TOWN OF FRAMINGHAM

July 2010

Multiple Hazard Mitigation Plan Update

Prepared by

The Multiple Hazard Mitigation Plan Working Group

Sampath Bade, Representative of the Conservation Commission and Citizen Member
Sheila Lynch, Citizen Member
John Magri, Assistant Fire Chief
Donna Nelson, citizen member
Alison C. Steinfeld, Director of Community and Economic Development
Steven Trask, Deputy Police Chief
Katherine R. Weeks, P.E., Senior Stormwater and Environmental Engineer, Department of Public Works — Engineering and Transportation Division

Other contributors

Geoffrey Kovar, GIS Coordinator, Engineering Department
Mikaele Neves, Administrative Assistant, Community and Economic Development Division
Stephen J. Wallace, Planner, Community and Economic Development Division

The Multiple Hazard Mitigation Plan Update was based on large part on the Multiple Hazard Mitigation Plan dated June 2005, which was prepared by the Community Planning Team and Rizzo Associates, Inc., under contract to the Town of Framingham. The Update itself was prepared by the members, based on their experience in implementing the Plan and professional expertise together with public comment.

Table of Contents

1.0 Introduction 2

2.0 Community Characteristics 2

2.1 Geography 2

2.2 Topography 3

2.3 Water Resources 3

2.4 Government 4

2.5 Housing Characteristics 5

2.6 Transportation 5

2.7 Culture and Recreation 5

2.8 Miscellaneous 5

3.0 Hazard Mitigation Planning Process 6

4.0 Public Hearings 8

4.1 Public Hearing No. 1 8

4.2 Public Hearing No. 2 8

4.3 Public Hearing No. 3 9

4.4Public Hearing No. 4 9

4.5Public Input 9

5.0 Risk Assessment 10

5.1 Flood-Related Hazards 10

5.1.1 Flooding 10

5.1.2 Dam Failure 16

5.2 Wind-Related Hazards 17

5.2.1 Thunderstorm Winds 18

5.2.2 Hurricanes 19

5.2.3 Tornadoes 20

5.3 Fire Related Hazards 21

5.3.1 Wildfires 21

5.3.2 Urban Fires 21

5.4 Geologic Hazards 23

5.4.1 Earthquakes 23

5.4.2 Landslides 26

5.4.3 Sinkholes 26

5.5 Winter Storms Related Hazards 27

5.6 Drought 29

5.7 Risk Assessment Summary 29

6.0 Multiple Hazard Maps 30

7.0 Existing Protection Matrix 31

8.0 Goals and Objectives 32

8.1 Regulatory/Administrative Objectives 33

8.2 Education & Outreach 33

8.3 Planning Objectives 33

8.4 Structural/Capital Improvements 34

9.0 Development of Mitigation Projects 34

9.1 Flood Related Hazards 34

9.1.1 Prevention 34

9.1.2 Emergency Services 35

9.1.3 Structural Projects 36

9.1.4 Public Information 36

9.1.5 Property Protection 37

9.2 Wind Related Hazards 38

9.2.1 Prevention 38

9.2.2 Emergency Services 38

9.2.3 Structural Projects 39

9.2.4 Public Information 39

9.2.5 Property Protection 39

9.3 Fire Related Hazards 39

9.3.1 Prevention 39

9.3.2 Emergency Services 40

9.3.3 Structural Projects 40

9.3.4 Public Information 40

9.4 Geologic Hazards 40

9.4.1 Prevention 40

9.4.2 Emergency Services 41

9.4.3 Structural Projects 41

9.4.4 Public Information 41

9.4.5 Property Protection 42

9.5 Winter Storm Related Hazards 42

9.5.1 Prevention 42

9.5.2 Emergency Services 42

9.5.3 Structural Projects 43

9.5.4 Public Information 43

9.5.5 Property Protection 43

10.0 Analysis of Mitigation Projects 43

11.0 Prioritization of Mitigation Projects 45

11.1 Prioritization Process 46
11.2 Priority Mitigation Projects 51
11.2.1 General Natural Hazard Mitigation Action Items…… 51
11.2.2 Master Drainage Plan…… 51
11.2.3 Stormwater Drainage System Improvements…… 52
11.2.4 Stormwater Drainage System Maintenance……. 52
11.2.5 Municipal Flood Damage Reduction Projects……. 52
11.2.6 Sudbury River Flood Warning Project……. 52
11.2.7 Floodplain Development with respect to Flood Elevations…. 52
11.2.8 Analyze Repetitive Flood Loss Structures…… 52
11.2.9 Public Education and Outreach…… 52
11.2.10 Integrate Multiple Hazard Mitigation Plan into Town's Development Review and Inter-departrmental Planning Processes…….. 53
11.3 Project Status…… 54

12.0 Appointment of Multiple Hazard Mitigation Plan Working Group.. 58

13.0 Plan Maintenance 58

14.0 Adoption of Multiple Hazard Mitigation Plan..... 58

List of Appendices

Appendix A. Bibliography A-1-A-2
Appendix B. Planning Process .....
B.1. Public Presentation to Board of Selectmen..... B.1-1-B.1-6
B.2 Request for Public Comment on Draft Update…… B.2-1-B.2-2
B.3 Multiple Hazard Mitigation Plan Update Distribution List…… B.3-1
B.4 Comments on Draft Multiple Hazard Mitigation Plan Update….. B.4-1
Appendix C. "Flood Facts"……..... C-1-C-3
Appendix D. Public Service Message re: Flooding D-1-D-3
Appendix E. Board of Selectmen Certificate of Adoption and Minutes from the meeting of September 27, 2011…… E-1

List of Tables

Table 3.1	Multiple Hazard Mitigation Planing Group Meetings	7
Table 5.1.1	Flood Potential	12
Table 5.1.2	Summary of Major Flooding Events	15
Table 5.2.1	The Effect of Wind Speed	18
Table 5.2.2	Summary of Major Events Related to Thunderstorm Winds	18
Table 5.2.3	Summary of Hurricanes	19
Table 5.4.1	Measuring Earthquake Magnitude (Richter Scale)	23
Table 5.4.2	Measuring Earthquake Magnitude (Modified Mercalli Intensity Scale)	24
Table 5.4.3	New England Earthquakes with Magnitude 4.2 or more, 1924-1989	24
Table 5.4.4	New England States Historical Earthquakes	25
Table 5.5.1	Summary of Major Winter Storms	28
Table 5.7.1	Hazard Identification and Analysis Matrix	30
Table 7.1	Existing Protection Matrix	31
Table 10.1	Evaluation of Flood Related Hazards Mitigation Alternatives	43
Table 10.2	Evaluation of Wind Related Hazards Mitigation Alternatives	44
Table 10.3	Evaluation of Fire Related Hazards Mitigation Alternatives	44
Table 10.4	Evaluation of Geologic Related Hazards Mitigation Alternatives	45
Table 10.5	Evaluation of Winter Storm Related Hazards Mitigation Alternatives	45
Table 11.1	Numerical Rating of Potential Mitigation Projects	46
Table 11.2	Priority Mitigation Projects	54

List of Figures

Figure 5.1.1	Flood Hazard Map	14
Figure 5.4.1	Earthquake Vulnerability Area	27
Figure 5.5.1	Average Annual Snowfall	29

1.0 Introduction

This Multiple Hazard Mitigation Plan (MHMP) Update for the Town of Framingham has been prepared in compliance with the requirements of the Federal Disaster Mitigation Act of 2000 (DMA). The MHMP Update expands the Town's capability to deal with natural hazards, minimize future disaster losses, identify mitigation activities and secure funding for future hazard mitigation projects.

The MHMP Update has been prepared using "Natural Hazards Mitigation Planning: A Community Guide," prepared by the Massachusetts Department of Environmental Management, Massachusetts Emergency Management Agency (MEMA) and Massachusetts Hazard Mitigation Team. Funding for the preparation of the original MHMP was from a grant received by the Town from the Department of Conservation and Recreation (DCR) and MEMA through the Hazard Mitigation Grant Program (HMGP). The Update was prepared by the Multiple Hazard Mitigation Plan Working Group, which includes Town staff and officials as well as interested citizens. Created as a direct result of the original Plan, the Working Group has aggressively sought to implement the Plan. More recently, the Working Group has focused on updating the Plan in light of the success of the original Plan as well as the knowledge gained during its implementation.

The Town has already developed and adopted a Comprehensive Emergency Management (CEM) Plan, which is required by the Commonwealth of Massachusetts. The CEM plan includes measures for mitigation, preparedness, response and recovery for various hazards including natural hazards such as flooding, earthquakes, hurricanes etc., and other hazards as a result of manmade activities (e.g., hazardous material-related accidents, terrorism, rioting). The primary focus of the MHMP was to complement the CEM plan and to focus on specific mitigation measures for the natural hazards that affect the Town. That purpose remains valid for the Update.

As was true of the original Plan, the Plan Update will meet the requirements of the Federal DMA 2000, which calls for communities to have an all hazards mitigation plan in place by November 1, 2004 in order to qualify for pre-disaster and post-disaster funding under the Federal Emergency Management Agency's (FEMA) Pre-Disaster Mitigation Program and HMGP. In addition, this Plan Update will assist the Town in applying for other hazard mitigation project funding, such as FEMA's pre-disaster mitigation program the Flood Mitigation Assistance (FMA) program, as well as other federal, state and private funding sources.

"Hazard mitigation" is defined in the "Natural Hazards Mitigation Planning: A Community Guide" as "any sustained action taken to reduce or eliminate long-term risk to life and property from natural hazards (flooding, storms, high winds, hurricanes, wildfires, earthquakes, etc.)." Mitigation assists in minimizing damage that occurs as the result of a natural disaster to structures, infrastructure and other man-made and natural resources.

2.0 Community Characteristics

The Town of Framingham, with a population of 66,910 (US Census Bureau, 2000), is located mid-way between Boston and Worcester and is the hub of the MetroWest region. Framingham offers a unique blend of urban, suburban and rural qualities. Framingham is home to a vibrant regional retail area along Route 9 and high technology oases in close proximity to quiet residential areas as well as working farms and dynamic commercial centers such as Framingham Centre with its small shops and historic buildings. The traditional strengths of the town have been its residents, and phenomenal location and accessibility.

From its founding in 1700, Framingham has supported a variety of industries. The mills and factories that flourished in Framingham encouraged the growth of Saxonville in Northeast Framingham and the downtown in South Framingham. Currently, the major town employers are primarily non-manufacturing, including medical, retail, education, office, and biotech activities.

Framingham residents value public participation. Framingham is the largest municipality in Massachusetts—if not the country—with a town meeting form of government.

2.1 Geography

Location: Located in Eastern Massachusetts, bordered by Southborough and Marlborough on the west, Sherborn and Ashland on the south, Natick on the east, Wayland on the northeast, and Sudbury

	on the north, Framingham is 19 miles west of Boston and 197 miles from New York City.
Total Area:	26.44 sq. miles Land Area: 25.12 sq. miles
Population:	66,910. Density: 2,663 per sq. mile
Climate:	(National Climatic Data Center) (Framingham Station) Normal temperature in January.....24.7°F Normal temperature in July.....72.9°F Normal annual precipitation.....44.9"
USGS Topographical Plates:	Framingham
Regional Planning Agency:	Metropolitan Area Planning Council
	Subregion: MetroWest Growth Management Committee
Metropolitan Statistical Area:	Boston

2.2 Topography

Topographical levels range from a low of 114 feet above sea level at the surface of the Sudbury River below the Saxonville Dam, to a high of 602 feet at the top of Nobscot Hill. The central section of Town is fairly flat with an elevation of about 200 feet above sea level. The Northwest Quadrant rises to an elevation of about 400 feet and is characterized by a combination of wetlands, steep slopes and exposed bedrock.

2.3 Water Resources

Sudbury River

The Town of Framingham is entirely within the drainage of the Sudbury River, Framingham's major waterway. The Sudbury River headwaters form in Cedar Swamp, located west of Framingham in the towns of Hopkinton and Westborough. The river flows easterly through Southborough and Ashland and then northerly into Framingham where it flows in a northeast direction to join the Assabet River in Concord. The Sudbury River passes through Massachusetts Water Resources Authority (MWRA) Reservoirs Numbers 1 and 2 as it flows through Framingham. The southern section of the river is barely thirty feet wide, but the river opens up just above the Massachusetts Turnpike I-90 bridge and widens considerably to a width of 700 feet (the area known as Mill Pond) above the dam at the bend of the river in Saxonville. From an elevation of 146 feet above sea level just above the Saxonville dam, the river falls to 114 feet as it winds through Saxonville and north to the Great Meadows National Wildlife Refuge in Sudbury and Wayland.

Major tributaries to the Sudbury River in Framingham are Lake Cochituate, which flows through Cochituate Brook into the Sudbury River below the Concord Street (Route 126) bridge; Dunsdell Brook, which flows into the Sudbury River at the point where it runs alongside the MassPike; Farm Pond, which flows through Eames Brook into the Sudbury River at Mount Wayte; Sucker Brook, which flows south from Sucker Pond, to Flagg School and is then largely culverted as it flows west to a wetland adjacent to Walnut Street and then north to the Sudbury River; and Birch Meadow and Baiting Brook, which flow into the Sudbury River just below the Reservoir outflow. Hop Brook flows north into Sudbury and eventually into the Sudbury River. The Sudbury River, in turn, feeds Stony Brook, which flows into Reservoir 3, which flows into Reservoir 1. Another large brook within the Sudbury River watershed is Beaver Dam Brook, which flows from Waushakum Pond through Framingham's southeast corner, then through Natick to Lake Cochituate.

Over time, the Sudbury River's meandering has created wetland zones that integrate in small strips and patches. Despite its small size, the river represents the diversity of characteristics present in a typical river floodplain. The overall effect is one of considerable ecological diversity within a small area (Margolis, Fairbairn).

One area in particular is the oxbow, which is located near the Sudbury Town line and is a marshy wetland, only exposed to running water intermittently. The oxbow is a refuge for many water birds since it is too shallow and weed-grown to permit boating for most of the breeding season.

Following a three-year study, the National Park Service and a 13-member advisory committee, which included a representative from the Town of Framingham, recommended that a 29-mile segment of the Sudbury, Assabet, and Concord (SuAsCo) Rivers be added to the National Wild and Scenic River System.

Rivers designated as "Wild and Scenic" must possess as least one "outstanding remarkable resource value." The study found that the SuAsCo segment has five of these qualities: ecological; recreational; historical/archaeological; scenic; and literary (US Department of the Interior (DOI), 1995).

At the conclusion of the study, all eight towns along the river segments (Framingham, Wayland, Sudbury, Lincoln, Concord, Bedford, Carlisle, and Billerica) voted at their 1995 spring town meetings to ask Congress for Wild and Scenic designation, which was awarded in 1999. The Sudbury River portion of the SuAsCo Wild and Scenic River begins in the Saxonville section of Framingham. Starting at the Danforth Street Bridge, the SuAsCo in Framingham includes the oxbow, and continues downstream into Wayland and Sudbury.

Section 7 of the Wild and Scenic Rivers Act restricts federal activities that have a direct and adverse effect on the values for which the river was designated. Each of the towns along the wild and scenic segment have also committed to work to protect the river resources. The Wild and Scenic River Stewardship Council (RSC), on which Framingham is represented, was created and directed by legislation to work with DOI to ensure the long-term protection of these rivers.

Ponds & Lakes

In addition to the MWRA Reservoirs, Framingham has six ponds. Farm Pond, recognized by the State as a great pond, is a natural pond consisting of 124 acres. It was once used to supply the Town's drinking water. A Town-owned park is located on the western shoreline and provides boat and fishing access to the pond.

Two ponds, Waushakum and Learned, have swimming beaches. Learned Pond consists of 34 acres with a maximum depth of 13 feet. The town beach is located on the eastern shore. Very little study or analysis has been conducted of Learned Pond.

Waushakum Pond is small (82 acres) but rather deep (50 feet). The majority of Waushakum Pond is in Framingham, but 80% of its drainage area is in Ashland. Primary recreational uses of the pond are swimming, boating and fishing. Waushakum Pond is accessible to the public through a park and swimming beach in Framingham and a boat launch in Ashland. The shoreline is privately owned except for areas of public access (Framingham Police Department, 1995). Waushakum Pond, a glacial kettle pond, is large in relation to its watershed, which generally gives a pond an advantage in avoiding eutrophication.

Norton Pond is located in the northern portion of town. Its primary function is to provide storm water storage for the surrounding developed neighborhoods to its north. It has a surface area of about 5 acres with a maximum depth of 6 feet. Approximately two-thirds of the pond shoreline is under private ownership. The Town owns the remaining one-third adjacent to Elm Street.

Gleason Pond is approximately 12 acres and is located at the intersection of Concord Street and Prindiville Avenue. Along the eastern shoreline are single and multi-family homes, set back 100 to 150 feet from the water's edge. The western edge of the shore contains woodlands and other undeveloped land. A portion of the northern shoreline along Prindiville Avenue is under Town Ownership for conservation purposes.

The Town's third swimming beach is on the North Basin of Lake Cochituate on land that is both Town and State-owned.

2.4 Government

Municipal Offices: Main Number: (508) 532-5400

Form of Government: Board of Selectmen
Town Manager
Representative Town Meeting

Year Incorporated: 1700

Registered Voters (Framingham Town Clerk, 2010)

	Number	%
Total Registered	34,034	100%
Democrats	12,578	37.0%

Republicans	3,435	10.1%
Other parties	154	0.4%
Unenrolled Voters	17,867	52.5%

State Legislators: Senator Karen Spilka
Representative Pam Richardson: precincts 1-7, 9, 13, 14 17
Representative Tom Sannicandro: precincts 8, 11, 12, 15, 16, 18

2.5 Housing Characteristics

Subsidized Housing Units (DHCD April 2010 and 2000 Federal Census)

Total year round housing units 26,588
Subsidized housing units: 2,901

Framingham's 2,901 subsidized units represent 10.91 percent of the Town's total housing units.

2.6 Transportation

Transportation and Access
Framingham is located approximately halfway between Worcester, the commercial center of Central Massachusetts, and Boston, New England's leading port and metropolitan area. Rail and highway facilities connecting these major centers and other communities in the Greater Boston area are excellent.

