations Actions could be proposed for the City. The Penacook Water Treatment Facility has requested a reduction in water usage ban for an indefinite time period to help conserve water. For now, water is being redirected from the Contoocook River into Penacook Lake.
Excessive Heat	The Committee feels similar concerns to Excessive Heat that they do with Winter Storms . The Fire Department is considering opening a "cooling shelter" and/or checking on residents in need as well as congregate care facilities. The Committee did not feel additional mitigation Actions could be proposed beyond those which could generally cover excessive heat.
Earthquake	The Committee recognizes Earthquakes will continue in this area but are likely to be small in nature. Beyond more stringent enforcement of the existing State Building Code, the Committee felt no mitigation Actions would be within the scope of their jurisdiction or would be financially feasible at this time.
Dam Failure	The Committee recognizes that although Penacook Lake Dam Failure is a technological hazard, its end result would be significant flooding of the North State Street neighborhood. The City regularly maintains the dam and seeks to solve residential drainage issues in the area. Other than the general Flooding mitigation Actions and public education, the Committee felt no specific mitigation Action for Dam Failure would be feasible within the scope of their jurisdiction.

Source: Concord Hazard Mitigation Committee

8 MITIGATION ACTION PLAN

The **Mitigation Action Plan** is the culmination of the work of the previous Assessments, inventories, and evaluations from the previous Chapters. Actions to help Concord mitigate the damages caused by disasters have been developed and prioritized by Hazard Mitigation consensus in consideration of both existing and new development.

As noted in **7 POTENTIAL ACTION EVALUATION**, each Action falls into (at least) one of these 4 mitigation Action categories:

Local Planning and Regulation
Structure and Infrastructure Projects
Natural Systems Protection
Education and Awareness

Each Action, including the **Deferred** 2012 Actions and the **New** 2017 Actions, is evaluated by the relative ease of completion using a numeric **Ranking Score** generated by the 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 Actions are numbered for easier tracking. The 2007 Actions were numbered **#01- 2007** through **#34- 2007**. The 2012 Actions received the designation of **#35- 2012** through **#115- 2012**. The 2017 Actions picked up where the prior Actions left off, beginning with **#116- 2017** through to **#131- 2017**. Over time, the Actions can be tracked to see which have been **Deferred** and to notice, with the missing numbers, how many have been **Completed** or **Deleted**.

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.

Concord’s Mitigation Action Plan 2017

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 of the **Hazard Mitigation Plan 2017**, the **Mitigation Action Plan** shown in **Table 48**, **Table 49**, **Table 50** and **Table 51** should be able to guide future hazard mitigation efforts in the City through an annual implementation process. Actions derived from one of the **Fluvial Geomorphic Assessments** of 2015 are denoted by a (FGA) suffix and their cells are highlighted in light blue.

Twelve (**12**) **Deferred** Actions from 2012 and **16 New** Actions from 2017 combine to develop the **28** Actions of the 2017 **Mitigation Action Plan**. The **Deferred** Actions’ cells are highlighted in tan.

**Table 48
Local Planning and Regulation Actions**

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approximate Cost to City	What Cost Will Pay For	How Funded
#35-2012	Continue to Enforce Floodplain Regulation in the Zoning Ordinance for Protection from the Floodway (CD)	<u>Short Term</u> 1-2 Years then <u>Ongoing</u>	44	Community Development - Planning Division/Code Enforcement	Staff Time	Cost is for volunteer and staff time in-kind labor.	N/A
#36-2012	Continue to Enforce Building Codes to Reduce Wind & Snow Load Damage that Leads to Structure Collapse (CD)	<u>Short Term</u> 1-2 Years then <u>Ongoing</u>	44	Community Development - Code Enforcement	Staff Time	Cost is for volunteer and staff time in-kind labor.	N/A
#40-2012	Update the Floodplain Development Zoning Ordinance to Comply with NFIP Requirements and Planning Board Recommendation (CD)	<u>Short Term</u> 1-2 Years then <u>Ongoing</u>	44	Community Development Planning Board	Staff Time	Cost is for volunteer and staff time in-kind labor.	N/A
#49-2012	Develop and Implement a Sprinkler Ordinance for the Conflagration Areas to Reduce the Risk of Fire (FD/PD)	<u>Medium Term</u> 3-4 Years	39	Community Development, assisted by Fire Department	\$6 million	Cost for retrofitting existing buildings, to include educational components, design and development of individual buildings but will not be borne by the City. Staff time could run	Private business funding to retrofit existing buildings, Community Development Operating Budget, NH Division of Historic Resources

City of Concord, NH Hazard Mitigation Plan Update 2017

8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approximate Cost to City	What Cost Will Pay For	How Funded
						1,000 hours or more. Staff labor could include tasks such as project management and implementation.	grant possibility
#85-2012	Continue to Enforce Road and Driveway Slope Subdivision Regulation Standards to Reduce Potential for Erosion and Road Washout (CD)	<u>Short Term</u> 1-2 Years then <u>Ongoing</u>	44	Community Development-Planning/Engineering	Staff Time	Cost is for volunteer and staff time in-kind labor.	N/A
#98-2012	Continue to Enforce City Requirements for Underground Utilities to Mitigate Severe Wind and Winter Weather Event Damage (CD)	<u>Short Term</u> 1-2 Years then <u>Ongoing</u>	44	Community Development-Planning/Engineering	Staff Time	Cost is for volunteer and staff time in-kind labor.	N/A
#109-2012	Review Regulations to Consider Tree Breaks During the Plan Review Process to Reduce the Impact of Wildfire (CD)	<u>Medium Term</u> 3-4 Years	35	Community Development, assisted by Fire Department	Staff Time	Cost is for volunteer and staff time in-kind labor.	N/A
#116-2017	Consider Developing a Fluvial Erosion Hazard (FEH) Zone for the Soucook River and Turkey River (FGA)	<u>Medium Term</u> 3-4 Years	35	Community Development-Planning/Engineering	Staff Time	Cost is for volunteer and staff time in-kind labor.	N/A