Major Highways
Principal highways are Interstate 90 (Massachusetts Turnpike) and State Route 9, which both run east-west across the state. Three additional State highways dissect Framingham: Routes 135 and 30 running east-west, and Route 126 running north-south.

Rail Service
Direct rail service to Boston, New York, and all other points on the Amtrak network is available through Framingham. The Massachusetts Bay Transportation Authority (MBTA) commuter rail service is available to South Station and Back Bay Station in Boston. Travel time to Back Bay Station is 42 to 45 minutes. The MBTA has low-cost parking adjacent to the Framingham Commuter Rail station. CSX Transportation provides freight rail service throughout the region and is especially active in south Framingham.

Public Bus Service
Framingham is served by the MetroWest Regional Transit Authority. This service links the following Towns with regular bus service to major retail and employment destinations including Framingham's Technology Park, Route 9, Framingham State College, and several commuter rail stations, along with many of their downtowns and key residential areas:

Ashland	Framingham	Holliston	Hopkinton	Marlborough	Natick
Sherborn	Southborough	Sudbury	Wayland	Weston	

MWRTA also operates the MetroWest Ride for elderly and disabled customers in Framingham and Natick and a "Dial-A-Ride" service in the Towns of Ashland, Marlborough, Southborough, and Wayland.

2.7 Culture and Recreation

Danforth Museum of Art
Framingham History Center
The Will C. Curtis Garden in the Woods/ New England Wildflower Society
Amazing Things

2.8 Miscellaneous

Hospitals
MetroWest Medical Center—Framingham Campus

Long Term Care
Bethany Skilled Nursing Facility—97 Bethany Road

The Carlyle House—342 Winter Street
Colonial House Nursing Home—11 Arbetter Drive
Countryside Nursing Home—153 Winter Street
Framingham Nursing Home –517 Winter Street
Oak Knoll Health Care Center—9 Arbetter Drive
Kathleen Daniel Health Care SNF—485 Franklin Street
Resident Care Nursing Home—328 Concord Street
St. Patrick's Manor—863 Central Street

Hospices
MetroWest Hospice—85 Lincoln Street
Brookhaven Hospice—6 Beech Street

Rest Homes
Winchester Mount Vernon House—110 Mount Vernon Street
Somerville at Farm Pond—300 West Farm Pond Road

3.0 Hazard Mitigation Planning Process

The Town of Framingham established a Multiple Hazard Mitigation Plan Working Group in 2006 to oversee the implementation of the Multiple Hazard Mitigation Plan and to update the Plan in a timely manner. As of June 2010, the Working Group consists of the following members:

Sampath Bade, Town Resident
Sheila Lynch, Town Resident
John Magri, Assistant Fire Chief
Donna Nelson, Town Resident
Alison Steinfeld, Director of Community and Economic Development
Stephen Trask, Deputy Police Chief
Katherine Weeks, Stormwater Engineer—Department of Public Works

The Working Group brings together individuals with exceptional backgrounds, expertise and experience in hazards affecting or potentially affecting the residents and businesses of Framingham. Each member brings an important perspective to the planning and implementation processes as well as a genuine interest in working together to insure that the Plan is in fact implemented and that the Update accurately reflects the needs of the community and how best to meet those needs.

The following provided important contributions to the updating of the Plan:

Geoffrey Kovar, GIS Coordinator, Engineering Department
Mikaele Neves, Administrative Assistant—Community and Economic Development Division

Rizzo Associates, Inc. was retained by the Town of Framingham to help develop the original Multiple Hazard Mitigation Plan, upon which the Plan Update is based.

The Working Group has been meeting consistently for the past seven years in order to implement the Plan. All meetings are public and, consistent with Town policy, meet at 7 pm on a weekday to insure that meetings are as convenient as possible for citizens and interested parties to participate in the discussion. All meetings and agendas are posted well in advance of the scheduled meeting. Further, consistent with Town policy, minutes are placed on the Town's official web site for the information of the public.

Throughout the update process (as well as its ongoing efforts to implement the Plan), the Multiple Hazard Mitigation Plan Working Group was committed to insuring that the Update:

1. Is comprehensive, practical, and cost-effective, and includes environmentally sound alternatives
2. Represents viewpoints from various departments, groups, and residents of the Town
3. Addresses repetitive problems, or ones that have the potential to have major impacts on specific areas of Town and reduce the potential for loss of life, loss of essential services

and personal property, damage to critical facilities, economic loss, hardship or human suffering

4. Is consistent with and supports the goals and objectives of Comprehensive Emergency Management Plan

Table 3.1 provides a list of meetings held by the Multiple Hazard Mitigation Plan Working Group.

Table 3.1 – Multiple Hazard Mitigation Plan Working Group Meetings

Meeting Date and Time	CPT Meeting Description
July 29, 2003, 7:00 p.m.	Initial Kickoff Meeting
August 26, 2003, 7:00 p.m.	Progress Meeting, Preparation for Public Hearing No. 1
October 28, 2003, 7:00 p.m.	Progress Meeting
January 13, 2004, 7:00 p.m.	Progress Meeting
March 23, 2004, 7:00 p.m.	Progress Meeting, Preparation for Public Hearing No. 2
September 20, 2004, 7:00 p.m.	Progress Meeting to review Draft MHMP comments
May 2, 2005, 7:00 p.m.	Progress Meeting
October 25, 2006, 7:00 p.m.	Progress Meeting
November 29, 2006, 7:00 p.m.	Progress Meeting
June 27, 2007, 7:00 p.m.	Progress Meeting
September 12, 2007, 7:00 p.m.	Progress Meeting
September 26, 2007, 7:00 p.m.	Progress Meeting
November 28, 2007, 7:00 p.m.	Progress Meeting
December 12, 2007, 7:00 p.m.	Progress Meeting
December 19, 7:00, p.m.	Progress Meeting
January 23, 2008, 7:00 p.m.	Progress Meeting
April 23, 2008, 7:00 p.m.	Progress Meeting
October 28, 2008, 7:00 p.m.	Progress Meeting
January 28, 2009, 7:00 p.m.	Progress Meeting
February 25, 2009, 7:00 p.m.	Progress Meeting
March 25, 2009, 7:00 p.m.	Progress Meeting
April 22, 2009, 7:00 p.m.	Progress Meeting
September 23, 2009, 7:00 p.m.	Progress Meeting
November 25, 2009, 7:00 p.m.	Progress Meeting
December 16, 2009, 7:00 p.m.	Progress Meeting
February 24, 2010, 7:00 p.m.	Progress Meeting—Assignments for Update
April 7, 2010, 7:00 p.m.	Update
June 2, 2010, 7:00 p.m.	Update
June 8, 2010, 7:00 p.m.	Presentation of draft Update to Board of Selectmen—Public Hearing

Input from the public is essential in order for the MHMP Update to be comprehensive and responsive to the needs of the community. In fact, the Board of Selectmen expressly identified and appointed highly qualified Framingham residents to bring their professional and personal perspectives to the Multiple Hazard Mitigation Plan Working Group. Their involvement has been instrumental in both implementing the current Plan and developing the Update. Staff from the Police, Fire and Public Works Departments as well as the Division of Community and Economic Development also actively participates in both the Plan implementation and Update development. The extent of staff involvement is indicative of the Town's commitment to multiple hazard mitigation planning.

Based on an understanding of and commitment to the Plan, the members are in a great position to identify strengths and weaknesses of the plan and to identify additional needs of the community to incorporate into an Update. The Working Group began to focus on updating the Plan during the fall of 2009, at which time the Working Group determined that it should begin the update process early to insure that the Plan Update met all of the State's requirements as well as identified the community's existing and projected needs for the upcoming five years. Representing the Working Group, Ms. Weeks and Ms. Steinfeld met with Sarah White of MEMA on October 12, 2009 to identify the process for updating the Plan.

Following the meeting with Ms. White, the Working Group discussed the update at each of its meetings. With the invaluable assistance of Ms. White, Town staff reviewed the plan and identified areas that warranted improvement and/or updating and subsequently discussed the matters with the entire Working Group.

At its meeting on February 24, 2010, the Working Group worked together to assign specific tasks to each member, depending upon their expertise and background. Each member focused on his or her assignment and submitted all of their comments and material directly to Ms. Steinfeld who incorporated all of their comments in a draft Update. The draft Update was circulated to the members for their review and then placed on the official Town web-site for the information of the public. The public was encouraged to submit comments and suggestions directly to the Division of Community and Development, which documented all comments and submitted them to the Working Group for consideration. A copy of the documented comments is provided in the attached Appendix B-2.

4.0 Public Hearings

In recognition of the importance of public input, the Multiple Hazard Mitigation Plan Working Group as well as its predecessor, the Community Planning Team (CPT) conducting several public hearings during the development of both the original plan and the Plan Update.

4.1 **Public Hearing Number** 1 (original plan development)

Upon conducting two CPT meetings to establish a work schedule and the delegation of responsibilities, the CPT conducted the first public hearing on September 16, 2003. The hearing was publicized in the local newspaper and the cable station. The hearing was attended by approximately 14 people. The meeting was taped for broadcasting on the local cable access channel.

A slide show presentation summarizing the objectives of the MHMP, the role of CPT and the information gathered on natural hazards was followed by public input regarding known hazards. Maps showing flood zones, the town-wide drainage system, and locations of critical facilities were on display at the meeting. Copies of questionnaire sheets were made available at the meeting for written input regarding known hazards. The CPT received two completed questionnaires one related to flooding due to storm water and the other concerning stability of existing dams. Individuals provided verbal testimony regarding various potential hazards.

4.2 **Public Hearing Number 2** (original plan development)

Upon completing a preliminary draft MHMP the CPT conducted the second public meeting on March 16, 2004. The meeting was publicized in the local newspaper and the cable station. The meeting was attended by approximately 14 people.

Maps showing flood zones, the town-wide drainage system and locations of critical facilities were again on display at the meeting. The need for the MHMP was emphasized. The status of the information collection process and the MHMP development was summarized, followed by a discussion about various mitigation projects for each of the potential natural hazards. The discussion was facilitated using computer software that documented mitigation projects and simultaneously displayed them on a screen that made it easier for discussion purposes. Copies of information gathering sheets were made available at the meeting for written input regarding known hazards. Individuals provided verbal testimony regarding various potential hazards and strategies to mitigate the hazards.

4.3 **Public Hearing Number 3** (original Plan development)

The third and last public hearing was held on June 21, 2004 at 7:30 p.m. during the Public Draft MHMP public comment period, which began on May 20, 2004 when the Public Draft MHMP was distributed and ended on June 28, 2004 at 5:00 p.m. The third public hearing was held specifically to obtain comments on the Public Draft MHMP; input was used to develop the final document.

4.4 **Public Hearing Number 4** (Plan update development)

The Multiple Hazard Mitigation Plan Working Group presented its draft Update to the Board of Selectmen on June 15, 2010 at which time the Board conducted a public hearing. The Working Group provided a power point presentation that explained the mitigation planning process, provided an update on the work of the Working Group, explained the draft, and encouraged public input. Please see Appendix B-1. The Selectmen's meeting was televised, repeatedly rebroadcast on Framingham's cable access channel, and remains accessible through streaming video via the Town's official web site. At the meeting, the plan was fully explained to the Board of Selectmen, people in the audience and to the viewing public who watched the presentation live, during rebroadcasts, or via streaming video.

Notice of the public hearing was placed on the Town's official web site together with a draft of the Plan and instructions on how to participate in the planning process.

4.5 **Public Input (Plan Update development)**

As indicated above, opportunities for public involvement are consistently provided. In fact, two of the members of the Multiple Hazard Mitigation Plan Working Group are citizens who bring with them valuable perspectives as well as extensive knowledge, relevant education, and commitment to the Town. Unfortunately, one member of the Working Group personally experiences the deleterious effects of flooding on her private residence.

The Working Group developed and undertook the following process to engage the public in the review and refinement of the draft Plan Update:

1. At the request of the Working Group, the Town Manager released a notice to all taxpayers that the draft would be available on the official web site for review and comment. (Appendix B.2.)
2. The draft document was placed on the Town's official web site and people were encouraged to review the draft and submit comments to the Community and Economic Development Division. Whenever the Working Group modified the draft Update based on ongoing input that it received, the modified draft was placed on the Town's official web site, replacing the outdated draft.
3. The Community and Economic Development Division was assigned the responsibility of compiling all comments and sharing them via e mail with the Working Group. A copy of the documented comments is attached hereto as Appendix B2.
4. The Working Group met with to address comments and finalize a draft for presentation to the Board of Selectmen.
5. The Multiple Hazard Mitigation Plan Working Group submitted the draft together with a detailed explanation to the Board of Selectmen on June 15, 2010, at which time the Board conducted a public hearing.
6. Town staff incorporated the comments of the Working Group, refined the draft, and submitted the draft to MEPA for its review and advice.
7. Town staff (specifically Alison Steinfeld and Katherine Weeks) subsequently met with Sarah White of MEMA to discuss how to improve the draft Update in order to better respond to MEMA and FEMA requirements. Staff incorporated Ms. White's recommendations.
8. The Town notified potentially interested parties of the availability of the draft Update on the Town's website and encouraged them to review the Update and convey comments to the Community and Economic Development Division. Please see Appendix B.3 for the list of potentially interested parties who were encouraged to submit comments on the draft Update.

Please see Appendix B.4 for all comments submitted by the public and other interested parties to the Community and Economic Development Division on behalf of the Working Group.

5.0 Risk Assessment

The Town updated the risk assessments that were initially performed by Rizzo Associates. Assessments were completed for the following potential hazards: flood-related hazards; wind-related hazards; fire-related hazards; geologic hazards; and winter storm-related hazards. The five potential hazards were assessed and the following information for each is provided below: a profile of the hazard events; assets in the hazard area; potential losses; and development trends. The Town continually updates the risk assessments that were initially performed by Rizzo Associates, especially after each major storm (storms that are 25-year storms or greater.

5.1 Flood-Related Hazards

5.1.1 Flooding

Communities in Massachusetts are frequently exposed to riverine flooding. Flooding events can range from minor street flooding to serious flooding resulting in damage to public and private property. Major storms including hurricanes and nor'easters have produced flooding numerous times during the past decade.

Whereas flash floods occur quickly after an upstream event, riverine flooding is a longer-term event that may last a week or more. Flooding along rivers and streams is natural and inevitable. Some floods occur seasonally when winter or spring rains, coupled with melting snows, fill river basins with too much water, too quickly. Torrential rains from hurricanes or tropical systems can also produce river and stream flooding.

Flooding on a non-leveed stream occurs when over-bank flows are of sufficient magnitude to cause considerable inundation of land and roads. Flooding on a leveed stream occurs when the stream level rises above the levee. Flooding can also occur if the levee fails. The ability of the levee to withstand flooding depends on the design standards used when constructing the levee. Many private (mostly agricultural) levees are not intended to withstand major floods.

Riverine flooding is normally the result of a combination of meteorological and hydrological factors. Although excessive rainfall alone can cause flooding, the most severe riverine floods usually have multiple causative factors, including:

- Heavy prolonged rainfall from a large-scale storm or a series of large-scale storms
- Heavy rainfall from a near-stationary or slow-moving thunderstorm complex
- Saturated soil conditions from previous rainfall events
- High existing river flows from previous rainfall events
- Extreme cold temperatures followed by thawing, leading to river ice jams
- Rapid snowmelt. Snowmelt floods can develop over periods ranging from several hours to several days, depending upon the part of the country, the water content of the snow, and temperatures during the melting period. The combination of large-scale storm rainfall and rapidly melting snow can cause severe flooding
- Silt buildup in river channels during previous storm events that reduces the capacity of the river to carry water

The dangers of riverine floods are similar to coastal and flash floods, including:

- Damaged or destroyed buildings and vehicles
- Uprooted trees causing power and utility outages
- Drowning, especially people trapped in cars
- Contamination of drinking water
- Dispersion of hazardous materials
- Interruption of communications and/or transportation systems

Flash floods are fast moving floods resulting from extremely heavy rainfall generally over a period of less than 6 hours. The National Weather Service and the New England River Forecast Center issue flood watch, flood warning, and flash flood watch and warnings through MEMA, Emergency Alert System (EAS) and the news media. A flood watch is issued if the flood stage is forecast to be reached or exceeded in 12

to 24 hours. A flood warning is issued if the flood stage forecast suggests that the flood stage for a given location will be reached or exceeded within 12 hours.

A flash flood watch would be issued if rainfall may reach or exceed the 1 or 3-hour rainfall values or amount needed to produce flooding on small streams in a forecast zone. A flash flood warning is issued based on radar or observation that the 1 or 3-hour rainfall values will be exceeded.

Areas in each community that are vulnerable to flooding are usually well-known, and are identifiable through National Flood Insurance Maps. However, the intensity of flooding impact and the amount of damage that can result from an especially heavy rainfall is sometimes worse than expected. Flash floods can occur with startling suddenness and be especially devastating.

When a water body can no longer accommodate increased discharge from heavy rains or snow melt, the excess water flows onto the adjacent land. This area is known as the "floodplain," defined as the land adjacent to streams, lakes, or rivers, which is likely to flood during a storm. Floodplains are categorized according to the average frequency of flooding. Thus, the "100-year floodplain" is an area of land likely to be flooded once every 100 years, i.e. there is a 1% chance that the land will be flooded in any given year.

Development in floodplains is regulated in order to protect the health and safety of people in the area as well as property. Unregulated development in the floodplain can increase the likelihood of flooding by decreasing flood storage and increasing the surface runoff into the stream channel. In addition, water contamination from flood-damaged sewage or septic systems and debris swept downstream from flooded properties can result in unnecessary hazards to those downstream.

Floodplains are delineated on the basis of topography, hydrology, and development characteristics of the area. In Framingham's case, the 100 and 500-year floodplains were mapped in 1992 by the National Flood Insurance Program in the form of Flood Insurance Rate Maps. These maps were subsequently revised in 2010 to make minor adjustments for the topographic contours and create electronic versions of the floodplain maps that can be used by the Town's Geographic Information System (GIS). Framingham's Flood Insurance Study investigated the existence and severity of flood hazards in the town. The study was conducted using two classification systems based on the likelihood of flooding. The areas most susceptible to flooding were examined using detailed methods. Those areas are listed below in Table 5.1.1 and shown on Figure 5.1.1, and have not changed since the first edition of this Plan.