Source: Concord Hazard Mitigation Committee

Table 49

Structure and Infrastructure Projects

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approximate Cost to City	What Cost Will Pay For	How Funded
#65-2012	Continue to Enforce Municipal Fire Alarm and Fiber Optic Network Regulations to Prevent Failure of Regional Fire Alarm System (FD)	<u>Short Term</u> 1-2 Years then <u>Ongoing</u>	39	Fire Department, assisted by Information Technology	Annual Costs of \$50,000 to \$100,000	Cost is for staff labor, supplies for maintenance of the system.	Fire Department Operating Budget, New connection costs are borne by owner, City User Fees, Concord School

City of Concord, NH Hazard Mitigation Plan Update 2017

8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approximate Cost to City	What Cost Will Pay For	How Funded
							District, MVSD
#89-2012	Construct a Sprinkler Program at Concord Gardens and Royal Gardens to Reduce the Risk of Lightning and Fire (FD)	<u>Medium Term</u> 3-4 Years	35	Fire Department	\$750,000 to multi-million dollars	Cost covers supplies, hardware and labor to install the sprinkler system; City staff costs to implement	Costs borne by owners of facilities
#91-2012	Construct an Upgraded Fire Alarm System Program at All Multifamily Developments to Reduce the Risk of Lightning and Fire (FD)	<u>Medium Term</u> 3-4 Years	35	Fire Department	\$3-5 million	Cost covers supplies, hardware and labor to install the sprinkler system; City staff costs to implement	Costs borne by owners of facilities
#117-2017	Retrofit the Downtown City Library with a Sprinkler System to Reduce Vulnerability to Fire (FD)	<u>Long Term</u> 4-5 Years	53	Fire Department with assistance of Library	\$500,000	Cost is for contracted labor, materials, installation	Capital Improvements Program
#118-2017	Upgrade Stormwater Management Systems at the <u>Fisherville</u> Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	<u>Long Term</u> 4-5 Years	47	Community Development - Engineering, assisted by General Services	\$1,500,000	Cost covers design, permitting, and construction of stormwater infrastructure	Capital Improvements Program
#119-2017	Upgrade Stormwater Management System at the <u>Heights</u> Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	<u>Long Term</u> 4-5 Years	47	Community Development - Engineering, assisted by General Services	\$3,500,000	Cost covers design, permitting, and construction of stormwater infrastructure	Capital Improvements Program
#120-2017	Upgrade Stormwater Management System at the <u>Hoit Road</u> Subcatchment Area to Eliminate Potential for Flooding, Erosion and Roadway Failure	<u>Long Term</u> 4-5 Years	47	Community Development - Engineering, assisted by General Services	\$600,000	Cost covers design, permitting, and construction of stormwater infrastructure	Capital Improvements Program
#121-2017	Upgrade Stormwater Management System at <u>Horseshoe Pond</u> Subcatchment Area to Eliminate Potential for	<u>Long Term</u> 4-5 Years	47	Community Development - Engineering, assisted by General Services	\$2,000,000	Cost covers design, permitting, and construction of stormwater infrastructure	Capital Improvements Program

City of Concord, NH Hazard Mitigation Plan Update 2017

8 MITIGATION ACTION PLAN

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approximate Cost to City	What Cost Will Pay For	How Funded
	Flooding and Erosion to Cause Roadway Failure						
#122-2017	Upgrade Stormwater Management System at the <u>Hospital</u> Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	Long Term 4-5 Years	47	Community Development - Engineering, assisted by General Services	\$1,500,000	Cost covers design, permitting, and construction of stormwater infrastructure	Capital Improvements Program
#123-2017	Upgrade Stormwater Management System at the <u>Oak Hill</u> Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	Long Term 4-5 Years	47	Community Development - Engineering, assisted by General Services	\$3,000,000	Cost covers design, permitting, and construction of stormwater infrastructure	Capital Improvements Program
#124-2017	Upgrade Stormwater Management System at the <u>Penacook</u> Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	Long Term 4-5 Years	47	Community Development - Engineering, assisted by General Services	\$2,000,000	Cost covers design, permitting, and construction of stormwater infrastructure	Capital Improvements Program
#125-2017	Upgrade Stormwater Management System at the <u>Trapezoid Drainage Area</u> to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	Long Term 4-5 Years	47	Community Development - Engineering, assisted by General Services	\$4,000,000	Cost covers design, permitting, and construction of stormwater infrastructure	Capital Improvements Program
#126-2017	Upgrade Stormwater Management System at the <u>Turkey River</u> Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	Long Term 4-5 Years	47	Community Development - Engineering, assisted by General Services	\$750,000	Cost covers design, permitting, and construction of stormwater infrastructure	Capital Improvements Program
#127-2017	Upgrade Stormwater Management System at <u>Washington</u> Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	Long Term 4-5 Years	47	Community Development - Engineering, assisted by General Services	\$1,500,000	Cost covers design, permitting, and construction of stormwater infrastructure	Capital Improvements Program
#128-2017	Upgrade Stormwater Management System at <u>West Concord</u>	Long Term 4-5 Years	47	Community Development - Engineering, assisted by	\$750,000	Cost covers design, permitting, and construction of	Capital Improvements Program

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approximate Cost to City	What Cost Will Pay For	How Funded
	Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure			General Services		stormwater infrastructure	
#130-2017	Purchase Lightning Rods for Installation on Tall, Older City Buildings and Houses of Worship to Reduce the Risk of Lightning Damage	<u>Long Term</u> 4-5 Years	35	Fire Department, assisted by Community Development	\$150,000	Cost is for purchase and installation of 10-20 rods by private contractor.	National Historic Trust grants to houses of worship and historic buildings