Areas having low development potential and minimal flood hazards are portions of Baiting Brook, Cochituate Brook, Hop Brook, Course Brook, Dunsdell Brook, East Outlet, Birch Meadow Brook, and numerous unnamed tributaries. These areas were studied by approximate methods, as opposed to detailed methods, due to the infrequencies of flooding.

Wetlands, streams, rivers, ponds etc. (referred to as Resource Areas) are protected under Massachusetts Wetlands Protection Act (M.G.L. c. 131, sec. 40—WPA) and locally under the Town of Framingham Wetlands Protection Bylaw (Article V, Section 18). Under the WPA: "No person shall remove, fill… or alter any bank, fresh water wetland, coastal wetland, dune, salt marsh, meadow, or swamp bordering any estuary, creek, river, stream, pond, or lake or any land under such waters…without filing written notice of his intention to so remove, fill, dredge or alter including such plans as may be necessary to describe such activity and its effect on the environment and without receiving and complying with an order of conditions." Proposed activities within 100 feet of said Resource Areas or 200 feet of perennial streams (streams that flow year-round) also require review and approval by the Conservation Commission.

The Town's Wetlands Protection Bylaw (Bylaw) provides additional protection to Resource Areas and Buffer Zones. Article V, Section 18.2 of the Bylaw states: "Except as permitted by the Conservation Commission, no person shall remove, fill, dredge build upon, or alter areas within 125 feet of any freshwater wetland, lake, pond…" Additionally the Commission "may establish a no work/no alteration zone as appropriate to each application."

Table 5.1.1: Flood Potential

Rivers	Limits of Detailed Study
Sudbury River	Entire Length
Reservoir No. 1-North Branch	From Reservoir No 1 Dam to the Reservoir No. 3 Dam
Reservoir No. 3	From Reservoir No. 3 Dam to a point approximately 0.5 mile upstream of the Pleasant St. bridge.
Angelica Brook	From its confluence with Reservoir No. 3 to a point approximately 0.1 mile upstream of Angelica Dr.
Beaver Dam Brook	From a point approximately 180 feet downstream of Second St. to a point approximately 2.2 miles upstream
Cochituate Brook	From its confluence with the Sudbury River to the CONRAIL bridge
Hop Brook	From a point approximately 0.25 mile downstream of the Colonial Dr. bridge to a point approximately 2.2 miles upstream.
Baiting Brook	From its confluence with Beaver Dam Brook to a point approximately 0.8 mile upstream.
Brook from Waushakum Pond	From its confluence with Beaver Dam Brook to a point approximately 0.8 mile upstream
East Outlet	From its confluence with the Sudbury River to divergence from Baiting Brook
Birch Meadow Brook	From its confluence with East Outlet to a approximately 90 feet upstream of the Weston Aqueduct

Source: FEMA, 1992, 2010.

Wetlands absorb and detain surface waters which help maintain relatively stable groundwater levels and prevent downstream damage. Development and activities that damage or replace wetlands with impervious surfaces result in increased runoff rates, reduced flood storage and elevated peak flows, leading to greater potential for damage from storms.

Low lying areas of Framingham are subject to periodic flooding. These occasional floods are caused by the overflow of the Sudbury River, the reservoirs, Hop Brook, Angelica Brook, Beaver Dam Brook, Dam Brook, Brook from Waushakum Pond, Eames Brook/ Farm Pond, Baiting Brook, and Cochituate Brook.

The most severe flooding in recent memory occurred in the Sudbury River in August of 1991 as a result of back-to-back hurricanes. Many of the bridges over the Sudbury River were flooded and impassable. The Massachusetts Turnpike was damaged and there was flooding of the Sudbury River in the Central Street area. Saxonville was severely damaged and the Reservoir No. 1 Dam at Winter Street was overtopped. Other recent floods include:

- A storm in October of 2005, which flooded the Sudbury River and Beaver Dam Brook. Beaver Street and Taralli Terrace were closed. Route 9 experienced severe flooding, especially at the intersection with Concord Street (Route 126).
- The “Mother’s Day Storm” in May of 2006, which flooded the Sudbury River and Beaver Dam Brook, resulting in making several roads impassable, including Herbert Street, Taralli Terrace, Beaver Street, and Second Street. Homeowners were evacuated, sometimes using boats since roadways were flooded with up to 4 feet of water.
- A storm in July of 2009, which dropped 5 inches of rain in 3 hours in the northern sections of the town. Hop Brook, Baiting Brook, and Angelica Brook overtopped their channels, causing flooding in many homes. Many roads were impassable due to street flooding, especially in the area of Hemenway Road, Gregory Road, and Sloane Drive but also including Wayside Inn Road, Edmands Road, and Lanewood Avenue/Angelica Drive.
- Two storms in March of 2010, which flooded the Sudbury River to a record high level (13.99 feet according to the USGS streamgage at Saxonville) made several roads impassable, including Auburn Street, Auburn Street Extension, Beulah Street, Circle Drive, Taralli Terrace, Beaver Street, and Second Street. Homeowners were evacuated on Circle Drive. The storms occurred March 14-

15 and March 29-31. DPW staff mobilized to prepare to close the Concord Street Flood Gate for the Saxonville Levee on March 31, however the final flood elevation was 9 inches below the trigger to close the gates, and therefore closure was not required.

Cedar Swamp in Westborough provides a natural upstream storage area for the Sudbury River. The storage area helps decrease peak flows and the severity of flooding along the river as it passes through the town. The Sudbury Reservoir and the Framingham Reservoir system also provide some storage volume that decreases peak flood flows on the Sudbury River within Framingham. The U.S. Army Corps of Engineers has constructed flood protection dikes and walls along a portion of the Sudbury River in the Saxonville area of the town. This project reduces the threat of flooding in much of the Saxonville area.

The Soil Conservation Service has constructed a flood control project for the Baiting Brook watershed that reduces the severity of flooding along major portions of Baiting Brook and Birch Meadow Brook. The project includes a dry dam on Baiting Brook and culvert and channel modifications to the east outlet diversion channel. Table 5.1.2 presents a summary of major flooding events.

FLOOD HAZARD MAP

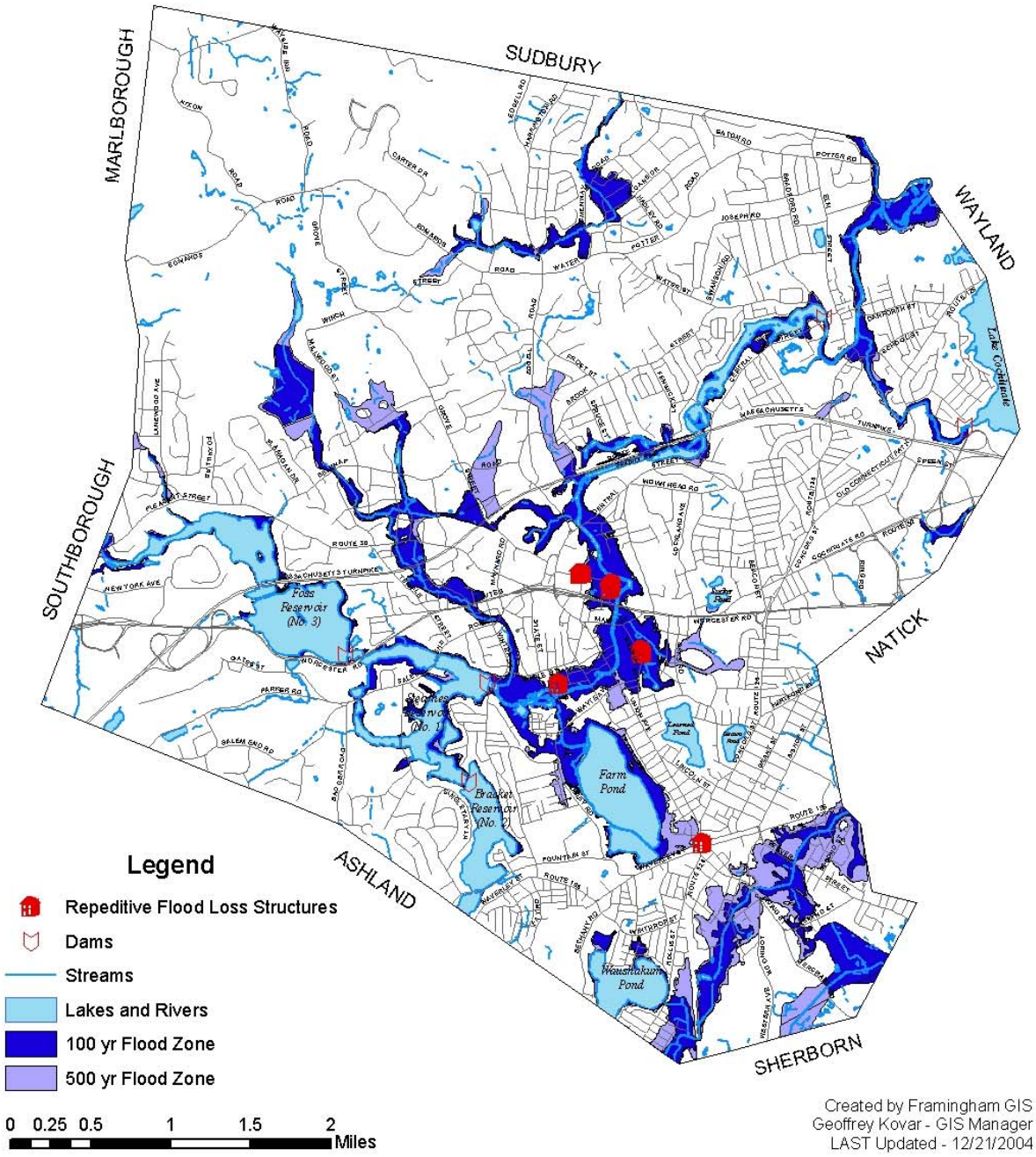


Figure 5.1.1 Flood Hazard Map

Table 5.1.2 – Summary of Major Flooding Events

Date	Type	Geographical Scope	Description
March 1987	Floods	Statewide	
April 1987	Floods	Statewide	
August 1991	Floods	Middlesex County	
October 1996	Floods	Middlesex County	
June 1998	Floods	Middlesex County	
January 15, 1999	Floods	Framingham	Rainfall of 1-2" combined with rapid snowmelt. Problem aggravated by clogged storm drains
March 22, 2001	Floods	Middlesex County	Declared a federal disaster area
October 2005	Floods	Middlesex County	
May 2006	Floods	Statewide	Declared a federal disaster area
July 7, 2009	Floods	Middlesex County	Rainfall of 5 inches in 3 hours
March 14-15, 2010 & March 30-31, 2010	Floods	New England region	Declared federal disaster area

In an attempt to gather data on recent flooding of individual residences, the Working Group reviewed the "Event Listing Reports" from the Framingham Fire Department; based on this data it appears that frequent flooding occurs on: Beaver Court, Edgell Road, Concord Street, Taralli Terrace, Second Street, and Speen Street. Public hearings revealed that some residents subjected to repetitive flooding do not call the Fire Department for assistance since the Department will not pump out a home surrounded by water. Thus, the above data can be misleading.

National Flood Insurance Program's (NFIP) repetitive flood loss structure information was obtained from MEMA. As of October 2009, 14 properties had experienced 2 to 3or more losses for a total of 33 repetitive losses. Approximately $378,657 was paid off for the damages to the buildings the contents of the buildings. Of these 14 structures, seven (7) are Single Family, four (4) are Other Residential (condominiums), one (1) is Multi-Family, and two (2) are Non-residential.

Additional information on known areas having frequent flooding was obtained from the Department of Public Works. The following areas have been identified as having known flooding issues:

- Lockerville Brook–Bishop Street Area
- Reservoir No. 3–Vallaincourt Drive, Westgate Road
- Farm Pond–Downtown, Park Street Area including Beech Street and the Common
- Dunsdell Brook–Brook Street, Scott Drive and McAdams Road
- Waushakum Pond–Berry Street and Gilbert Street
- Beaver Dam Brook–Waverly Street, Beaver Second and Herbert Streets; and Taralli Terrace
- Sudbury River–Circle Drive, Trafton Road, Bare Hill Road and Maple Street
- Baiting Brook–Wayside Inn Road
- Angelica Brook–Lanewood Drive and lower Angelica Drive
- Sucker Brook–Walnut Street residences (not including the roadway)
- Hop Brook–Gregory Road, Sloane Drive, and Hemenway Road

Additional locations with flooding problems were noted at the first Public Hearing conducted during the development of the original Plan. Information was also obtained from responses to the Hazard Information Sheets distributed at the meeting. The following are locations with additional flooding problems:

> Sudbury River–the areas between the Reservoir Number 1 dam and the Central Street dam, particularly just north and south of where the Sudbury River goes under Route 9 including Auburn, Beulah, Walnut and Main Streets, Union Avenue and Circle Drive.

In addition, Flood Insurance Rate Maps (FIRM) and Flood Insurance Studies (FIS) by FEMA were used to determine potential flooding areas. These locations are shown on Figure 5.1.1. Floodplain maps are the basis for implementing floodplain regulations and for delineating flood insurance purchase requirements. A FIRM is the official map produced by FEMA, which delineates Special Flood Hazard Areas. FIRMs are also

used by insurance agents and mortgage lenders to determine if flood insurance is required and what insurance rates should apply.

Water surface elevations are combined with topographic data to develop FIRMs. FIRMs illustrate areas that would be inundated during a 100-year flood, floodway areas, and elevations marking the 100-year-flood level. They also include base flood elevations and areas located within the 500-year floodplain. FIS and FIRM provide assessments of the probability of flooding at a given location. FEMA conducted many flood insurance studies in the late 1970s and early 1980s. These studies and maps represent flood risk at the point in time when FEMA completed the studies.

FEMA flood maps are not entirely accurate given that they represent flood risk at the point in time when FEMA completed the studies and do not incorporate floodplain changes due to potential new development. The FIRM for Framingham was completed in 1992. Manmade and natural changes to the environment have changed the floodplain boundaries. Although a revised version of the FIRM becomes final as of June 4, 2010, the floodplain delineations are essentially the same as the 1992 version, being defined by topographic contours. Combined with other layers in the Framingham's GIS System, the revised FIRMs will help the Town more easily determine which properties are in the floodplain.

5.1.2 Dam Failure

Dam Failure is a highly infrequent occurrence, but a severe incident could prove deadly. Since 1984, three dams have failed in or very near to Massachusetts (one of which resulted in a death) and two have come very close to failing.

There are over 2,500 dams in the state. Of these, the Army Corps of Engineers in conjunction with the Department of Conservation and Recreation (DCR) has classified over 50 as "structurally unsafe". Three hundred dams including over 40 of the "unsafe dams" are designated as "high hazard" dams by DCR's Office of Dam Safety, under Dam Safety Regulations 310 CMR 10.00. Section 10.06(3) defines "High Hazard" as: "Dams located where failure or misoperation will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s)." Many of the dams in the state were built in the 19th century during the industrial revolution; some even date back to the late 18th century. These structures are definite hazards that must be considered when planning for the safety of residents. Even dams which, theoretically, would pose little threat under normal circumstances can overspill or fail under the stress of such cataclysmic events as an earthquake.

The following are the major dams in Framingham that have been rated as a high hazard dams by the DCR Office of Dam Safety. None of these dams is owned by the Town:

Central Street Dam – Sudbury River
Reservoir No. 1 Dam – Sudbury River
Reservoir No. 2 Dam – Direct to Reservoir #1 Dam
Reservoir No. 3 Dam – On Reservoir #1
Lake Cochituate Dam – Lake Cochituate

In addition to the dams mentioned above that are within the Town, the Sudbury Reservoir Dam is located just west of the Framingham/Southborough town line, and has also been rated as a high hazard dam. Below are brief descriptions of the six high hazard dams that could potentially impact Framingham.

The Central Street Dam is located on the Sudbury River and impounds Saxonville Pond, and owned by the Saxonville Realty Trust. The dam is owned by Saxonville Realty Trust and maintained in cooperation with the Town of Framingham. The dam is a composite masonry and earth structure. Based on a hydraulic and hydrologic analysis completed by the Army Corps of Engineers included in the Phase I Inspection Report, the existing spillway of the dam appears to be adequately sized to pass the test flood outflow (10,000 cfs [cubit feet per second] = half of Probable Maximum Flood). The last inspection performed by the DCR Office of Dam Safety found that the dam was in fair condition and no evidence of apparent conditions requiring emergency actions was noted. However, the following recommendations for maintenance-related remedial measures were identified:

1. Repair right abutment where undermined
2. Clear debris from spillway and outlet structure intake area
3. Repoint masonry walls, particularly at left masonry wall, and right abutment
4. Remove vegetation and trees from wall and chain link fence at right abutment, and from base of left spillway abutment

Reservoir Number 1 (Stearns) Dam is located on the Sudbury River near Winter Street. The Dam along with the related water storage and supply facilities is owned and operated by DCR. Water transmission into and from the reservoir for public use is accomplished by means of gates and conduits owned and operated by the MWRA (MDC 1995).

The spillway discharge from the Reservoir Number 1 Dam is conveyed by the Sudbury River to Concord, where it joins the Assabet River. The dam consists of two earthen embankments separated by a stone masonry spillway and a gate house structure. The total length of the dam is approximately 800 feet.

The overflow spillway crest is approximately 168 feet long and 9.5 feet lower than the top of dam. The spillway was designed to operate with up to 1.75 feet of flashboards, which have not been used recently. A gatehouse structure is located to the right of the spillway. A 48-inch cast-iron supply pipe from upstream Reservoirs Number 2 and 3 enters the upstream side of the structure. The arrangement of ten gates and various chambers in the gate house is such that water from Reservoir Number 1 and/or the 48-inch pipe can be released to the Sudbury River or diverted into the Sudbury Aqueduct, a horseshoe-shaped water supply aqueduct that flows to the Chestnut Hill Reservoir in Brookline. Note that this aqueduct has not been utilized in many years and its structural integrity is unknown.

Reservoir Number 2 (Brackett) Dam and Appurtenances is located on the Sudbury River about one mile upstream of the Reservoir Number 1 Dam. The Dam along with the related water storage and supply facilities is owned and operated by DCR. Water transmission into and from the reservoir for public use is accomplished by means of gates and conduits owned and operated by the MWRA (MDC 1995).

The spillway from Reservoir Number 2 Dam discharges into Reservoir Number 1. An earth embankment structure with a stone masonry core, the dam is approximately 1,340 feet long. The dam impounds water in Reservoir Number 2; Reservoir Number 1 is immediately downstream of the dam.

The overflow spillway is a stone masonry structure approximately 186 feet long. There are training walls on either side and there is a cast-iron framework of an abandoned walkway on the crest. The walkway was used to provide access to the spillway for the installation and removal of flashboards. Both the flashboards and the walkway have been removed. A gatehouse is located on the right side of the spillway.

Reservoir Number 3 (Foss) Dam and Appurtenances is located on Stony Brook about 0.8 miles upstream of its confluence with the Sudbury River. The Dam along with the related water storage and supply facilities is owned and operated by DCR. Water transmission into and from the reservoir for public use is accomplished by means of gates and conduits owned and operated by the MWRA (MDC 1995).

The spillway from Reservoir Number 3 Dam discharges into Reservoir Number 1. The length of the dam is approximately 1,640 feet. The spillway is 100 feet long and has a narrow-crested stone masonry weir. There are no stop logs or flashboards on the crest of the spillway. The channel below the spillway is a 200-foot wide pond that is part of Reservoir Number 1.

Lake Cochituate Dam**,** located on the western side of Lake Cochituate near the Natick town line, is owned and operated by DCR. The channel below the dam is Cochituate Brook, which flows northwesterly into the Sudbury River (MDEM 2002).

Sudbury Reservoir , built between 1894 and 1898, is by far the largest water body in the Framingham area. With a surface area of 1,292 acres (MDC 2002) it is well over twice the size of Framingham Reservoirs 1, 2, and 3 combined. The reservoir has a volume capacity of 7.254 billion gallons, which is more than 3.5 times more than combined total of Framingham Reservoirs 1, 2, and 3.

The Sudbury Reservoir Dam is roughly 0.2 miles west of the Southborough/Framingham town line. The 2,000 foot-long dam (MDC 2002) along with the related water storage and supply facilities is owned and operated by the DCR. Water transmission into and from the reservoir for public use is accomplished by MWRA-operated gates and conduits. Water from the Sudbury Reservoir (elevation 259 feet above sea level) flows over the dam into the Framingham Reservoir Number 3 (elevation 154 feet). Based on an analysis of 1876 to 1972 MDC flow data (MDM, 1997), an average of 21 MGD (million gallons per day) flow over the Sudbury Reservoir Dam.

5.2 Wind-Related Hazards

Wind-related hazards are associated with thunderstorms, hurricanes and tornadoes, and can result in a variety of problems, e.g., trees toppling, damage to buildings and cars, downed power lines. Table 5.2.1 summarizes the potential effects of various wind speeds.

The Wind Resources Map available through the Community Wind Collaborative (http://www.masstech.org/IS/Community_Wind/maps/Wind%20Resources_FRAMINGHAM.pdf) shows that most areas in the town have an average wind speed of 12 to 13 mph. Winds in two elevated areas, specifically Nobscot Hill and Indian Head Hill, average 13 to 16 mph, which are not significantly higher than in other parts of Framingham. Although wind storms have caused damage such as knocking down trees or power lines, wind storms do not create significantly more impacts in these elevated areas compared with other areas in the town.

Table 5.2.1 – The Effect of Wind Speed

Wind Speed (mph)	Wind Effects
25-31	Large branches will be in motion
32-38	Whole trees in motion; inconvenience felt walking against the wind
39-54	Twigs and small branches may break off trees; wind generally impedes progress when walking; high profile vehicles such as trucks and motor homes may be difficult to control
55-74	Potential damage to TV antennas; may push over shallow rooted trees especially if the soil is saturated
75-95	Potential for minimal structural damage, particularly to unanchored mobile homes; power lines, and signs; and tree branches may be blown down
96-110	Moderate structural damage to walls, roofs and windows; large signs and tree branches may be blown down; moving vehicles pushed off roads
111-130	Extensive structural damage to walls, roofs, and windows; trees blown down; mobile homes may be destroyed
131-155	Extreme damage to structures and roofs; trees uprooted or snapped
Greater than 155	Catastrophic damage; structures destroyed

Source: Washington County Office of Consolidated Emergency Management

5.2.1 Thunderstorm Winds

During strong or severe thunderstorms, a burst of intense winds can flatten buildings and knock down trees. These winds, known as 'downbursts', are often mistaken for tornadoes due to the severity of the damage. A downburst features air diving toward the surface, whereas a tornado is composed of rising air.

Thunderstorms affect relatively small areas when compared with hurricanes and winter storms. The typical thunderstorm is 15 miles (24 kilometers) in diameter and lasts an average of 20 to 30 minutes. Of the estimated 100,000 thunderstorms occurring each year in the United States, only about 10 percent are classified as severe.

The National Weather Service (NWS) considers a thunderstorm severe if it produces hair at least three-quarters of an inch (2 centimeters) in diameter, has wind gusts of 58 miles (93 kilometers) an hour or higher, or produces a tornado. Although lightening can be deadly, the NWS does not use it to define a severe thunderstorm. If it did, every thunderstorm would be severe, by definition. Also, excessive rainfall may lead to deadly flash flooding, but heavy rain is not a "severe" criterion either. The flood threat is handled through a separate set of watches and warnings from local NWS forecast offices. Thunderstorms affect Framingham almost annually and impact the entire town equally.

Table 5.2.2 – Summary of Major Events Related to Thunderstorm Winds

Date	Type	Geographical Scope	Description
March 21, 1976	Thunderstorm		
August 4, 1993	Thunderstorm Winds	Framingham	Wires and trees knocked down, lightning
February 26, 1996	Thunderstorm Winds		

June 2, 2000	Thunderstorm Winds/Hail	Framingham	Winds downed trees, branches, and power lines; dime sized hail
May 12, 2001	Thunderstorm Winds	Framingham	Uprooted trees, smashed windows (Cornell Rd. area)
July 1, 2001	Thunderstorm Winds	Framingham	Power lines down. Lightning struck apartment building ($125,000 damage)

Lightning is the key ingredient that defines a thunderstorm since lightning is needed to create thunder. Thunderstorms come in all shapes and sizes with some cells only a few miles in diameter and some clusters of storms that span hundreds of miles.

5.2.2 Hurricanes

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. The eye of the storm is usually 20-30 miles wide and may extend over 400 miles. The dangers of the storm include torrential rains, high winds and flooding. It produces measurable damage from heavy rainfalls, winds, and flooding.

High winds are a primary cause of hurricane-inflicted loss of life and property damage. Another cause is the flooding resulting from the torrential rains that accompany the storm. Several unsuccessful programs have studied ways to "defuse" hurricanes in their developing stages; more recent hurricane damage-mitigation steps have included better warning systems involving real-time satellite imagery. A hurricane watch is issued when there is a threat of hurricane conditions within 24-36 hours. A hurricane warning is issued when hurricane conditions (winds greater than 74 mph or dangerously high water and rough seas) are expected in 24 hours or less.

Since 1900, 39 tropical systems have impacted New England. Twenty-five were hurricanes, while 14 were of tropical storm strength. Of the 25 hurricanes, 9 made landfall along the southern New England coast. Of those 9 hurricanes, 7 of them were either of category 2 or 3 intensity based on the Saffir-Simpson hurricane scale. Though the primary threat to New England is during August and September, the region has been affected as early as June, and as late as mid October.

The worst hurricane to affect New England was the great New England hurricane of 1938, which struck on September 21st. The great New England hurricane of 1938 struck at high tide, which coincided with the highest astronomical tide of the year, pushing a storm surge of 12 to 15 feet across the south coast and up the many bays and inlets including Narragansett and Buzzards Bays. Winds of over 120 mph blew across the coastal regions. The Blue Hill observatory, in Milton MA, recorded a sustained five-minute wind of 121 mph and a peak gust to 186 mph. Parts of interior Connecticut and Massachusetts not only bore the brunt of high winds, but also experienced severe river flooding as rain from the hurricane combined with heavy rains earlier that week to produce rainfall totals of up to 17 inches. This resulted in some of the worst river flooding ever experienced in parts of Connecticut and Massachusetts. This powerful storm caused 564 deaths and over 1,700 injuries. Nearly 9,000 homes and businesses were destroyed with over 15,000 damaged. The boating community was equally devastated with 2,600 boats destroyed and 3,300 damaged.

It is not uncommon for New England to be impacted more than once in a given season. The area has been impacted by two or more tropical storms or hurricanes in one season a total of 11 times.

The strongest hurricanes, such as the great New England hurricane of 1938 and Hurricane Carol, have brought severe damage to coastal locations, while totally disrupting utility power for days across the interior from downed trees and high winds. Both the stronger hurricanes and several of the weaker tropical storms have caused inland river flooding in various parts of the New England.

Table 5.2.3 below provides a summary of hurricanes that have affected Framingham since 1635 to date.

Table 5.2.3 – Summary of Hurricanes

Date	Type	Geographical Scope	Description
August 15, 1635	Hurricane	Regional	
October 18-19, 1778	Hurricane	Regional	40-75 mph winds

April 1798	Hurricane	Framingham	
October 9, 1804	Hurricane		
September 23, 1815	Hurricane	Regional	
September 3, 1821	Hurricane	Regional	
September 8, 1869	Hurricane	Regional	Winds in excess of 50 mph
1916	Hurricane	Regional	Category 1
September 21, 1938	Hurricane	Framingham	Winds up to 87 mph; many trees, towers, and buildings were toppled in all parts of town
September 1954	Hurricane Carol	Regional	Category 1
August 1955	Hurricane Connie	Regional	
August 1955	Hurricane Diane	Regional	
September 1960	Hurricane Donna	Regional	Category 3
1969	Hurricane Gerda	Regional	Category 3
September 27, 1985	Hurricane Gloria	Framingham	Category 3; winds in excess of 70 mph
August 20, 1991	Hurricane Bob	Framingham	Category 2; winds in excess of 65 mph; 110 trees down, 6000 residents w/o power, two emergency generators depleted, $112,000 estimated damages
September 16, 1999	Tropical Storm Floyd	Regional	Category 5: Winds in excess of 150 mph

5.2.3 Tornadoes

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. These events are spawned by thunderstorms and occasionally by hurricanes, and may occur singularly or in multiples. They develop when cool air overrides a layer of warm air, causing the warm air to rise rapidly. Most vortices remain suspended in the atmosphere. Should they touch down, they become a force of destruction. Evacuation of high-risk areas may be required on short notice. Sheltering and mass feeding efforts may be required along with debris clearance, search and rescue, and emergency fire and medical services.

The Fujita Scale is the standard scale for rating the severity of a tornado as measured by the damage it causes. A tornado is usually accompanied by thunder, lightning, heavy rain, and a loud "freight train" noise. In comparison with a cyclone or hurricane, a tornado covers a much smaller area but can be more violent and destructive.

On average, the United States experiences 100,000 thunderstorms each year and approximately 1,000 tornadoes develop from these storms. Damage from tornadoes is caused by high wind velocity and wind-blown debris. Over 80% of tornadoes strike between noon and midnight. "Tornado season" is marked from March through August, although tornadoes may occur at any time. The peak months of tornado occurrence in the Northeast are June through August, with August being the most frequent month.

Normally, a tornado will stay on the ground for no more than 20 minutes. Injuries and deaths most often occur when buildings collapse. The tornadoes experienced in recent history in New England have been generated by severe summer storms.

The most devastating tornado ever to occur in New England was the Worcester Tornado of July 9, 1953, a category F4 tornado which hit at 5:08 p.m. The twister tore through Barre, Rutland, Holden, Worcester, Shrewsbury, Westborough, and Southborough. Within one minute more than 90 people were dead and over 1,300 injured. Damage estimates were placed in excess of $52 million. The National Storm Prediction Center has ranked this as one of the deadliest tornados in the nation's history.

Another damaging tornado occurred in Windsor Locks, Connecticut at about 3 p.m. on October 3, 1979. This twister lasted only about 45 to 60 seconds, but managed to kill 3 people, injure over 300, destroy 40 homes and cause $300 million in property damage.

The most recent killer tornado to strike New England occurred on May 29, 1995 in Great Barrington, Massachusetts. This tornado, with winds in excess of 200 mph, killed 3 people, injured 23 and caused an estimated $25 million in damage.

No tornadoes have been documented in Framingham since the publication of this Plan.

Thunderstorms have been responsible for spawning tornadoes in many parts of New England. On average six tornadoes per year touchdown somewhere in New England. Many of these are in rural uninhabited areas, but when one occurs in a densely populated area, disaster strikes.

5.3 Fire-Related Hazards

There are many types and causes of fires. Wildfires, arson, accidental fires and others all pose a danger to communities and individuals. Fire kills over 4,000 and injures more than 23,000 people in the United States each year. Firefighters pay a high price for this terrible fire record as well; approximately 100 firefighters die in the line of duty each year. Direct property losses due to fire exceed $8.5 billion a year. However, America's fire losses today represent a dramatic improvement from nearly 30 years ago, attributable in large measure to significantly improved mitigation and fire prevention efforts.

The risk of fire is difficult to predict based on location. Some areas and structures that are surrounded by dry vegetation that has not been suitably cleared are at high risk. Homes and buildings without functioning smoke detectors are at higher risk for fires that cause injury and increased damage. However, fire danger is generally universal and can occur to any home, business or community at practically any time.

5.3.1 Wildfires

A wildfire is any uncontrolled fire that occurs in a suburban or a wilderness area. Other names such as brush fire, forest fire, grass fire, hill fire, mulch/peat fire, vegetation fire, and wildland fire may be used to describe the same phenomenon depending on the type of vegetation being burned. A wildfire differs greatly from other fires by its extensive size, the speed at which it can spread out from its original source, its potential to unexpectedly change direction, and its ability to jump gaps such as roads, rivers and fire breaks. Wildfire season can begin in March and usually ends in late November. The majority of wildfires typically occur in April and May, when home owners are cleaning up from the winter months, and when the majority of vegetation is void of any appreciable moisture, making them highly flammable. Once "green-up" takes place in late May to early June, the fire danger usually is reduced somewhat.

There have been no wildfires in Framingham since the publication of this Plan.

As residential areas expand into relatively untouched forested areas, people living in these communities are increasingly threatened by forest fires. Protecting structures in heavily forested areas from fire poses special problems, and can stretch firefighting resources to the limit. If heavy rains follow a fire, other natural disasters can occur, including landslides, mudflows, and floods. Once ground cover has been burned away, little is left to hold soil in place on steep slopes and hillsides. A major wild fire can leave a large amount of scorched and barren land. These areas may not return to pre-fire conditions for decades. If the wild fire destroys the ground cover, then erosion becomes one of several potential problems.

Wildfires are usually signaled by dense smoke that fills the area for miles around. There are three different classes of wild fires:

- Surface fires are the most common type and burn along the floor of a forest, moving slowly and killing or damaging trees
- Ground fires are usually started by lightning and burn on or below the forest floor
- Crown fires spread rapidly by wind and move quickly by jumping along the tops of trees.

The Bureau of Forest Fire Control is responsible for the protection of the Massachusetts' 3.5 million acres of state, public, and private forested land. The majority of information in the remainder of this section was taken from the Forest Fire Control Directory (April 2004).

Prevention and Pre-Suppression. Human carelessness, railroads, incendiary, and burning debris are the primary causes of forest fires in Massachusetts. In 1926, the Bureau of Fire Control created a system of prevention programming and pre-suppression activities. One program is called the RFP&C (Rural Fire Prevention and Control) Program, which conducts numerous education programs to increase public awareness on the prevention and hazards of forest fires.

The Bureau of Forest Fire Control (BFFC) is also active in the CFFP (Cooperative Forest Fire Prevention Program). They utilize CFFP materials such as “Smokey Bear,” one of the greatest fire prevention marketing efforts of our time. Weather Stations are also used to determine daily fire danger classifications for posting at the State’s Forests and Parks areas. The Framingham Fire Prevention Bureau also introduces wildfire safety and prevention as part of its ongoing education.

Bureau personnel carry out pre-suppression activities, which attempt to control and reduce potential fire hazards through education, training, planning, and the maintenance of existing fire equipment. Pre-suppression work includes:

- Thick brush cut back on state forest roads; water holes constructed
- Fire breaks constructed and maintained
- General fuel reduction (also called "Prescribed Burning,") performed within forested areas, which is a precision management tool which requires good planning and perfect timing.

Fire Prevention and Open Burning Permits. In 1908, Massachusetts enacted Chapter 209, which created a permitted debris burning season in the state in order to control the increase of forest fires due to human carelessness when burning debris. Within our borders Framingham’s Fire Chief has the primary responsibility for the issuance of burning permits and oversight. The Department of Environmental Protection (DEP) determines the standards for air quality and sets open burning times and dates during the year. Under severe fire conditions, the Framingham Fire Chief, the Director of Forests and Parks (State Forester) through a proclamation by the Governor of Massachusetts, may revoke existing burning permits and prevent issuance of new permits.

Fire Detection. The BFFC provides fixed-point fire detection from 43 active fire tower locations. From their vantage points (typically, the highest point in an area), skilled tower personnel utilize alidade tables, binoculars, and topographic maps to triangulate the precise location of a fire. This information is then dispatched to the local fire department for first response or the Bureau District Fire Warden for fires on State Forest or Parkland. Tower personnel also initiate dispatch requests to the District Fire Warden for state assistance when resources are requested by a local fire department. Inter-Regional dispatch of State resources should be initiated through the Regional Supervisor in the region in which the fire is located.

The BFFC also uses limited county-based fire patrols and contracted fixed-wing detection aircraft to supplement detection efforts of forested areas during periods of high fire danger. If a fire is detected, a quick response allows for swift deployment of equipment to the fire. The state maintains an agreement with the Massachusetts Army Air National Guard for use of aircraft in wild land fire detection activities. These aircraft operate from Westover and Otis Air Force Bases.