Source: Concord Hazard Mitigation Committee

Table 50

Natural Systems Protection Actions

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approximate Cost to City	What Cost Will Pay For	How Funded
#105-2012	Implement Natural Fire Breaks in Areas of High Concern to Reduce Wildfire and Lightning Damage (FD)	<u>Medium Term</u> 3-4 Years	35	Fire Department, assisted by Conservation Commission	\$200,000 annually for about 5 years	Cost is for staff and contractor labor and equipment rentals.	Conservation Commission fund
#131-2017	Evaluate the Streambank along the Merrimack River to Identify Areas Susceptible to Instability and Erosion in Public Spaces with the Goal of Stabilizing and Armoring Affected Areas	<u>Long Term</u> 4-5 Years	39	Community Development-Engineering, assisted by General Services	\$50,000	Cost will pay for consultant and contractor labor and equipment. Staff labor will be in-kind.	CIP - Community Development

Source: Concord Hazard Mitigation Committee

Table 51

Education and Awareness Actions

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approximate Cost to City	What Cost Will Pay For	How Funded
#71-2012	Develop NFIP Public Awareness Program and Publicize the Availability of Flood Insurance to Reduce the Impact of Flooding Event (HMC)	<u>Medium Term</u> 3-4 Years	44	Community Development - Planning Division, with assistance of City Manager Office	Staff Time and minimal printing costs	Cost is for volunteer and staff time in-kind labor.	N/A

Action Number	Action	Action Timeframe	Ranking Score	Who is Responsible	Approximate Cost to City	What Cost Will Pay For	How Funded
#129-2017	Educate the Public about the Implications of Soucook River & Turkey FGA Assessment to Reduce the Risk of Erosion and Impacts of Flooding (FGA)	<u>Medium Term</u> 3-4 Years	40	Community Development - Planning Division, with assistance of City Manager Office, Economic Development Advisory Committee	Staff Time. Cost will be determined by method of dissemination	Cost is for volunteer and staff time in-kind labor.	N/A

Source: Concord 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 City staff member. The struggle to obtain municipal funding at City 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 City’s ability to complete successful hazard mitigation projects within the Plan’s 5-year lifespan. City staff and volunteers are often 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. Concord’s City Council makes the budget decisions instead of voters at annual Town Meetings, but funding still often becomes allocated based on greatest need or political support.

Because of this necessity to channel funding to the most needful places, 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 2017**. However, many of these **2017** Actions may end up **Deferred to 2022** simply because of the difficult nature of obtaining funding for projects for which future benefits may be limited and/or uncertain.

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.

STAPLEE METHOD

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 City’s Action *importance* priority. Instead, the STAPLEE process evaluates each Action and attempts to identify some potential barriers to its success. A score of **60** would indicate that the mitigation strategy, or Action, would be relatively among the easiest Actions to complete from a social, ethical and practical standpoint.

All STAPLEE answers are subjective and depend on the opinions of the Committee members discussing them. The Committee answered these **12** questions with a numeric score of “**1**” (indicating a **NO/Very Poor** response), “**2**” (indicating an **UNCERTAIN/Below Average** response, “**3**” (indicating a **MAYBE/Average** response), “**4**” (indicating a **LIKELY/Above Average** response) or “**5**” (indicating a **YES/Excellent** response), a scale of *how well* or *can* the Action 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?
- Is the action legal?
- Does the action offer reasonable benefits compared to its cost in implementing?
- Is the action environmentally sound?

Action Completion	
Rating	SCORE
Easiest	48 - 60
Easy	47 - 35
Normal	24 - 36
Hard	13 - 25
Hardest	12

The STAPLEE scores can range from a low of **12** to a high **60**. Concord’s **Mitigation Action Plan** STAPLEE rating is shown in **Figure 22**. The highest scored Actions should be easier to accomplish than the lower scored Actions. The City’s **28** Actions are rated:

Figure 22
STAPLEE Ranking of Mitigation Actions

Action Number	HOW WELL Does or CAN the Action..... Action	Reduce Damage?	Contribute to City Objectives?	Meet Regulations?	Protect Sensitive Structures?	Implemented Quickly?	Socially Acceptable?	Technically Feasible?	Administratively Realistic?	Politically Acceptable?	Legal?	Have a Reasonable Cost to Benefits?	Environmentally Sound?	Ranking Score
#35-2012	Continue to Enforce Floodplain Regulation in the Zoning Ordinance for Protection from the Floodway (CD)	4	4	4	4	4	3	4	3	3	4	3	4	44
#36-2012	Continue to Enforce Building Codes to Reduce Wind & Snow Load Damage that Leads to Structure Collapse (CD)	4	4	4	4	4	3	4	3	3	4	3	4	44
#40-2012	Update the Floodplain Development Zoning Ordinance to Comply with NFIP Requirements and Planning Board Recommendation (CD)	4	4	4	4	4	3	4	3	3	4	3	4	44
#49-2012	Develop and Implement a Sprinkler Ordinance for the Conflagration Areas to Reduce the Risk of Fire (FD/PD)	4	4	4	4	2	2	3	2	2	4	4	4	39
#65-2012	Continue to Enforce Municipal Fire Alarm and Fiber Optic Network Regulations to Prevent Failure of Regional Fire Alarm System (FD)	4	4	4	4	2	2	3	2	2	4	4	4	39
#71-2012	Develop NFIP Public Awareness Program and Publicize the Availability of Flood Insurance to Reduce the Impact of Flooding Event (HMC)	4	4	4	4	4	3	4	3	3	4	3	4	44
#85-2012	Continue to Enforce Road and Driveway Slope Subdivision Regulation Standards to Reduce Potential for Erosion and Road Washout (CD)	4	4	4	4	4	3	4	3	3	4	3	4	44
#89-2012	Construct a Sprinkler Program at Concord Gardens and Royal Gardens to Reduce the Risk of Lightning and Fire (FD)	4	4	3	3	2	3	2	3	3	2	3	3	35
#91-2012	Construct an Upgraded Fire Alarm System Program at All Multifamily Developments to Reduce the Risk of Lightning and Fire (FD)	4	4	3	3	2	3	2	3	3	2	3	3	35
#98-2012	Continue to Enforce City Requirements for Underground Utilities to Mitigate Severe Wind and Winter Weather Event Damage (CD)	4	4	4	4	4	3	4	3	3	4	3	4	44
#105-2012	Implement Natural Fire Breaks in Areas of High Concern to Reduce Wildfire and Lighting Damage (FD)	4	4	3	3	2	3	2	3	3	2	3	3	35
#109-2012	Review Regulations to Consider Tree Breaks During the Plan Review Process to Reduce the Impact of Wildfire (CD)	4	4	3	3	2	3	2	3	3	2	3	3	35
#116-2017	Consider Developing a Fluvial Erosion Hazard (FEH) Zone for the Soucook River and Turkey River (FGA)	3	3	3	4	2	3	3	2	3	2	3	4	35
#117-2017	Retrofit the Downtown City Library with a Sprinkler System to Reduce Vulnerability to Fire (FD)	5	5	5	4	3	5	4	4	5	5	4	4	53