Fire Suppression. Within the state's fifteen (15) fire districts, crews of firefighters under the direction of the Fire Chiefs are used to suppress all wildfire conditions. Framingham is a member of Fire District fourteen (14) and has entered into mutual aid agreements for assistance during wildfire events. Activation of the District Fourteen (14) Wildfire Task Force is through the district control point in Ashland, MA 1-866-347-8714. In severe conditions, additional districts may be called in for assistance through the State of Massachusetts Mobilization Plan and can call for backup aid from the National Guard for helicopter water-drop suppression assistance. Helicopters equipped with 1,000 gallon buckets of water are used for aerial drops to help contain fires in remote areas. Massachusetts also benefits from mutual aid agreements with neighboring states and other forest fire fighting agencies. Bureau units are used at all fires that occur on state-owned forest land and are available to municipal fire departments for mutual assistance.

The Bureau, under extreme hazards of wildfires to people and property, ***The High Ground Management Program, the Construction Crew, and the DCR Communications Control Center.*** Reporting directly to the Bureau's Chief Fire Warden, the High Ground Management Program is authorized by Massachusetts General Law to manage all of the Bureau's and DCR’s tower facilities, mountain top areas, and communication systems as well as entering into reciprocal and financial agreements with private and state organizations for individual use of the communications and fire towers. There are currently 53 existing fire towers (43 are considered operational); 25 radio towers; and two state-of-the art microwave communications towers. One of DCR’s tower facilities is in north-central Framingham at the top of Nobscot Hill.

The Construction Crew builds, maintains, and repairs the state's existing fire towers; installs radio antennas; and builds, maintains, and repairs DCR's state-owned power utilities and telephone facilities.

DCR Communications Control Center provides backup communication and daily incident reports for DCR personnel. In addition to radio relay communications, the Communications Control Center, with the cooperation of the National Oceanic and Atmospheric Administration (NOAA), also maintains the state's "Early Warning Detection System." This system gives advance notice to the State's Forests and Parks in the case of severe weather detection. The Communications Control Center also monitors all FTS remote fire weather stations, Davis weather instrument systems, and a DTM Doppler satellite radar weather system; and provides emergency information to all DCR units upon threat of any natural disasters.

5.3.2 Urban Fires

Urban fires are a major problem that can affect any area of the town. Because buildings exist anywhere people live and work, fires can occur anytime and anyplace. These fires generate a variety of economic, social and indirect costs. The frequency of fires depends on a wide range of factors, which include, but are not limited to, population or building density, building use, fire safety practices (or lack thereof) by building occupants, and criminal intent related to arson. These fires are almost always caused by human activities. There have been no urban fires caused by natural events in Framingham.

5.4 Geologic Hazards

5.4.1 Earthquakes

Although New England has not experienced a damaging earthquake since 1755, numerous less powerful earthquakes have been centered in Massachusetts and neighboring states. Seismologists state that a serious earthquake occurrence is possible.

There are five seismological faults in Massachusetts, but there is no discernable pattern of previous earthquakes along these fault lines. Earthquakes occur without warning and may be followed by after shocks. Most buildings and infrastructures in Massachusetts were constructed without specific earthquake-resistant design features. Development in filled, sandy or clay soils is more vulnerable to earthquake pressures that other soils.

Seismologists use a Magnitude scale (Richter Scale) to express the seismic energy released by each earthquake. Table 5.4.1 includes the typical effects of earthquakes in various ranges.

Table 5.4.1 – Measuring Earthquake Magnitude (Richter Scale)

Richter Magnitudes	Earthquake Effects
Less than 3.5	Generally not felt, but recorded.
3.5-5.4	Often felt, but rarely causes damage
Under 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions
`6.1-6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0-7.9	Major earthquake. Can cause serious damage over larger areas
8 or greater	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Source: Nevada Seismological Laboratory (NSL), 2005

Each earthquake should have just one magnitude, although the several methods of estimating it will yield slightly different values (e.g.: 6.1, 6.3). Although each earthquake has a unique Magnitude, its effects will vary greatly according to distance, ground conditions, construction standards and other factors. In seismology, a scale of seismic intensity is a way of measuring or rating the *effects* of an earthquake at different sites. The Modified Mercalli Intensity Scale (see Table 5.4.2) is commonly used in the United States by seismologists seeking information on the severity of earthquake effects. Intensity ratings are expressed as Roman numerals between I at the low end and XII at the high end (NSL 2005).

Rating the Intensity of an earthquake's effects does not require instrumental measurements. Thus, seismologists can use newspaper accounts, diaries, and other historical records to make intensity ratings of past earthquakes for which there are no instrumental recordings. Such research helps promote our understanding of the earthquake history of a region, and estimate future hazards.

Table 5.4.2 – Measuring Earthquake Magnitude (Modified Mercalli Intensity Scale)

Rating	Seismic Intensity/Effects
I	People do not feel any Earth movement.
II	A few people might notice movement if they are at rest and/or on the upper floors of tall buildings
III	Many people indoors feel movement. Hanging objects swing back and forth. People outdoors might not realize that an earthquake is occurring.
IV	Most people indoors feel movement. Hanging objects swing. Dishes, windows, and doors rattle. The earthquake feels like a heavy truck hitting the walls. A few people outdoors may feel movement. Parked cars rock.
V	Almost everyone feels movement. Sleeping people are awakened. Doors swing open or close. Dishes are broken. Pictures on the wall move. Small objects move or are turned over. Trees might shake. Liquids might spill out of open containers.
VI	Everyone feels movement. People have trouble walking. Objects fall from shelves. Pictures fall off walls. Furniture moves. Wall plaster might crack. Trees and bushes shake. Damage is slight in poorly built buildings. No structural damage.
VII	People have difficulty standing. Drivers feel their cars shaking. Some furniture breaks. Loose bricks fall from buildings. Damage is slight to moderate in well-built buildings; considerable in poorly built buildings.
VIII	Drivers have trouble steering. Houses that are not bolted down might shift on their foundations. Tall structures such as towers and chimneys might twist and fall. Well-built buildings suffer slight damage. Poorly built structures suffer severe damage. Tree branches break. Hillsides might crack if the ground is wet. Water levels in wells might change.
IX	Well-built buildings suffer considerable damage. Houses that are not bolted down move off their foundations. Some underground pipes are broken. The ground cracks. Reservoirs suffer serious damage.
VX	Most buildings and their foundations are destroyed. Some bridges are destroyed. Dams are seriously damaged. Large landslides occur. Water is thrown on the banks of canals, rivers, lakes. The ground cracks in large areas. Railroad tracks are bent slightly.
XI	Most buildings collapse. Some bridges are destroyed. Large cracks appear in the ground. Underground pipelines are destroyed. Railroad tracks are badly bent.
XII	Almost everything is destroyed. Objects are thrown into the air. The ground moves in waves or ripples. Large amounts of rock may move.

Source: NSL 2005 (Original Source: FEMA)

Nineteen earthquakes with intensity V or greater have centered in Massachusetts. Several other earthquakes were centered off the coast and affected the eastern portion of the state. A shock in 1755 reached intensity VIII in Boston and was felt across the state. The state was affected by some of the more severe Canadian shocks plus the 1929 earthquake that centered on Grand Banks of Newfoundland.

Strong earthquakes in the St. Lawrence Valley in 1638, 1661, 1663, and 1732 were felt in Massachusetts. The 1638 and 1663 shocks damaged chimneys at Plymouth, Salem and Lynn. On June 11, 1643, Newbury, Massachusetts, was strongly shaken. On November 9, 1727, an earthquake described as "tremendous" in one report and "violent" in another caused much damage at Newbury. The shock was felt from the Keenebec River to the Delaware River and from ships at sea to the extreme western settlements. Several strong aftershocks were reported from the area through February 1728.

Eastern Massachusetts was shaken moderately on February 17, 1737 and June 24, 1741. On June 14, 1744, large numbers of bricks were shaken from tops of chimneys in Boston and other towns. People in Newbury and Ipswich were alarmed; and the quake was reported to have been felt severely in Falmouth, Maine.

On November 18, 1755, one of the most significant earthquakes in the northeastern region occurred off Cape Ann. In Boston, walls and chimneys were thrown down and stone fences were knocked down

(intensity VIII, Modified Mercalli scale). Some descriptions mentioned violent ground movement, like waves of the sea, making it necessary to cling to something to prevent being thrown to the ground. In Pembroke and Scituate small chasms opened in the earth through which fine sand reached the surface. Large numbers of fish were killed and many people on vessels felt shocks as if the ships were striking bottom. This earthquake was felt from Lake George, New York to a point at sea 200 miles east of Cape Ann, and from Chesapeake Bay to the Annapolis River, Nova Scotia.

Little is known about an earthquake that occurred on October 5, 1817. Walls were reportedly destroyed in Woburn (VII - VIII), but additional details are lacking.

Moderate earthquakes in 1847 (August 8), 1852 (November 27), 1854 (December 10), 1876 (September 21), 1880 (May 12), 1903 (January 21 and April 24), 1907 (October 15), 1925 (January 7 and April 24), 1940 (January 28), and 1963 (October 16 and 30), were felt over limited areas of eastern Massachusetts. The epicenter of the January 7, 1925 shock was off Cape Ann and was felt from Providence, Rhode Island, to Kennebunk, Maine. The October 16, 1963 shock caused some plaster to fall in Somerville; in addition a wall was reported cracked and stones fell from a building foundation (intensity VI). Dishes were broken and many persons were alarmed in Amesbury, and a window was cracked at Winthrop. The other earthquakes did not exceed intensity V.

The residents of Nantucket Island were jolted by a moderate earthquake on October 24, 1965. Very slight damage, mostly to ornaments, was reported. Doors, windows, and dishes rattled, and house timbers creaked.

Table 5.4.3 – New England Earthquakes with Magnitude 4.2 or more, 1924-1989

New England Location	Date	Magnitude
Ossipee, NH	December 20, 1940	5.5
Ossipee, NH	December 24, 1940	5.5
Dover-Foxcroft, ME	December 28, 1947	4.5
Kingston, RI	June 10, 1951	4.6
Portland, ME	April 26, 1957	4.7
Middlebury, VT	April 10, 1962	4.2
Near NH Quebec Border, NH	June 15, 1973	4.8
West of Laconia, NH	Jan. 19, 1982	4.5
Milo, ME	February 8, 1928	4.5
Southeast of Bar Harbor, ME	October 3, 2006	4.2

Source: Northeast States Emergency Consortium (NESEC).

Earthquakes precipitate several potentially devastating secondary effects, including:

- the collapse of buildings, bridges, roads, dams, and other vital structures
- Rupture of utility pipelines
- Flooding caused by dam failure
- Landslides
- Extended power outages
- Fires and/or explosions
- Water contamination
- Tsunami in coastal areas.

Table 5.4.4 – New England States Historical Earthquakes

State	Years of Record	Number Of Earthquakes
Connecticut	1568 - 1989	137
Maine	1766 - 1989	391
Massachusetts	1627 - 1989	316

New Hampshire	1728 - 1989	270
Rhode Island	1766 - 1989	32
Vermont	1843 - 1989	69

Total Number of Earthquakes within New England: 1215
Total Number of Earthquakes in the Northeast, 1538-1989: 4498

Information in this table has been reproduced in tabular form, and comes from a NESEC publication (to 1989).

The following websites concerning earthquakes in Massachusetts have been researched along with the known local historic occurrences:

http://www.neic.cr.usgs.gov/neis/states/states.html

http://quake/wr.usgs.gov

http://www.bc.edu/bc_org/avp/cas/wesobs/default.html

Based on information found on the above websites, it was determined that there have been no documented earthquakes centered in the Town of Framingham. On June 7, 2002, a 2.5 magnitude earthquake that occurred in Hopedale, MA was felt in Framingham. Figure 5.4.1 identifies an earthquake vulnerability area within Framingham near Pearl Street to Claflin Street, and the intersection of Routes 126 and 135. There is an existing thrust fault line that traverses the northwest portion of the Town.

5.4.2 Landslides

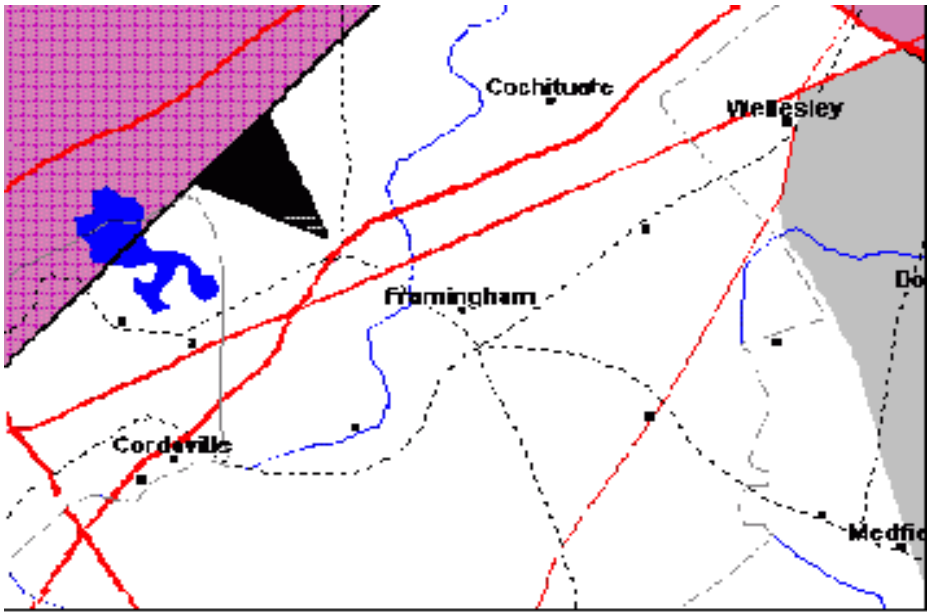
Based on a review of the USGS landslide website, it was determined that there have been no recorded landslides in Framingham, which is considered to be in a low landslide incidence area. Less than 1.5% of the town area is considered a landslide incidence area, as shown on the Atlantic North East Landslides map. The following website concerning landslides in Massachusetts has been researched along with any historic occurrences: http://landslides.usgs.gov/html_files/landslides/nationalmap/national.html

5.4.3 Sinkholes

Based on a review of websites dealing with geologic hazards, it was determined that there have been no recorded sinkholes in the Town of Framingham.

Figure 5.4.1 Earthquake Vulnerability Area

TOWN OF FRAMINGHAM – THRUST FAULT LINE



Source: U.S. Geological Survey

Dark triangle shows approximate location of thrust fault line that traverses the northwest portion of the Town of Framingham.

5.5 Winter Storms Related Hazards

Winter storms are the most common and most familiar of Bay State hazards which affect large geographical areas. The majority of blizzards and ice storms in the Commonwealth cause more massive inconvenience than they do serious property damage, injuries, or deaths. Winter storms generally make walking and driving extremely dangerous.

A Winter Storm can range from moderate snow to blizzard conditions: 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.

A Blizzard is a snowstorm with sustained winds of 40 mph or more or gusting up to at least 50 mph with heavy falling or blowing snow, persisting for one hour or more, temperatures of ten degrees Fahrenheit or colder and potentially life-threatening traveling conditions.

An Ice Storm involves rain that freezes upon impact. Ice coating at least one-fourth inch thick is heavy enough to damage trees, overhead wires, and similar objects and to 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 form a northeasterly direction. The sustained winds may meet or exceed hurricane force.

New England has a long history of severe winter storms and blizzards. The most severe winter storm to ever hit New England was the Blizzard of 1888, which occurred on March 11-14. Snow depths measured from 30 to 50 inches where precipitation was entirely snow. Areas such as Boston received a mix of snow and rain creating up to nine inches of slush.

The Blizzard of 1978 dumped 24-38 inches of snow on New England, immobilizing the infrastructure and blocking major interstates. Thousands of motorists abandoned their cars on the highway. Two weeks were required to remove the snow. More recent blizzards and snowstorms occurred in March of 1993, February

of 1996 and March of 2001. These events killed scores of people, caused millions of dollars in damage and left thousands of people without power for days.

New England 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.

Infrastructure, including critical facilities, may be impacted by these events, and power outages and transportation disruptions (i.e., snow and/or debris-impacted roads, as well as hazards to navigation and aviation) are often associated with the event. Ice storms can down power lines causing widespread blackouts.

In the winter months, New England may experience the additional coincidence of blizzard conditions with many of 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. The region may experience various related negative impacts upon the economy.

During winter storms, there is an increased risk of fire because people may lose electricity and use portable heaters, gas stoves, candles and other flammable sources of heat and light. Fire during winter storms presents a great danger because water supplies may freeze and it may be difficult for fire fighting equipment to get to the fire.

The leading cause of death during winter storms is from automobile or other transportation accidents. Exhaustion caused by overexertion is the number two killer. Frostbite is a severe reaction to cold exposure that can permanently damage its victims. A loss of feeling and a white or pale appearance in fingers, toes or ear lobes are symptoms of frostbite. Hypothermia is a condition brought on when body temperature drops to less than 95 degrees Fahrenheit. Symptoms of hypothermia include uncontrollable shivering, slow speech, memory lapse, frequent stumbling, drowsiness, and exhaustion.