Figure 22, continued
STAPLEE Ranking of Mitigation Actions

Action Number	HOW WELL Does or CAN the Action..... Action	Reduce Damage?	Contribute to City Objectives?	Meet Regulations?	Protect Sensitive Structures?	Implemented Quickly?	Socially Acceptable?	Technically Feasible?	Administratively Realistic?	Politically Acceptable?	Legal?	Have a Reasonable Cost to Benefits?	Environmentally Sound?	Ranking Score
#118-2017	Upgrade Stormwater Management Systems at the Fisherville Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	5	5	5	4	2	4	4	4	3	4	3	4	47
#119-2017	Upgrade Stormwater Management System at the Heights Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	5	5	5	4	2	4	4	4	3	4	3	4	47
#120-2017	Upgrade Stormwater Management System at the Hoyt Road Subcatchment Area to Eliminate Potential for Flooding, Erosion and Roadway Failure	5	5	5	4	2	4	4	4	3	4	3	4	47
#121-2017	Upgrade Stormwater Management System at the Horseshoe Pond Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	5	5	5	4	2	4	4	4	3	4	3	4	47
#122-2017	Upgrade Stormwater Management System at the Hospital Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	5	5	5	4	2	4	4	4	3	4	3	4	47
#123-2017	Upgrade Stormwater Management System at the Oak Hill Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	5	5	5	4	2	4	4	4	3	4	3	4	47
#124-2017	Upgrade Stormwater Management System at the Penacook Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	5	5	5	4	2	4	4	4	3	4	3	4	47
#125-2017	Upgrade Stormwater Management System at the Trapezoid Drainage Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	5	5	5	4	2	4	4	4	3	4	3	4	47
#126-2017	Upgrade Stormwater Management System at the Turkey River Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	5	5	5	4	2	4	4	4	3	4	3	4	47
#127-2017	Upgrade Stormwater Management System at Washington Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	5	5	5	4	2	4	4	4	3	4	3	4	47
#128-2017	Upgrade Stormwater Management System at West Concord Subcatchment Area to Eliminate Potential for Flooding and Erosion to Cause Roadway Failure	5	5	5	4	2	4	4	4	3	4	3	4	47
#129-2017	Educate the Public about the Implications of Soucook River & Turkey FGA Assessment to Reduce the Risk of Erosion and Impacts of Flooding (FGA)	4	4	3	4	4	4	3	2	3	2	3	4	40
#130-2017	Purchase Lightning Rods for Installation on Tall, Older City Buildings and Houses of Worship to Reduce the Risk of Lightning Damage	3	3	3	4	2	3	4	2	3	2	3	3	35
#131-2017	Evaluate the Streambank along the Merrimack River to Identify Areas Susceptible to Instability and Erosion in Public Spaces with the Goal of Stabilizing and Armoring Affected Areas	3	3	3	4	2	3	4	4	3	3	3	4	39

Source: Concord Hazard Mitigation Committee

ACTION TIMEFRAMES

The Actions are also prioritized by an estimated **Action Timeframe** for completion based upon the other City 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**.

Action Timeframe	Description of Timeframe
Ongoing	Action undertaken throughout the life of the 5-year Plan
Short Term	Action should be undertaken during Years 1-2 of the Plan
Medium Term	Action should be undertaken during Years 3-4 of the Plan
Long Term	Action should be undertaken during Years 4-5 of the Plan

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.

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 an 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 City 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 STAPLEE criteria.

9 ANNUAL IMPLEMENTATION AND EVALUATION

The City received FEMA approval for the prior **Hazard Mitigation Plan** in **April 2012**. 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 City 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 City of Concord will review, monitor, and update its new **Concord Hazard Mitigation Plan Update 2017**.

Annual Monitoring and Update of the Mitigation Action Plan

The City Council 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.

The Emergency Management Coordinator or designee should continue to serve as Chair of the Committee for Hazard Mitigation meetings, and should be appointed in such a capacity by the City Council. 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
- ✓ Emergency Management Coordinator
- ✓ City Administration
- ✓ Fire Department
- ✓ Police Department
- ✓ General Services
- ✓ Community Development- Planning
- ✓ Community Development- Engineering
- ✓ Community Development- GIS
- ✓ Community Development- Building Inspection
- ✓ 1 City Councilor
- ✓ 1 Planning Board member
- ✓ 1 Conservation Commission member
- ✓ 1 School District Representative for each District or Private School
- ✓ Members at Large (Stakeholders)

Stakeholders who should be solicited to attend meetings and to participate equitably in the Plan development process include Business Community members, Non-profits, and local, State or Federal agency representatives and members of the public. This composition provides a wide spectrum of potential interests and opportunities for partnership to develop and accomplish Actions.