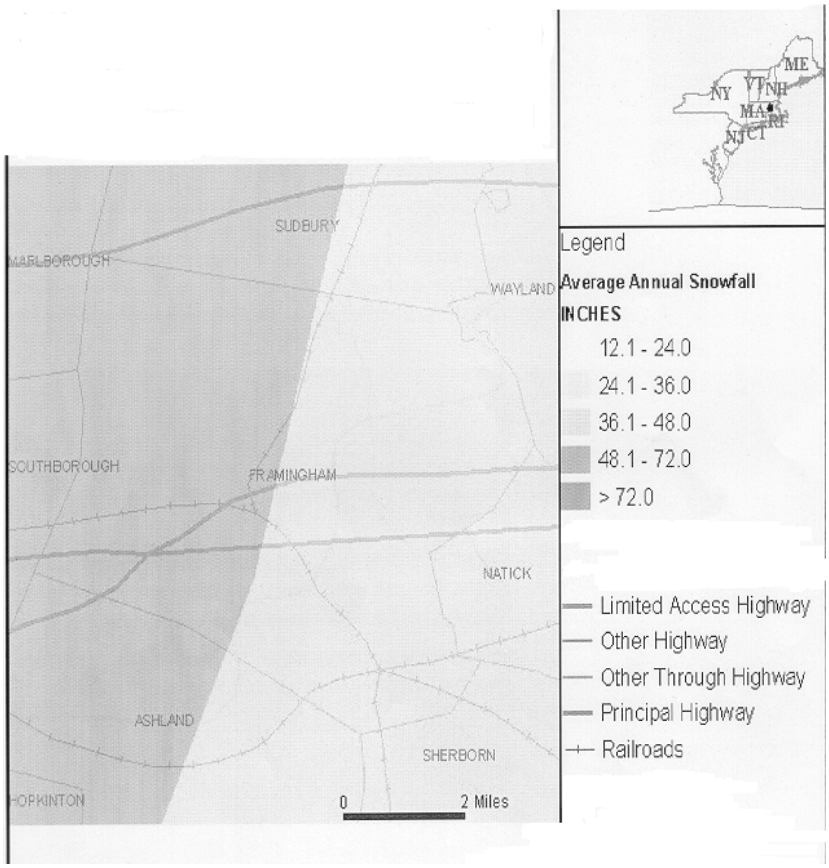
Severe winter storms typically occur during January and February, however, winter storms do occur from late September through late April. Table 5.5.1 summarizes the areas major winter storms. Figure 5.5.1 shows that the western half of the town receives a significantly higher amount of average annual snowfall than the eastern half.

Table 5.5.1 – Summary of Major Winter Storms

Date	Type	Geographical Scope	Description
March 11-14, 1888	Blizzard	Regional	30-50 inches of snow
February 5-6, 1978	Blizzard	Regional	24-38 inches of snow, winds up to 60 mph
October , 1991	Nor'easter	Statewide	
March, 1993	Winter Storm	Statewide	
December 7, 1996	Snow Storm	Framingham	Power outages and fallen trees
January 7, 1996	Snow Storm	Framingham	Roof collapse on a condo and a barn (two horses killed)
March 30-April 1, 1997	Snow Storm	Framingham	Loss of electricity due to heavy/wet snow, 20 inches of snow
January 1998	Ice Storm	Middlesex County	
January 25, 2000	Snow Storm	Middlesex County	
December 12, 2008	Ice Storm	Statewide	Loss of electricity (not in Framingham)

Figure 5.5.1 – Average Annual Snowfall

TOWN OF FRAMINGHAM – AVERAGE ANNUAL SNOWFALL



Source: http://www.tpmc.com/ (March 2004)

5.6 Drought

Drought is a temporary irregularity and differs from aridity since the latter is restricted to low rainfall regions and is a permanent feature of climate. Drought is a period characterized by long durations of below normal precipitation. Drought conditions occur in virtually all climatic zones yet its characteristics vary significantly from one region to another, since it is relative to the normal precipitation in that region. Drought can affect agriculture, water supply, aquatic ecology, wildlife, and plant life.

The Commonwealth of Massachusetts is often considered a 'water-rich' state. Abundant precipitation results from frontal systems or storms that move across the continent and exit through the Northeast. Under normal conditions, regions across the state annually receive between 44 and 47 inches of precipitation. The normal annual rainfall in Framingham is 45 inches.

Drought conditions are very rare in Framingham, and are not considered a potential hazard for the Town.

5.7 Risk Assessment Summary

Table 5.6.1 presents a summary of each of the hazards discussed in above sections in relation to the likelihood of hazard occurrence, the location of the occurrence, and the impacts of an event. The table is organized as a hazard index to measure the most likely and most damaging natural event.

Table 5.7.1 – Hazard Identification and Analysis Matrix

Natural Hazard	***Likelihood of Occurrence*** (highly, likely, possible, unlikely)	***Location*** (local or small, medium or regional, multiple communities or larger)	***Impacts*** (catastrophic, critical, limited, negligible)	***Hazard Index*** (rank by combining how much impact & how frequently this affects your community)
Flood-Related Hazards				
Riverine	Highly likely	Multiple Communities or Larger	Critical	10
Dam Failures	Unlikely	Multiple Communities or Larger	Catastrophic	8
Thunderstorms	Likely	Medium or Regional	Critical	8
Hurricanes	Likely	Medium or Regional	Critical	8
Wind-Related Hazards				
Hurricanes	Likely	Medium or Regional	Critical	8
Tornadoes	Possible	Medium or Regional	Critical	7
Fire-Related Hazards				
Drought	Likely	Medium or Regional	Limited	7
Wildfires	Likely	Local or small	Limited	6
Urban Fires	Likely	Local or small	Limited	6
Geologic Hazards				
Earthquakes	Possible	Medium or regional	Catastrophic	8
Landslides	Possible	Local or Small	Limited	5
Sink Holes	Unlikely	Local or Small	Negligible	3
Winter Storms Related				
Winter Storm	Highly likely	Multiple Communities or Larger	Critical	10
Blizzard	Likely	Multiple Communities or Larger	Critical	9
Ice Storm	Likely	Multiple Communities or Larger	Critical	9
Nor' easter	Likely	Multiple Communities or Larger	Critical	9

Risk Assessment Rating System

1. Unlikely.	1. Local or small.	1. Negligible.
2. Possible.	2. Medium/Regional.	2. Limited.
3. Likely.	3. Multiple Communities or larger.	3. Critical
4. Highly likely.		4. Catastrophic.

One of the actions to be taken under this Plan is an analysis of physical locations in the Town that may be prone to the most common hazards, and create a risk assessment of these areas. The risk assessment will include identification of buildings (and/or critical facilities) located in the hazard areas described in this section. The assessment will also provide an analysis of the potential impacts of an occurrence of the hazard, such as flooding, upon the surrounding neighborhood. The assessment will then describe the areas where buildings (and/or critical facilities) might be built or re-developed (i.e., developable land) located in the hazard areas.

6.0 Multiple Hazard Maps

The following is a list of maps that have been produced based on the information summarized in Section 5.0, Risk Assessment:

- Water Bodies and Flood Hazard Related Resources
- Critical Facilities
- Location of Fires
- Geologic Features

The Town has developed a Critical Facilities Map, which has been submitted to FEMA as part of this Plan Update. However, due to security concerns, the Critical Facilities Map is not a public document.

7.0 Existing Protection Matrix

Table 7.1 is a summary of the existing protection measures in place at this time.

Table 7.1 – Existing Protection Matrix

Type of Existing Protection	*Description*	*Area Covered*	*Effectiveness and/or Enforcement*	*Improvements or Changes Needed*
Flood Related Hazards				
Storm water management standards	State regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-wide	Enforced by the Conservation Comm. (Wetlands Protection Act) and Planning Board (Subdivision Control Law and site plan review)	
Rivers Protection Act	State Law 310 CMR 10.58 & Local bylaw Article V Sect.18 development and activity in riverfront area	200-foot (1)	Enforced by the Conservation Comm. & DEP	
Wetlands Protection Act (state) and Wetlands Protection Bylaw (local)	State and local laws regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area(2); local bylaw policy requires a 30 foot no disturb area closest to wetland	Enforced by the Conservation Commission	
100 Year Flood Zone(3) Town Bylaw Sec. III. H. Flood Plain Districts	State law and local bylaw requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated Nov. 19, 1986	Enforced by the Building Inspector and Conservation Commission	Insurance Flood Rate Maps updated as of June 4, 2010.
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-wide	Directed by the Department of Public Works	Additional personnel and equipment needed
Culverts replacement	Replacement of culverts that are undersized and/or deteriorated	Town-wide	Directed by the Department of Public Works	Culverts in flood areas to be evaluated for replacement

(1) Riverfront Area is the land measured horizontally outward from the edge of river and a parallel line located 200-feet away

(2) 125 foot town bylaw buffer

(3) Compensatory storage shall be provided for all flood storage volume that will be lost as a result of a proposed project

Table 7.1 – Existing Protection Matrix (Continued)

Type of Existing Protection	*Description*	*Area Covered*	*Effectiveness and/or Enforcement*	*Improvements or Changes Needed*
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways needed, e.g., remove trash, debris.	Town-wide	Directed by DPW with guidance from Conservation Commission	Additional personnel and equipment needed
Inspection of major dams	Periodic inspections of the structural integrity of the dam and appurtenances	Major dams including Reservoir No.1, 2, and 3 dams, Central St. Dam and Lake Cochituate Dam	Directed by the DCR Office of Dam Safety	Update dam failure studies for the dams rated as high hazard
Wind Related Hazards				
State Building Code	State Law related to design loads to include wind effects	Town-wide	Enforced by Building Dep.	
Tree maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-wide	Utility companies	Additional staff
Fire Related Hazards				
Limited brush Clearing	provide access to Emergency Services	Town-Wide		Identify areas with potential for brushfires
Geologic Hazards				
Location of earthquake vulnerable areas	Potential Earthquake Vulnerable Area has been Identified			
Winter Storms Related				
Residential parking bans	Parking bans to enable effective snow removal from residential streets	Town-wide	DPW	Additional personnel and equipment needed
Clearing snow from major arterial routes	Ensure access to emergency services	Town-wide	DPW	Additional personnel and equipment needed

The Town continues to comply with the National Flood Insurance Plan (NFIP). In 2009, the Town completed a certification process to ensure that the Saxonville Levee meets all the criteria set forth in NFIP Regulations 44 CFR 65.10 "Mapping of Areas Protected by Levee Systems". This certification was accepted by FEMA in the fall of 2009. In addition, FEMA has recently updated the Flood Insurance Rate Maps (FIRMs). The Town's 2010 Annual Town Meeting contains a warrant article to change its Zoning Bylaw for Flood Districts to comply with the 2010 FIRM requirements.

8.0 Goals and Objectives

In line with the Massachusetts' State Hazard Mitigation Plan, our goal is to:

Reduce the loss of life, property, infrastructure, and cultural resources throughout the Town of Framingham from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education and capital improvements.

The objectives that need to be accomplished in order to meet this goal are as follows:

1. Increase coordination between departments in pre-disaster planning and continuous hazard mitigation implementation (Regulatory & Administrative)
2. Increase awareness of hazard mitigation among Town Officials, private organizations, businesses and the general public (Education & Outreach)
3. Analyze and improve this plan's effectiveness as well as the effectiveness of program management of current and future mitigation initiatives (Planning)
4. Implement a broad range of programs and projects which promote the Town's comprehensive mitigation strategy (Structural/Capital Improvements)

8.1 Regulatory/Administrative Objectives

1. Continue to identify, develop and implement hazard mitigation measures and regulations town-wide consistent with the National Flood Insurance Program, the Flood Mitigation Assistance Program, the Hazard Mitigation Grant Program, the Pre-Disaster Mitigation Program and other relevant programs.
2. Develop and adopt bylaws if necessary to include the downstream flood impact of development proposals as criteria when reviewing applications for permitting.
3. Continue to work at developing a closer working relationship between the Conservation Commission and the Department of Public Works to expedite maintenance and structural projects especially those that provide flooding relief.

8.2 Education & Outreach

1. Increase awareness of the cost-savings and public safety benefits of hazard mitigation projects and policies among Town official-wide hazard mitigation education program that would piggyback on publicity and educational efforts of MEMA and DCR.
2. Work more frequently with state and federal agencies, especially MEMA, FEMA and DCR, in coordinating hazard mitigation projects, policies and programs before, during and after disaster events, especially for critical infrastructure.
3. Notify all residents and aggressively promote in the media the availability of hazard mitigation grant programs funded through the annual Flood Mitigation Assistance Program, the annual Pre-Disaster Mitigation Program and the post-disaster Hazard Mitigation Grant Program.
4. Meet with neighboring communities and appropriate organizations such as SuAsCo Watershed Community Council and the Metropolitan Area Planning Council to discuss natural hazard mitigation issues and identify appropriate implementation actions from a regional perspective.

8.3 Planning Objectives

1. Meet the Disaster Mitigation Act of 2000 requirement and other federally recognized organizations' requirements to have a FEMA-approved "all natural hazards" mitigation plan in place to qualify for future hazard mitigation funding.
2. Ensure that hazard mitigation is adequately addressed in Town Regulations, particularly the Comprehensive Plan, Subdivision Regulations, Zoning Bylaw, and Conservation Commission Bylaws. These regulations should be assessed in terms of their effectiveness to mitigate natural hazards within a larger geographical context, and not just on a localized basis.
3. Include natural hazard mitigation consideration in the evaluation and prioritization of public policy initiatives, such as public land acquisition.
4. Perform a comprehensive evaluation and prioritization of hazard mitigation infrastructure, especially flooding (such as culverts and dams) that should be constructed or replaced, and ensure that the highest priority items are included in the Town's Capital Improvement Plan.
5. Work with neighboring communities in developing regional multi-jurisdictional natural hazards mitigation plans that incorporate regional natural hazard risk assessments and strategies based on input provided by local jurisdictions' risk assessments and local hazard mitigation strategies.

6. Apply for available Pre-Disaster Mitigation Program funding when available.
7. Continually review the Multiple Hazard Mitigation Plan in order to assess the regional and local risk assessments, loss estimates and hazard mitigation strategies.
8. Continue to update the Geographical Information Systems (GIS) Mapping Town-wide and make it available for the Fire and Police Departments, Emergency Management and DPW.
9. Continue to attempt to mitigate repetitive loss structures with solutions that must meet federal, state, and local regulations, but for which there is insufficient funding.

8.4 Structural/Capital Improvements

1. Based on input from residents, review, analyze and prioritize the recommended structural hazard mitigation projects. The Town will work with the appropriate state and federal government agencies and other partners to secure funding and resources to assist in completing these projects.
2. Work with the DCR Office of Dam Safety, US Army Corps of Engineers' Flood Assistance Program, and other federal and state agencies to develop a strategy to obtain funding and staffing in order to conduct inundation analyses for the all "high risk" dams in town, and the hardest hit flood areas.
3. Develop a plan to ensure that existing and future flood mitigation infrastructure is adequately maintained, such as periodic inspection and cleaning of culverts, detention and retention basins, ponds, streams and swales.

9.0 Development of Mitigation Projects

An extensive list of mitigation projects was initially developed by the CPT, Town staff and the consultant following several public hearings in 2003 and 2004. The Multiple Hazard Mitigation Plan Working Group has, over the years, reviewed the projects and updated them as appropriate.

9.1 Flood Related Hazards

9.1.1 Prevention

Prevention activities include planning, zoning, open space preservation, floodplain and wetland development regulations, storm water management, waterway dumping regulations, watershed protection measures and best management practices, soil erosion and sediment control, building bylaws, and subdivision regulations.

Analyze Repetitive Flood Loss Structures

Description

This alternative action will recommend the analysis of each repetitive flood loss structure and identify feasible mitigation options

Implementation

- Identify appropriate and feasible mitigation activities for identified repetitive flood properties
- Contact repetitive loss property owners to discuss mitigation opportunities, and determine interest should future project opportunities arise
- Explore incentives to encourage property owners to engage in mitigation.

Master Drainage Plan

Description

The Town is in the process of developing a Master Drainage Plan, which consists of a comprehensive evaluation of the existing storm water drainage systems, the development of an Operations and Maintenance Plan for the continued maintenance of the system and the prioritization and schedule of any necessary capital improvements. The Plan will provide specific recommendations for planning, approving, constructing and maintaining drainage facilities.

Implementation

The Master Drainage Plan should take a watershed-based approach and include the following:

- Aerial survey or GIS base maps of the Town with the storm water drainage system delineated
- A description and review of the Town's existing drainage system for each watershed, including hydraulic analyses to determine the capacities of each system
- A description and analysis of the hydrologic condition of the Town and how future developments may impact drainage systems, streams and wetlands in each watershed
- A review of the Town's regulations as they pertain to or affect drainage issues
- Recommendations for the development of drainage facilities within the Town for each watershed
- For each watershed, the development of a plan for the implementation of specific recommendations to upgrade existing drainage systems and provide for adequate operation and maintenance procedures.

Development with respect to Flood Elevations

Description

This alternative action will recommend revision to requirements for new development.

Implementation

- Explore raising the base elevation requirement for new residential construction to two or three feet above base flood elevation, or greater. An increased elevation standard is one activity the Town can engage to receive credit from the NFIP Community Rating System Program (CRS)
- Identify opportunities to upgrade the Federal Insurance Rate Map
- Eliminate or reduce the amount of "grandfathering" allowed under existing regulations.

Track Depth of Sudbury River

Description

This alternative action will enable accurate prediction of imminent flooding due to the water levels in Sudbury River.

Implementation

- Evaluate the location of existing stream gauges located along the Sudbury River. Contact the United States Geological Survey to install a simplified stream gauge that would provide real time stream gauge to enable accurate predictions of imminent flooding

Dam Maintenance

Description

- This alternative action will ensure that the dams and the flood control works are inspected and maintained in good operational condition.

Implementation

- Identify the owners of all the dams, and inspect the dams periodically and monitor them regularly
- Ensure that all recommended repairs and maintenance at all dams is completed
- Ensure flood control works are in good operational condition at all times
- Evaluate opportunities to conduct/update dam inundation studies.

Increase Flood Storage Capacity

Description

This alternative requires the use of natural or man-made storage or retention facilities to diminish the effects of increased storm water runoff. Storm water quality can also be improved in some cases.

Implementation

- Increase the flood storage capacity and buffering using detention tanks or ponds, drywells for groundwater recharge and oversized storm water collection systems
- Use natural low-lying areas and wetlands to detain runoff by installing control structures upstream of areas prone to flooding.

9.1.2 Emergency Services

Emergency services include hazard recognition, emergency warning systems, emergency response, protection of critical facilities and health and safety maintenance.

Maintenance and Readiness

Description

This alternative action will ensure that the emergency services are available. A detailed Comprehensive Emergency Management Plan (CEMP) was developed and extensively updated in 2008. It was approved by the Board of Selectmen and MEMA.

Implementation

- Develop warning systems in the areas prone to flooding to notify the Town and residents of imminent flooding. This could be expanded to include areas located downstream from high hazard dams
- Update and maintain plans for managing emergency response activities due to flooding including addressing potentially hazardous dams
- Emergency management and other local government agencies should familiarize themselves with technical data and other information pertinent to the dams that impact Framingham. This should include determining the probable extent and seriousness of the effect of failures on downstream areas
- Determine minimum notification time for areas downstream from the dams
- The Department of Public Works shall install and remove sandbags to protect repetitive loss properties and critical facilities during times of imminent flooding
- Identify appropriate shelters for people who may need to evacuate due to loss of electricity and heat and make their locations known to public.