This Committee will **aim to meet up to 2-4 times per year** with the following potential future meeting activities to update the **Mitigation Action Plan** and complete the Plan’s annual evaluation as displayed in **Table 52**.

Table 52

Hazard Mitigation Committee Preliminary Annual Future Meeting Activities

Month	Preliminary Interim Activities and/or Meeting Agenda Items
January – February	CIP Planning meeting is held among Departments. Committee ensures Haz Mit Actions are introduced into the CIP. Continues working on Plan Actions.
March – May	Committee continues update to the Mitigation Action Plan using Department Mitigation Action Progress Reports and an updated Action Status Tracking sheet . Committee provides revised copies to Department Heads, keeps original Word and Excel files accessible on City computer system. Final budget to City Council provided in early May.
June	Annual funding is received from adopted City Budget. Committee sends Progress Report #2 to Departments for completion by beginning of July.
JULY MEETING	HMC completes annual update of the Mitigation Action Plan and the associated Plan Chapter and sections . Committee informs Department Heads of Action priorities and assists with implementing the Plan. Committee prepares Annual Evaluation of the Plan .
July - September	Implementing the Mitigation Action Plan and begin revisions of necessary Plan sections. With HMC help, Department Heads should be working on Actions .
September - December	Begin planning for next year’s budget. Committee to assist Department Heads with their budget requests to include Action Plan items, and to determine which Action Plan items should be funded within the City budget. HMC continues assistance to Departments for Action Plan items and will provide 1 Department Mitigation Action Progress Report #1 for each Action to respective Departments for completion by beginning of December . Committee begins to update the Action Status Tracking Sheet using the returned Progress Reports. HMC assists City Council and City Manager with getting their mitigation projects funded and written into budgets. Action implementation continues.
DECEMBER MEETING	Determine budget funding requirements. Committee continues to update the Action Status Tracking Sheet from Department/Board progress on their Actions . HMC attends City budget meetings and suggests budget items for Action implementation. Committee determines Action Plan items to pursue for next year, including \$0 cost items. Committee attends City Manager meetings scheduled through January to champion Action item funding. Outline what is needed to be introduced into the CIP at the January CIP Planning meeting.

Sources: Concord Hazard Mitigation Committee

Annually and independent of the City’s budget cycle, a simpler listing of the Hazard Mitigation Committee’s tasks should include:

- ✚ **Document New Hazard Events that Occurred in City**
 - Hazard Risk Assessment
 - Local and Area History of Disaster and Hazard Events
- ✚ **Coordinate Completion of Annual Mitigation Actions by Assigning to Departments**
 - Appendix B Mitigation Action **Progress Report**
- ✚ **Seek and Help Departments Acquire Funding for Actions & Fill in Tracking File**
 - Appendix B Mitigation **Action/Project Status Tracking**
- ✚ **Evaluate Effectiveness of the Plan and Its Actions Yearly**
 - Appendix B Plan **Evaluation Worksheet**
- ✚ **Obtain Semi-Annual Progress Reports from Departments & Update Tracking File**
 - Appendix B Mitigation **Action/Project Status Tracking**
- ✚ **Update & Reprioritize Mitigation Action Plan and Update Supporting Plan**
 - Document Sections**
 - Mitigation Action Plan
 - Enhanced STAPLEE Prioritization
 - Hazard Mitigation Plan Update 2017 sections as needed (make a note of the new information added/changed)
- ✚ **Repeat**

For each of the Hazard Mitigation Committee meetings, the Emergency Management Coordinator (or Staff Coordinator) will invite other Department members, Board and Committee members, City Staff, Concord School District Staff, Merrimack Valley School District Staff, State and Federal Agencies and non-profit representatives, utility providers and the business community. The purpose of including stakeholders in the Plan update process is to document their participation, encourage them to provide input, and assist with decision-making using their unique perspectives. Public notice will be given as press releases in local papers, and will be posted in the public places in Concord, on the City of Concord website at www.concordnh.gov and on the City Clerk’s bulletin board.

The **Hazard Mitigation Plan’s Mitigation Action Plan** will be updated and evaluated annually generally following the suggestions outlined within this Chapter. All publicity information, Agendas, and Attendance Sheets, should be retained and compiled for inclusion into **APPENDIX C**.

The Emergency Management Coordinator and Department heads will work with the City Council to discuss the funding of Action projects as part of the budget process, beginning winter 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), City Operating Budgets, and other funding methods.

The Federal Emergency Management Agency (FEMA) encourages communities to upload their Hazard Mitigation Plan Actions into an online database. The **Mitigation Action Tracker** follows municipal Actions through their completion. This added attention to the City's Actions could enable additional support for grant opportunities when it is shown the City can complete its mitigation projects. The City would need to set up an account to enter their Actions into the **FEMA Mitigation Action Tracker** at <https://mat.msc.fema.gov>.

Tasks of the Plan Update

A number of tasks will be accomplished for the complete (five-year, FEMA approved) update to the Hazard Mitigation Plan. Note that information from many Chapters will be used or referenced by other Chapters. The annual **Mitigation Action Plan** update tasks for the Hazard Mitigation Committee are indicated in bulleted list above and are noted below under the brief instructions for chapter updates.

1 PLANNING PROCESS

Add the new Hazard Mitigation Committee members, contributors, and the public who participated in meetings. Add any new Agendas to the Table. Retain all meeting, attendance, publicity and invitation documents in updated **APPENDIX C Meeting Information**.