9.1.3 Structural Projects

Structural projects include construction, maintenance or repair of levees, berms, dams, floodwalls, drainage and sewer improvements and detention/retention basins.

Evaluation of Drainage System

Description

This alternative requires the evaluation of drainage system and regular maintenance.

Implementation

- Prepare and update an inventory of culverts that historically create flooding problems.
- Identify and prioritize candidate culverts for replacement
- Institute regular maintenance program for culverts in problem areas
- Prepare and update an inventory of areas with drainage problems and conduct engineering studies in each of the areas to identify causes and develop potential mitigation actions
- Backflow preventers were installed at the end of storm drain outfalls to stop the water from the Sudbury River from reversing flow. However, mitigation was ultimately diminished due to competing regulations regarding the floodplain.
- Evaluate sewerage pumping stations that are located in the frequent flooding areas and elevate them beyond the flood elevations.

9.1.4 Public Information

Public information activities include providing map information, informational mailings or workshops, real estate disclosure of hazards, environmental education, and technical assistance provided on disaster, mitigation and management issues.

Public Education and Awareness

Description

This alternative action will increase public awareness of flood mitigation activities.

Implementation

- Make a presentation of this plan to the Board of Selectmen
- Collect information on public educational materials for protecting life, property and the environment from flooding events
- Disseminate emergency public information and instructions concerning flood preparedness and safety including dam hazards

- Obtain and maintain records of flooding incidents in local neighborhoods
- Provide public information about flood prevention, insurance, preservation of wetlands, etc. as inserts in the utility bills
- Institute system of warnings and fines for landscapers found to be dumping grass clippings, leaves and yard wastes in wetlands and flood plains.

9.1.5 Property Protection

Property protection activities include acquisition, building relocation, building elevation, barriers, dry/wet floodproofing, utility relocation or floodproofing, sewer backup protection and insurance.

Land Acquisitions

Description

This alternative involves requiring the Town to consider flood hazard and flood mitigation impact as important considerations in prioritizing land acquisitions as part of the Town's Comprehensive Plan and Open Space and Recreation Plan.

Implementation

In prioritizing land acquisitions, consideration must be given to the probability of development and the proximity to flood hazard areas. More specifically, consideration should be given to:

- Land with structures subjected to repetitive losses
- Open space located in the floodplain
- Open space or undeveloped space suitable for detention or groundwater recharge facilities near developed or developable land
- Parcels experiencing heavy development pressure or those with a high probability for future development that would increase the flood hazard potential downstream if developed. This land need not be in the floodplain.
- Land that is suitable for playing fields or other recreational uses where periodic flooding would not cause excessive flood damage.

Flood Damage Reduction

Description

These alternative actions result in flood preparedness and significantly reduce the flood damage.

Implementation

Public Works/Utilities:

- Protect or elevate ground-mounted transformers
- Elevate vulnerable equipment, electrical controls and other equipment at wastewater treatment plants, potable water treatment plants and pump stations
- For sewer lines in the floodplain, fasten and seal manhole covers to prevent floodwater infiltration
- Protect wells and other potable water from infiltration and flood damage by raising controls and well pipes
- Replace low bridges or other obstructions that may induce flooding of houses or businesses
- Move building contents to a higher floor or store outside of floodplain
- Obtain whatever equipment is required to lessen impacts during flooding events.

Residences:

- Elevate existing residences above floor elevation on a new foundation
- Relocate residences to outside of floodplain
- Acquire and demolish residences
- Store important documents and irreplaceable personal objects where they will not get damaged
- Elevate or relocate furnaces, hot water heaters and electrical panels
- Provide openings in foundation walls that allow flood waters to move, thus avoiding collapse of walls incapable of resisting hydrostatic pressure
- Build and install flood shields for doors and openings (after evaluating whether the building can handle the forces) to prevent floodwater from entering

- Buy and install sump pumps with back-up power.

Businesses:

- Elevate, floodproof, relocate or demolish buildings
- Store important documents, such as insurance papers, where they will not get damaged
- Elevate or relocate furnaces, hot water heaters, electrical panels and other equipment
- Provide openings in foundation walls that allow flood waters to move, thus avoiding collapse of walls incapable of resisting hydrostatic pressure
- Build and install flood shields for doors and other openings (after evaluating whether the building can handle the forces) to prevent the floodwater from entering
- For drains, toilets and other sewer connections, install backwater valves or plugs
- Backflow of sewer lines can occur outside of the flooded areas, particularly where there are combined sanitary or storm sewer systems; check with the town for advice
- Elevate, relocate, protect or reduce the amount of equipment or inventory that can be flooded
- Identify stored hazardous materials or other chemicals that should be relocated or elevated in the case of flooding.

9.2 Wind Related Hazards

9.2.1 Prevention

Building Codes:

Since Massachusetts municipalities are not legally authorized to adopt individualized building codes, the Town relies on the State Building Code, which has always contained regulations concerning this aspect of construction. In the 7th edition of the code, the State has enhanced these regulations with clearly delineated requirements.

Description and implementation: Continue to implement the State Building Code, which contains clearly delineated requirements for new construction relative to structural resistance to wind-related hazards.

Maintenance

Description

This alternative action will recommend developing and implementing programs to keep trees from threatening lives, property and public infrastructure during windstorm events.

Implementation

- Disseminate information to property owners to reduce risk from tree failure to life, property and utility systems
- Identify potentially hazardous trees in critical areas
- Increase staff to assist tree warden to identify and remove hazardous trees.

9.2.2 Emergency Services

Maintenance and Readiness

Description

This alternative action will ensure that emergency services are available. Details relative to emergency services are provided in the Town's local plan.

Implementation

- Update and maintain plans for managing emergency response activities
- Identify appropriate shelters for people who may need to evacuate due to loss of electricity and heat and make their locations known to public
- Assure that critical facilities such as police and fire station and schools are accessible and equipped
- Obtain equipment needed to assure that streets and roads can be quickly cleared of fallen trees and other debris to assure the passage of public safety vehicles and general traffic
- Ensure that warning/notification and communication systems are in readiness.

9.2.3 Structural Projects

Underground Electrical Utilities

Description

This alternative action will support/encourage electrical utilities to use underground construction methods where possible in order to reduce power outages from windstorms.

Implementation

Increase the use of underground utilities where possible.

9.2.4 Public Information

Public Awareness

Description

This alternative action will increase public awareness of windstorm mitigation activities.

Implementation

- Collect public educational materials for protecting life, property and the environment from windstorm events
- Distribute educational materials to the residents and public and private sector organizations regarding preparedness for no power situations.

9.2.5 Property Protection

Retrofit Public Buildings and Critical Structures

Description

This alternative action will assure of public buildings and critical facilities can withstand high winds.

Implementation

- Evaluate public buildings and critical facilities for the potential to withstand high winds
- Retrofit public buildings and critical facilities to withstand high winds.

9.3 Fire Related Hazards

9.3.1 Prevention

Coordination between Residents and Fire Department

Description

This action will increase communication, coordination and collaboration between property owners and the Fire Department to address risks, existing mitigation measures, and federal assistance programs.

Implementation

- Encourage single-family residences to have fire plans and practice evacuation routes
- Encourage fire inspections in residential homes by Fire Department personnel to increase awareness among homeowners and fire responders
- Require Fire Department to notify new business applications to ensure that appropriate fire plans and egress plans have been developed
- Encourage the Building and Wire, Community and Economic Development, and Engineering Departments to work closely with landowners and developers to identify and mitigate conditions that aggravate wildfires including:
  - Limited access for emergency equipment due to width and grade of roadways;
  - Inadequate water supplies and the spacing, consistency and species of vegetation around structures
  - Inadequate fuel breaks, or lack of defensible space
  - Highly flammable construction materials
  - Building lots and subdivisions that are not in compliance with the State and Town land use and fire protection regulations

- Inadequate entry/escape routes
- Encourage the public to evaluate access routes to remote areas for fire-fighting vehicles and to develop passable routes if they do not exist
- Clear trimmings, trees, brush, and other debris completely from sites when performing routine maintenance and landscaping to reduce fire risk.

9.3.2 Emergency Services

Maintenance and Readiness

Description

This alternative action will enhance emergency services to increase the efficiency of wildfire response and recovery activities.

Implementation

- Evaluate the need for fire reporting/watch stations for better access and coverage
- Evaluate and update the evacuation routes, assess the bridges for their capability to support fire apparatus ingress, and encourage rehabilitation/retrofit.

9.3.3 Structural Projects

Fire Resistant Roofs

Description

This alternative action will encourage new homes and major remodels to have fire resistant roofs.

Implementation

Encourage all new homes and major remodels involving roofs or additions that are located where wild land and urban interface occur to have fire resistant roofs and residential sprinkler systems.

9.3.4 Public Information

Outreach and Education

Description

This alternative action will enhance outreach and education programs aimed at mitigating fire hazards and reducing or preventing the exposure of residents, public agencies, private property owners, and businesses to natural hazards.

Implementation

- Hire fire prevention and educational personnel to conduct and oversee educational programs
- Encourage residents to visit the District fourteen (14) Fire Warden, serving South Middlesex and Suffolk Counties and based at the Hopkinton State Park office in Hopkinton, MA
- Fire Stations to hold open houses and allow the public to visit, see equipment, and discuss wildfire mitigation with the station crew.

9.4 Geologic Hazards

9.4.1 Prevention

Seismic Strength Evaluations

Description

This alternative action will encourage seismic strength evaluations of critical facilities to identify vulnerabilities for mitigation of schools and universities, public infrastructures, and other critical facilities to meet current seismic standards.

Implementation

- Develop an inventory of schools, universities, public buildings and critical facilities that do not meet current seismic standards

- Evaluate the seismic strength of the high risk dams and develop plans to upgrade them to meet seismic standards

Revise Planning/Zoning and Building Codes

Description

This action will ensure that new buildings and structures will provide adequate seismic resistance.

Implementation

- Develop planning and zoning bylaws that require siting critical facilities away from seismic fault lines
- Adopt planning and zoning bylaws that require keeping new structures away from areas below steep slopes or soils subject to liquefaction
- Enforce Building Codes to prohibit loose masonry, overhangs, and similar building features that could be easily impacted during a seismic event.

9.4.2 Emergency Services

Emergency services include hazard recognition, emergency warning systems, emergency response, protection of critical facilities, and health and safety maintenance.

Emergency Response Plans

Description

This alternative action will minimize the losses that will occur in an event of a geologic hazard.

Implementation

- Have earthquake response plans in place that account for secondary problems such as fires and hazardous materials spills
- Evaluate and retrofit emergency shelters to be earthquake-resistant

Evacuation Routes

Description

This alternative action will encourage the development of earthquake evacuation routes and ensure that they are incorporated into the appropriate planning documents.

Implementation

- Develop/update the evacuation routes from the seismic fault line areas
- Integrate the evacuation routes data into the Emergency Management Plan

9.4.3 Structural Projects

Slope Stabilization

Description

This alternative action will identify areas with slopes that are vulnerable to failures during an earthquake and provide reinforcement.

Implementation

- Assess slopes that are potentially vulnerable to failures
- Provide slope stabilization to areas that are identified as vulnerable to failures.

9.4.4 Public Information

Reduction of nonstructural and structural earthquake hazards

Description

This alternative action will encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices.

Implementation

- Assess slopes that are potentially vulnerable to failure.

- Provide information to government building and school facility managers and teachers on securing bookcases, filing cabinets, light fixtures, and other objects that can cause injuries and block exits
- Encourage facility managers, business owners, and teachers to refer to FEMA's practical guidebook: "Reducing the Risks of Nonstructural Earthquake Damage"
- Encourage homeowners and renters to use "Is your Home Protected from Earthquake Disaster? A Homeowner's Guide to Earthquake Retrofit" for economical and efficient mitigation techniques.

9.4.5 Property Protection

Property Acquisition and Retrofit

Description

This alternative action will minimize the loss in case of occurrence of a geologic hazard.

Implementation

- Acquire and clear property located in high hazard areas
- Retrofit structures to add braces, remove overhangs, provide flexible utility connections and tie downs
- Encourage real estate disclosures and earthquake insurance riders.

9.5 Winter Storm Related Hazards

9.5.1 Prevention

Enhanced Weather Monitoring

Description

This alternative action will enhance weather monitoring to attain earlier severe winter storm warnings.

Implementation

- Improve capability to monitor weather forecasts, conditions and warnings issued by the National Weather Service
- Evaluate the need for more weather stations and services and/or weather instrumentation.

Maintenance and Mitigation Activities

Description

This alternative action will recommend developing and implementing programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.

Implementation

- Partner with agencies such as FEMA and MEMA to design and implement programs that reduce the risk to life, property and utility systems
- Develop partnerships with utility providers and DPW to document known hazards.

9.5.2 Emergency Services

Maintenance and Readiness

Description

This action will ensure that the emergency services are available during severe winter storms.

Implementation

- Update and maintain plans for managing all winter storm emergency response activities
- Maintain snow removal equipment and adequate supplies of de-icing materials ready for deployment
- Identify appropriate shelters for people who may need to evacuate due to loss of electricity and heat and make their locations known to the public
- Assure that critical facilities such as police and fire stations and schools are accessible and well-equipped
- Obtain equipment needed to quickly clear roadways of snow to assure the passage of public safety vehicles and general traffic
- Ensure that warning/notification and communication systems are in readiness

- Ensure roofs on public buildings and critical facilities are cleared of excessive snow accumulation.

9.5.3 Structural Projects

Relocate Utilities Underground

Description

This alternative action will identify areas impacted severely due to winter storms and recommend relocation of utilities underground.

Implementation

Develop partnerships with utility providers to relocate overhead utilities underground to minimize disruption of services, especially power.

9.5.4 Public Information

Public Awareness

Description

This action will increase the public awareness of severe winter storm mitigation activities.

Implementation

- Collect public education materials about protecting life, property and the environment from severe winter storm events
- Distribute educational materials to residents and public and private sector organizations regarding evacuation routes during road closures
- Target the vulnerable populace for disseminating preparedness information.

9.5.5 Property Protection

Retrofit Public Buildings and Critical Structures

Description

This alternative action will require evaluation of public buildings and critical facilities to withstand snowloads and retrofit.

Implementation

- Evaluate capability of public buildings and critical facilities to withstand snow loads
- Retrofit public buildings and critical facilities to withstand excessive snow loads.

10.0 Analysis of Mitigation Projects

An analysis of the proposed mitigation projects identified in Section 9 has been completed and is summarized below in Tables 10.1 through 10.5.

TABLE 10.1. EVALUATION OF FLOOD RELATED HAZARDS MITIGATION ALTERNATIVES

STRUCTURAL PROJECTS ALTERNATIVE	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Accept-able	Legal	Economically Sound	Environment-ally Sound	Cost
Analyze repetitive flood loss structures	●	●	●	●	●	●	●	Low
Master Drainage Plan	●	●	●	●	●	●	●	Moderate
Development with respect to flood elevations	○	●	●	○	○	●	●	High

Track depth of Sudbury River	●	●	○	○	○	●	●	Low
Dam /levee maintenance	●	●	●	●	●	●	●	Moderate
Increase flood storage capacity	●	●	●	●	●	●	●	Moderate
Maintenance and readiness	●	●	●	●	●	●	●	Moderate
Evaluation of drainage system	●	●	●	●	●	●	●	Moderate
Public education and awareness	●	●	●	●	●	●	●	Low
Land acquisitions	●	●	●	○	○	○	●	High
Flood damage reduction	●	●	●	●	●	●	●	Moderate

● = Acceptable ○ = Somewhat Acceptable

TABLE 10.2 EVALUATION OF WIND RELATED HAZARDS MITIGATION ALTERNATIVES

STRUCTURAL PROJECTS ALTERNATIVE	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Accept-able	Legal	Economically Sound	Environment-ally Sound	Cost
Building Codes	●	●	●	●	●	●	●	Low
Maintenance	●	●	●	●	●	●	●	Moderate
Maintenance and readiness	●	●	○	●	●	●	●	Moderate
Underground electrical utilities	●	●	●	●	●	●	●	Low
Public awareness	●	●	●	●	●	●	●	Low
Retrofit public buildings and critical structures	●	●	●	○	●	●	●	High

● = Acceptable ○ = Somewhat Acceptable

TABLE 10.3 EVALUATION OF FIRE RELATED HAZARDS MITIGATION ALTERNATIVES

STRUCTURAL PROJECTS ALTERNATIVE	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Accept-able	Legal	Economically Sound	Environment-ally Sound	Cost
Coordination between residents and Fire Department	●	●	○	●	●	●	●	Low
Maintenance and readiness	●	●	●	●	●	●	●	Moderate
Firer-resistant roofs	●	●	●	●	○	●	●	Moderate
Outreach and education	●	●	●	●	●	●	●	Low

● = Acceptable ○ = Somewhat Acceptable

TABLE 10.4 EVALUATION OF GEOLOGIC RELATED HAZARDS MITIGATION ALTERNATIVES								
STRUCTURAL PROJECTS ALTERNATIVE	**Socially Acceptable**	**Technically Feasible**	**Administratively Possible**	**Politically Accept-able**	**Leg al**	**Economically Sound**	**Environment-ally Sound**	**Cost**
Seismic Strength Evaluations	●	●	●	●	●	●	●	Moderate
Revise Planning/Zoning Building Codes	●	●	●	●	●	●	●	Low
Emergency Response Plans	●	●	●	●	●	●	●	Low
Evacuation Routes	●	●	●	●	●	●	●	Low
Slope Stabilization	●	●	●	○	○	●	●	Moderate
Reduction of nonstructural and structural earthquake hazards	●	●	●	●	●	●	●	Moderate
Property Acquisition and Retrofit	●	●	●	○	○	●	●	High

● = Acceptable ○ = Somewhat Acceptable

TABLE 10.5 EVALUATION OF WINTER STORM RELATED HAZARDS MITIGATION ALTERNATIVES								
STRUCTURAL PROJECTS ALTERNATIVE	**Socially Acceptable**	**Technically Feasible**	**Administratively Possible**	**Politically Accept-able**	**Legal**	**Economically Sound**	**Environment-ally Sound**	**Cost**
Enhanced Weather Monitoring	●	●	●	●	●	●	●	Low
Maintenance and Mitigation Activities	●	●	●	●	●	●	●	Moderate
Maintenance and Readiness	●	●	●	●	●	●	●	Moderate
Relocate Utilities Underground	●	●	●	●	○	●	●	High
Public Awareness	●	●	●	●	●	●	●	Low
Retrofit Public Buildings and Critical Structures	●	●	○	●	●	●	●	High

● = Acceptable ○ = Somewhat Acceptable

11.0 Prioritization of Mitigation Projects

Prioritization of the proposed mitigation projects outlined in Section 9 was challenging. The process used by the CPT for prioritizing projects is included in Section 11.1, and the agreed upon priorities are detailed in Section 11.2.