2 COMMUNITY PROFILE

Revise the Tables with new demographic and housing information as it becomes available. Update the building permit figures. Revise land use data from the ***City's Vision Appraisal assessment System*** and compare to previous years' data. Update any zoning changes. The text analysis will need to be revised to reflect all changes.

3 GOALS AND OBJECTIVES

Review and update the general and hazard-specific objectives (Flood, Wind, Fire, Extreme Temperature, Earth, Technological, Human) to ensure their continued relevance.

4 HAZARD RISK ASSESSMENT

Review and update the **Hazard Risk Assessment**. Add new disasters, new Public Assistance funding received, and significant new hazard events since the last Plan into the Tables and Appendices. Determine the magnitude of new declared disasters. Add any specific narrative dialogue about new hazard events occurring in Concord. Update **Local and Area Hazard Event History** with new disasters or hazard events and review the **Hazard Risk Assessment** for necessary changes. Update **Potential Future**

Hazards to document the possible new hazards that could occur in City based on historic or current evidence.

5 COMMUNITY VULNERABILITY AND LOSS ESTIMATION

Review and update the **APPENDIX A Critical and Community Facility Vulnerability Assessment** Tables to ensure accuracy. Update the Structure Valuation cost when new Vision assessing data becomes available. Generate additional **Problem Statements** that arise because of issues with facilities. Update the Culvert Upgrade Table. Revise the number and type of buildings in the Special Flood Hazard Areas (floodplains) including new structure valuation and recalculate the discussion values. Once the new structure assessments are available, recalculate the building dollar losses by the other natural hazards. Update the NFIP Tables and changes to the Floodplain Ordinance.

6 CAPABILITY ASSESSMENT

Review and update the **Capability Assessment** for adoption date revisions, changes since the last plan, or future improvements. List additional example capabilities in the Chapter. Add additional mitigation support resource documents to the Table.

7 POTENTIAL ACTION EVALUATION

Review the Actions for validity and revise as needed to place them in different categories: Completed, Deferred or Deleted. Explain why each Action was Deleted or Deferred and indicate when each Action was Completed. Determine any new Actions can be developed from new Problem or new Capability Assessment Future Improvements. List some examples of each type of the 5 actions in the Plan. Revise the **Potential Action Evaluation** to accommodate the Action changes.

8 MITIGATION ACTION PLAN - ANNUAL UPDATE

Remove Completed and Deleted Actions and move to **7 POTENTIAL ACTION EVALUATION**. Add New Actions to the **Mitigation Action Plan 2017** and ensure they are reviewed in the previous Chapter, listed above. Reevaluate Actions not yet completed, remove the Deleted, and evaluate any New Actions utilizing the enhanced **STAPLEE Mitigation Action Prioritization** matrix. Modify the approximate cost, date for completion, and funding changes as needed.

9 ANNUAL PLAN IMPLEMENTATION AND EVALUATING - ANNUAL ACTIVITY

The Hazard Mitigation Committee (HMC) should be permanently appointed by the City Council to hold up to **6** meetings yearly to review, implement, and evaluate the Plan. Updates any procedures or processes in the Chapter. Use the **APPENDIX B Annual Plan Evaluation and Implementation Worksheets** to guide the annual update of **8 MITIGATION ACTION PLAN**. Keep track of publicity, Department Reports, and all progress made towards the identified Actions. Add progress since the last Plan for implementation programs. Review continued public involvement for accuracy. Add other new information to the Chapter or revise as needed if new information becomes available.

10 APPENDICES

Revise the **APPENDICES A-F** as needed to update the data and documentation for Concord. Ensure all the publicity documents, Agendas, Attendance Sheets, revised files and more are available for transfer to CNHRPC when the **5-year** Plan update is due. These interim files will be placed into an updated **APPENDIX C Meeting Information**.

11 MAPS

Update *Map 1*, *Map 2*, *Map 3 Series*, and *Map 4 Series* of the Plan as needed to reflect the changes of the hazard event locations and site locations. The City of Concord has the staffing capability to update and maintain its hazard mitigation maps. The additional maps of the **Soucook and Turkey Rivers fluvial geomorphic assessments** were a one-time project with the NH Geological Survey and developed by the Central NH Regional Planning Commission; no further revisions are anticipated to these detailed Maps.

Implementing the Plan through Existing Programs

In addition to work by the Hazard Mitigation Committee and City Departments, several other mechanisms exist which will ensure that the **Concord Hazard Mitigation Plan Update 2017** 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.

MASTER PLAN

The **Concord Master Plan** was adopted in **2008**, developed by the Planning Board. The Planning Department uses the Master Plan during operations and the Board uses the document during its long-range planning and plan proposal decisions. The intent is to update sections of the Master Plan over the next **5** years (through 2022).

The Planning Board can consider adopting the Hazard Mitigation Plan Update as a separate Chapter to its Master Plan in accordance with **RSA 674:2.II(e)**. The **Hazard Mitigation Plan** should be presented to the Planning Board 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.

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 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.

Implementation Progress through the Master Plan Since the 2012 Plan

The existing **2008** Master Plan developed by the Planning Board does not contain the **Hazard Mitigation Plan 2012** (or **2017**) as an Appendix.

How Was This or Will This Be Accomplished?

Sections of the **2008** Master Plan may be updated by the Planning Board between now and **2022**. This will be an opportune time to integrate the **Hazard Mitigation Plan**. The Planning Board will be given a copy of the **2017 Plan** and can choose to incorporate several Action items that pertain to the Planning Board or incorporate the entire Plan by reference. Several Actions include revisions to Board regulations and to Capital Improvements, Zoning Amendments, or Subdivision and Site Plan Review regulations. The Floodplain Ordinance under the purview of the Planning Board was updated since the last Plan, in **2010**. The Emergency Management Coordinator will recommend that the Board incorporate the identified Planning Board-responsibility Actions as appropriate into the Future Land Use, Implementation, and Community Facilities Chapters and include the **Hazard Mitigation Plan** into the Master Plan Appendix whenever the Planning Board updates the Master Plan.

CAPITAL IMPROVEMENTS PROGRAM

Concord newest **Capital Improvements Program (CIP)** is the **2016-2025** version with the intention of an annual update. 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. Depending on the City's funding needs, a Capital Reserve Fund for Hazard Mitigation Program Projects may be established to set aside funding for the many projects identified in the Hazard Mitigation Plan Update.

Process to Incorporate Actions

The Hazard Mitigation Committee will oversee the process to begin working with the CIP Committee to incorporate the various Hazard Mitigation Plan projects into the yearly CIP. As the CIP is updated on a yearly basis, a representative from the Hazard Mitigation Committee could talk to the City Manager to request the projects are added.

Implementation Progress through the CIP Since the 2012 Plan

Many of the Completed Actions have been completed because of their placement into and purchase out of the Capital Improvements Program.

How Was This or Will This Be Accomplished?

The City Departments and Emergency Management Coordinator will work together with City Manager to identify the items needed for the **Hazard Mitigation Plan** Action implementation. The Actions identified were then (or will be in the future) added to the next updated CIP.

ZONING ORDINANCE AND REGULATIONS

Several of the implementation strategies proposed involve revisions to the Zoning Ordinance, Subdivision Regulations, and/or the Site Plan Review Regulations. The City staff and Planning Board annually draft Zoning Ordinance amendments for City Council approval, and will be requested to do so in order to accommodate Actions. The Land Use Regulations are updated by the Planning Board as needed.

Process to Incorporate Actions

A Hazard Mitigation Committee member, perhaps the Emergency Management Coordinator, will work with Planning Board to develop appropriate language for modifications to the Zoning Ordinance and the Subdivision and Site Plan Regulations as they deem appropriate as appropriate to accommodate Actions in the **Hazard Mitigation Plan**. Other Committee members, if requested, could offer to help City staff draft language for respective changes to the Regulations or the Zoning Ordinance, and assist City staff with presenting the language to the Planning Board for consideration.

The Hazard Mitigation Committee representative will request from the Planning Board a copy of future required language for any FEMA Zoning Ordinance Updates for incorporation into the Plan.

Implementation Progress through Zoning Since the 2012 Plan

The City adopted the **April 19, 2010 NFIP** DFIRM Maps and respective updates to the Zoning Ordinance. Other Zoning Ordinance changes did not pertain to mitigation.

How Was This or Will This Be Accomplished?

The Planning Board directly obtains the required NFIP floodplain ordinance revision information from the NH Office of Energy and Planning and provides it to the City Council for approval, a legislative power granted to them. For any future updates to the Floodplain Development Ordinance not required by FEMA, the changes will have to be approved at City Meeting.

OPERATING 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. City Departments and staff have rigorous job functions that demand their undivided attention to the tasks required to run their respective Departments. Additions to the work load to accommodate the Actions can put a strain on their ability to serve the public during performance of their normal job duties. When possible, Concord Departments and staff will be able to prioritize their tasks to work on **Hazard Mitigation Plan Update 2017** Actions. The in-kind work performed comes out of the Operating Budget for that particular Department.

Process to Incorporate Actions

With getting started help from the HMC, the Department given the responsibility to ensure the Action gets completed will work on the Actions allocated to him/her or delegate the Action to another person, when their normal job duties permit. 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 City staff members' normal work duties.

Staff or volunteers will attempt to follow the **Action Timeframe** as a guideline for completion. A yearly review of the **Mitigation Action Plan** by the Hazard Mitigation Committee will reprioritize the Actions, and the members can report on their progress, asking for assistance or more time as needed.

Implementation Progress through Operating Since the 2012 Plan

The Operating Budgets of the City Departments typically served to implement many of the Actions displayed in **Mitigation Action Plan**.

How Was This or Will This Be Accomplished?

Department heads who participated in the Hazard Mitigation Committee submitted their Action items to City Council and City Manager for consideration. Individual Department needs are recognized as part of their respective Operating Budgets and are proposed to the City Council and City Manager.

Continued Public Involvement

On behalf of the Hazard Mitigation Committee, the Emergency Management Coordinator, under direction of the Emergency Management Director, will be responsible for ensuring that City Departments and the public have adequate opportunity to participate in the planning process. Administrative staff may be utilized to assist with the public involvement process.

For each interim meeting in the annual update process, and for the five-year update process procedures that will be utilized for public involvement include:

- Provide personal invitations to City volunteer Board and Committee Chairs, and City Council members;
- Provide personal invitations to City Department heads;
- Provide personal invitations to the following entities listed below;
- Post public meeting notice flyers on the City's website at www.concordnh.gov and in the City Hall (City Clerk bulletin board) and City Library;
- Submit media releases to the Concord Monitor (a regional newspaper serving 39 communities around the Concord area) and the Concord Patch (a popular online local news source).

Agencies and businesses to invite to future **Hazard Mitigation Plan Update** meetings include the Concord School District, Merrimack Valley School District, State and federal agencies, utility companies and representatives from business and non-profit communities (see **APPENDIX A Critical and Community Facilities Vulnerability Assessment** Tables: Vulnerable Populations, Economic Assets and Recreational and Gathering Sites). The Emergency Management Directors of the neighboring communities will again be invited as will the NH Homeland Security and Emergency Management Field Representative for Merrimack County. The City will contact 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.

The Hazard Mitigation Committee will work to ensure that the City website's Emergency Management webpage and the City Calendar at www.concordnh.gov are updated with the Hazard Mitigation meeting notices. A number of Action Plan items which will be undertaken relate to public education and involvement and the Emergency Management website could be a good way to get 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 comprehensive **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 52**.

The worksheets include administrative and organizational documents, those that are used with the Appendices spreadsheets developed, and two Agendas to get started with HMC Interim Update meetings:

- ↪ **Permanent Hazard Mitigation Committee Establishment**
- ↪ **Organization of Public Invitees to Join Meetings**
- ↪ **HMC Interim Meeting (IM) Publicity Tracking 2017-2022**
- ↪ **Annual Interim Plan Update Evaluation Worksheet 2017-2022**
- ↪ **Hazard Mitigation Actions Status Tracking 2017-2022**
- ↪ **Department Mitigation Action Progress Report 2017-2022**
- ↪ **Attendance Sheet Example**
- ↪ **Agenda IM1 Example**
- ↪ **Agenda IM2 Example**

The five-year full Plan update will evaluate the Actions in the same manner in addition to fulfilling all of the **TASKS OF THE PLAN UPDATE** earlier in this Chapter.

10 APPENDICES

The following **APPENDICES A-H** are included under a separate electronic or paper document to maintain the relative brevity of this **Hazard Mitigation Plan Update**.

Listing of Concord Hazard Mitigation Plan Update 2017 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 as a result of the new or revised annual information, but they are optional. It is necessary to establish a location for placing any new or updated hazard, Action, meeting or Plan data over the 5-year interim until the Plan is fully updated again.

APPENDIX

- A Critical and Community Facility Vulnerability Assessment**
- B Annual Plan Evaluation and Implementation Worksheets ***
- C Meeting Information ***
- D Plan Approval Documentation**
- E Historical Disaster Event Photos ***
- F Lightning Strike and Wildfire Inventory, Jan 2011 – Mar 2017 ***
- G Soucook River Fluvial Geomorphic Assessment Addendum 2015**
- H Turkey River Fluvial Geomorphic Assessment Addendum 2015**

11 MAPS

Multiple detailed Maps were created during the development of the **Hazard Mitigation Plan 2017**. Data from the previous Plan's 14 Maps were revised, new standardized data layers were available, and Hazard Mitigation Committee members added their own knowledge of sites and hazard events. Maps from the 2015 Hazard Mitigation Plan Addendums of the *Soucook River and Turkey River Fluvial Geomorphic Assessments* are included as they are an integral component of the potential hazard issues along these two rivers.

Plan Update 2017 Maps

Map 1 - Potential Hazards illustrates potential hazard event locations in Concord that have the possibility of damaging the community in the future. The **Map 1** legend includes (technology) infrastructure hazards such as dams, bridges, water lines, gas lines, sewer lines, electric transmission lines, and evacuation routes. Natural hazards are displayed such as Special Flood Hazard Areas (SFHAs), locations of potential road washout, fire/wildfire, and more.

Map 2 - Past Hazards illustrates the locations of where hazard events have occurred in Concord in the past, including areas of flooding, washouts, wind events, ice, transportation accidents, wildfire, lightning, and more.

Map 3 - Critical and Community Facilities (Series) includes all of the infrastructure included in **Map 1 Potential Hazards** on a background of aerial photography to give readers a better, real world perspective. The locations of all critical facilities and community facilities as recorded in the Critical and Community Vulnerability Assessment are displayed on the Maps. Each of these sites is numbered on a key listing the names of each facility.

Map 4 - Potential Hazards and Losses (Series) 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. This Map series provides a look into the possible future locations of natural disasters in the community.








 **Map 1 - Potential Hazards**

 **Map 2 - Past Hazards**

Map 3 - Critical and Community Facilities Series

-  **Map 3A - Critical Facilities**
-  **Map 3B - Infrastructure**
-  **Map 3C - Vulnerable Populations**
-  **Map 3D - Economic Assets**
-  **Map 3E - Public Gathering Sites**
-  **Map 3F - Historic Resources**
-  **Map 3G - Hazardous Materials Facilities**

Map 4 Potential Hazards and Losses Series

-  **Map 4A - Critical Facilities**
-  **Map 4B - Infrastructure**
-  **Map 4C - Vulnerable Populations**
-  **Map 4D - Economic Assets**
-  **Map 4E - Public Gathering Sites**
-  **Map 4F - Historic Resources**
-  **Map 4G - Hazardous Materials Facilities**

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 field data along the **Soucook River** in 2013, the lower river assessment covered river reaches in Concord and Concord, while the north covered reached in Loudon. Field Geology Services also collected field data along the **Turkey River** in 2013. The two assessments and associated maps were completed in **2015** with assistance of the CNHRPC.

While **APPENDIX G** and **APPENDIX H** are the **Turkey River** and **Soucook River Fluvial Geomorphic Assessments** respectively, the accompanying maps comprise important **Hazard Mitigation Plan** information that should be considered when developing mitigation Actions.

FLUVIAL GEOMORPHIC ASSESSMENT (FGA) MAPS

Turkey River

- ✚ **Map 5A - Fluvial Geomorphic Features East**
- ✚ **Map 5B - Fluvial Geomorphic Features West**

- ✚ **Map 6A - Fluvial Erosion Hazard (FEH) Meander Belts East**
- ✚ **Map 6B - Fluvial Erosion Hazard (FEH) Meander Belts West**

Soucook River

- ✚ **Map 7A - Fluvial Geomorphic Features South**
- ✚ **Map 7B - Fluvial Geomorphic Features Center**
- ✚ **Map 7C - Fluvial Geomorphic Features North**

- ✚ **Map 8A - Fluvial Erosion Hazard (FEH) Meander Belts South**
- ✚ **Map 8B - Fluvial Erosion Hazard (FEH) Meander Belts Center**
- ✚ **Map 8C - Fluvial Erosion Hazard (FEH) Meander Belts North**

All **10** FGA Maps incorporated into the **Hazard Mitigation Plan 2017** are included as color fold-out 11x17” pages in the back of the Plan document.