In recognition of the extensive work undertaken by the CPT in developing the projects and their relative priorities, the Multiple Hazard Mitigation Plan Working Group worked hard and will continue to work hard to implement the projects consistent with the numerical ratings assigned by the CPT. The Working Group maintains that the priorities for projects that have not yet been implemented are still relevant. Information is provided below relative to the status of projects that have been implemented and are in the process of being implemented.

11.1 Prioritization Process

The CPT developed and carried out a process to prioritize the mitigation projects outlined in Section 9, which in general consisted of assessing the analysis of proposed mitigation measures in Section 10 conducted by the Town's consultant, reviewing all public input, and interviewing Town personnel. However, even after implementing this prioritization process, the CPT found it difficult to eliminate potential projects listed in Section 9 from continued consideration. For that reason the Planning and Economic Development Division developed a method of numerically rating the potential mitigation projects. Table 11.1 provides a list of the potential natural hazard mitigation projects that six CPT members individually rated in order to assist with the Town's hazard mitigation prioritization process.

The Multiple Hazard Mitigation Plan Working Group is charged with the responsibility of overseeing the implementation of mitigation projects on behalf of the Town. In designating the membership of the Working Group, the Board of Selectmen expressly selected dedicated and knowledgeable citizens as well as representatives of the municipal departments that are typically involved in hazard mitigation. Specifically, the municipal personnel assigned to the Working Group includes the Town's Senior Stormwater and Environmental Engineer with the Department of Public Works, an Assistant Fire Chief, a Deputy Police Chief, and the Director of Community and Economic Development. In addition, one of the citizen members serves on the Town's Conservation Commission. Accordingly, while the Working Group oversees all action items, specific members, in their capacity as Town employees, serve as links between the Working Group and their respective municipal departments. This interrelationship has been very effective and resulted in the complete or ongoing implementation of several mitigation projects. The Working Group will continue to oversee the implementation of the Plan, while specific departments will assume actual responsibility for undertaking and funding the work. This has been an extraordinarily successful collaboration that has resulted in a viable, effective and dynamic plan.

Table 11.1 Numerical Rating of Potential Mitigation Projects

Prioritization of Mitigation Projects				
Suggested Natural Hazard Mitigation Project, Program, or Strategy	**Rating:**	**Funding/ Resource**	**Responsible Department**	**Time Frame (years)**
Listed below are mitigation projects that have been identified by the Town. Rankings are from 0 to 5 (low to high).	Average	TBD (all)	TBD (all)	
Analyze Structures Impacted by Hazards				
Identify appropriate and feasible mitigation activities for identified repetitive flood properties	4.20			Ongoing
Contact repetitive loss property owners to discuss mitigation opportunities, and determine interest should future project opportunities arise	3.70			Ongoing
Explore options for incentives to encourage property owners to engage in mitigation.	3.80			Ongoing
Master Drainage Plan				
The Master Drainage Plan should take a watershed-based approach and should include the following items:				
Aerial survey or GIS base maps of the Town with the storm water drainage system delineated	3.40			Done
A description and review of the Town's existing drainage system for each watershed. This would include hydraulic analyses to determine the capacities of each system	4.00			1 - 5
A description and analysis of the hydrologic condition of the Town and how future developments may impact drainage systems, streams and wetlands in each watershed	3.67			1 – 5
A review of the Town's regulations as they pertain to or	3.40			Ongoing

affect drainage issues				
Recommendations for the development of drainage facilities within the Town for each watershed	4.00			5 – 10
Develop a plan for each watershed for the implementation of specific recommendations to upgrade existing drainage systems and provide for adequate operation and maintenance procedures.	4.50			5 - 10
Development with respect to Flood Elevations				
Explore raising the base elevation requirement for new residential construction to two or three feet above base flood elevation, or greater. An increased elevation standard in one activity the town can engage to receive credit from the NFIP Community Rating System Program (CRS)	3.67			Ongoing
Identify opportunities to upgrade the Federal Insurance Rate Map	3.08			Ongoing
Eliminate or reduce the amount of "Grandfathering" allowed under existing regulations.	2.75			Ongoing
(Re)Development of Vulnerable Properties				
Incorporate information from the Plan relative to vulnerability of existing buildings, infrastructure and critical facilities located in identified hazard areas into the Town's development review and planning processes	TBD			ongoing
Incorporate information from the Plan relative to vulnerability of potential development or redevelopment in hazard areas described in Section 5 into the Town's development review and planning processes.	TBD			ongoing
Monitor land use and development trends to determine consistency with the Plan. Identify methods to redirect or modify development to insure consistency with Plan, to the maximum extent possible.	TBD			ongoing
Develop a system to estimate potential dollar losses to vulnerable structures	TBD			
Track Depth of Sudbury River				
Evaluate the location of existing stream gauges located along the Sudbury River. Contact the United States Geological Survey to install a simplified stream gauge that would provide real time stream gauge to enable accurate predictions of imminent flooding.	3.50			1 - 5
Evaluation of Drainage System				
Prepare and update an inventory of culverts that historically create flooding problems. Identify and prioritize candidate culverts for replacement	4.67			5 – 10
Institute regular maintenance program for culverts in problem areas	4.83			Ongoing
Prepare and update an inventory of areas with drainage problems and conduct engineering studies in each of the areas to identify causes and develop potential mitigation actions	4.67			1 – 5
Prepare and update an inventory of open channels that require dredging or other significant maintenance and identify a plan for operations and maintenance of these channels that incorporates required permitting, such as from the Conservation Commission, the DEP, and the U.S. Army Corps of Engineers.	4.90			1 – 5
Flood Damage Reduction				
Public Works and Utilities:				
Obtain whatever equipment is required to lessen impacts during flooding events	3.42			Ongoing

Install backflow preventers at the end of storm drain outfalls to stop the water from the Sudbury River from reversing flow	3.17			Done
Evaluate the sewerage pumping stations that are located in the frequent flooding areas and elevate them beyond the flood elevations.	4.50			Ongoing
Protect or elevate ground-mounted transformers	2.92			Ongoing
Elevate vulnerable equipment, electrical controls and other equipment at wastewater treatment plants, potable water treatment plants and pump stations	3.00			Ongoing
For sewer lines in the floodplain, fasten and seal manhole covers to prevent floodwater infiltration	3.80			Ongoing
Replace low bridges or other obstructions that may induce flooding of houses or businesses.	3.70			Ongoing
Move building contents to a higher floor or store outside of floodplain	1.50			Ongoing
The Department of Public Works has sandbags in storage that can be borrowed for use by Framingham residents and businesses.	2.92			Ongoing
Store important documents and irreplaceable personal objects where they will not get damaged	0.80			Ongoing
Elevate or relocate furnaces, hot water heaters and electrical panels	3.40			Ongoing
Provide openings in foundation walls that allow flood waters to move, thus avoiding collapse of walls incapable of resisting hydrostatic pressure	2.00			Ongoing
Build and install flood shields for doors and openings (after evaluating whether the building can handle the forces) to prevent floodwater from entering	3.20			Ongoing
Buy and install sump pumps with back-up power.	2.80			Ongoing
Businesses:				
Store important documents, such as insurance papers, where they will not get damaged	1.00			Ongoing
Elevate or relocate furnaces, hot water heaters, electrical panels and other equipment	3.80			Ongoing
Provide openings in foundation walls that allow food waters to move, thus avoiding collapse of walls incapable of resisting hydrostatic pressure	2.00			Ongoing
Build and install flood shields for doors and other openings (after evaluating whether the building can handle the forces) to prevent the floodwater from entering	3.20			Ongoing
For drains, toilets and other sewer connections, install backwater valves or plugs	3.60			Ongoing
Identify stored hazardous materials or other chemicals which should be relocated or elevated, in the case of flooding.	4.20			Ongoing
Public Education and Outreach				
Collect information on public educational materials for protecting life, property and the environment from flooding events	3.17			Ongoing
Disseminate emergency public information and instructions concerning flood preparedness and safety including dam hazards	3.50			Ongoing
Obtain/maintain records of flooding incidents in local neighborhoods	3.33			Ongoing
Make a presentation of this plan to the Board of Selectmen	2.00			Done
Provide public information about floods prevention, insurance, preservation of wetlands, etc. as inserts included in the utility bills	3.25			Ongoing

Institute system of warnings and fines for landscapers found to be dumping grass clippings, leaves and yard wastes in wetlands and flood plains	3.50			Ongoing
Hiring of fire prevention and educational personnel to conduct and oversee educational programs	2.42			Ongoing
Visit neighborhoods located in the high risk areas to conduct education and outreach activities	2.42			Ongoing
Fire Station to hold open houses and allow the public to visit, see the equipment, and discuss wildfire mitigation with the station crew.	2.42			Ongoing
Maintenance and Readiness				
Develop adequate warning/notification systems in the areas prone to flooding to notify of imminent flooding. This could be expanded to include areas located downstream from high hazard dams	3.50			Done
Identify appropriate shelters for people who may need to evacuate due to loss of electricity and heat and make their locations known to public	2.33			Done
Assure that critical facilities such as police and fire station and schools are accessible and equipped	2.33			Done
Clearing streets and roads of fallen trees to assure the passage of public safety vehicles and general traffic	2.67			Ongoing
Distribute educational materials to the residents and public and private sector organizations regarding preparedness for no power situations	2.75			Ongoing
Disseminate education information to property owners to reduce risk from tree failure to life, property and utility systems	2.67			Ongoing
Identify potentially hazardous trees in critical areas	2.50			Ongoing
Increase staff to assist tree warden to identify and remove hazardous trees	2.50			Ongoing
Maintain snow removal equipment and adequate supplies of deicing materials ready for deployment	3.33			Ongoing
Update and maintain plans for managing emergency response activities due to flooding including addressing potentially hazardous dams	4.00			Ongoing
Emergency management and other local government agencies should familiarize themselves with technical data and other information pertinent to the dams which impact Framingham. This should include determining the probable extent and seriousness of the effect of failures on downstream areas	4.00			Ongoing
Determine minimum notification time for areas downstream from the dams.	3.40			1 – 5
Underground Electrical Utilities				
Increase the use of underground utilities where possible	2.25			Ongoing
Develop partnerships with utility providers to relocate overhead utilities underground to minimize disruption of services, especially power.	2.92			Ongoing
Coordination between Residents and Fire Department				
Encourage single-family residences to have fire plans and practice evacuation routes	2.50			Ongoing
Encourage fire inspections in residential homes by fire departments to increase awareness among homeowners and fire responders	2.20			Ongoing
Require fire department notification of new business applications to ensure that appropriate fire plans have been developed	2.40			Ongoing
Encourage the Building and Wire, Planning and Economic Development, and Engineering departments to work closely with landowners and/or developers to identify and	2.80			Ongoing

mitigate conditions that aggravate wildfires, including:				
Limited access for emergency equipment due to width and grade of roadways;	2.80			Ongoing
Inadequate water supplies and the spacing, consistency and species of vegetation around structures	2.70			Ongoing
Inadequate fuel breaks, or lack of defensible space	2.80			Ongoing
Highly flammable construction materials	2.70			Ongoing
Building lots and subdivisions that are not in compliance with the state and town land use and fire protection regulations, and	2.60			Ongoing
Inadequate entry/escape routes.	2.90			Ongoing
Encourage the public to evaluate access routes to remote areas for fire-fighting vehicles and to develop passable routes if they do not exist	3.00			Ongoing
Clear trimmings, trees, brush, and other debris completely from sites when performing routine maintenance and landscaping to reduce fire risk.	2.80			Ongoing
Revise Planning/Zoning and Building Codes				
Planning/Zoning to keep critical facilities away from seismic fault lines	1.83			Ongoing
Planning, zoning and building codes to avoid areas below steep slopes or soils subject to liquefaction	3.00			Ongoing
Building Codes to prohibit loose masonry, overhangs, etc.	2.17			Ongoing
Evaluate current building codes and revise to enhance structural resistance to high winds	2.33			Ongoing
Allow new construction in areas that are not vulnerable to direct wind effects.	1.17			Ongoing
Enhanced Weather Monitoring				
Improve capability to monitor weather forecasts, conditions and warnings issued by the National Weather Service	1.83			Ongoing
Evaluate the need for more weather stations/services and/or weather instrumentation	1.67			Ongoing
Retrofit Public Buildings and Critical Structures				
Evaluating and retrofitting public buildings and critical facilities to withstand snow loads	2.00			Ongoing
Clearing roofs of excessive snow accumulations	3.33			Ongoing
Evaluating and retrofitting public buildings and critical facilities to withstand high winds.	3.00			Ongoing

TBD = To Be Determined

CPT members numerically rated the proposed mitigation projects 0 through 5. Giving a project a rating of 0 meant without any doubt the CPT member believed it should be removed from the list of mitigation projects. Giving a rating of 5 meant the CPT member believed the proposed mitigation project definitely should be one of the Town's 10 highest priority projects. The Planning and Economic Development Division compiled input from other CPT members. Average ratings are shown above. Average ratings of 4 or over were given higher consideration than those with lower ratings.

The process of numerically rating the potential mitigation measures in Section 9 spurred dialogue at a May 2, 2005 CPT Meeting resulting in a fairly rapid thinning of projects. In addition to numerical ratings, several CPT members provided written comment including the reasons for their rating. As a result, some measures that received high ratings in Section 11.1 are not listed in Section 11.2 as priorities. Some of the potential mitigation projects were actually disaster response and recovery activities. Others were private owner issues, which the majority of CPT members believed should not be the responsibility of the Town, or could be handled with a public education approach. Other potential mitigation measures were already being done by a specific Town department or agency (e.g., Fire Department, DPW). The priority mitigation

projects focus on preparing Town infrastructure for flooding and to a smaller extent winter storms. In addition, education and outreach regarding mitigation of all natural hazards are a priority.

11.2 Priority Mitigation Projects

Listed below are the mitigation projects that have been identified as priorities for implementation by the Town. The Town has attempted to develop priority projects and actions that meet the plan goals mentioned in Section 8 of this plan; projects and required actions fall into the categories of regulatory and administrative, education and outreach, planning, and structural and capital Improvements.

11.2.1 General Natural Hazard Mitigation Action Items

- Integrate the priority mitigation measures outlined in this section into the Town's comprehensive plans, Capital Improvement Program, and Building Codes as appropriate.
- Identify and pursue funding opportunities to plan and implement mitigation measures
- Maintain accurate records of flooding incidents in local neighborhoods.
- Pursue development of a system of warnings and fines for property owners found to be dumping grass clippings, leaves and yard wastes in wetlands and flood plains.

11.2.2 Master Drainage Plan

By far the most important natural hazard issue facing the Town is its stormwater drainage system. The system is frequently overwhelmed by flood events much less severe than a 100 year event.

A preliminary stormwater drainage plan was completed in July 2003 by the Town with the assistance of an engineering consultant. The location of culverts and additional storm drainage system components were mapped, and several problem areas were identified. More detailed assessments of four of these problem areas were begun, but additional assessment and engineering is still required.

The Town of Framingham's top priority is completion of a Master Stormwater Drainage Plan that takes a watershed-based approach and includes:

- A detailed survey and mapping of the town with the storm water drainage system delineated
- A description and review of the Town's existing drainage system for each watershed. This includes hydraulic analyses to determine the capacities of each system.
- A description and analysis of the hydrologic condition of the Town and how future developments may impact drainage systems, streams and wetlands in each watershed
- A review of the Town's regulations as they pertain to or affect drainage issues
- Recommendations for the development or reconstruction of drainage facilities for each watershed.

While evaluating the Town's stormwater drainage system, the Town will do the following:

- Prepare an inventory of culverts that historically create flooding problems. Identify and prioritize candidate culverts for replacement.
- Prepare an inventory of areas with drainage problems and conduct engineering studies in each of the areas to identify causes, and develop potential mitigation actions
- Assess the potential use of backflow preventers at the end of storm drain outfalls to stop the water of the Sudbury River from reversing flow and flooding low lying neighborhoods.

The first phase of the evaluation of the work described above is complete for the two top priority sub-basins (Beaver Dam Brook and Farm Pond), and the Town currently has a contract with engineering consultants to perform the second phase of the work (Jacobs Brook, Sucker Pond, Angelica Brook, Cochituate Brook, and Lokerville drainage sub-basins). The Phase II Master Plan is expected to be completed in the summer of 2011 and will expand on the capital improvements plan from the Phase I evaluation with priority projects. Additional study for the remaining 17 sub-basins will be required, but the seven sub-basins that received first priority comprise more than half of Framingham's drainage problems, and the Town is well on its way toward identifying priority storm drainage construction projects.

Framingham's Engineering Department will seek funds to complete the Stormwater Master Plan. Work will hopefully be ongoing and be completed by the end of the 2014 State fiscal year.

Once the Town's Stormwater Master Plan is complete and a list of priority stormwater drainage system improvement projects are identified, the Town will likely update Section 11 of the MHMP to include a detailed list of priority engineering and construction projects.

The Engineering Department is also developing a white paper to document the flooding in the priority areas town-wide, understand the major causes of flooding, and identify potential solutions to mitigate flooding.

11.2.3 Stormwater Drainage System Improvements

After the Town's master stormwater plan is complete, the Engineering Department will contract with an engineering consultant to engineer/design a list of priority stormwater system improvement projects. Once the list of priority projects has been engineered/designed, the Engineering Department will begin engineering/designing lesser priority projects. The Town expects to be engineering/designing stormwater projects for at least the next five fiscal years. Projects will be engineered/designed one or two at a time (or all projects in a specific watershed at the same time) and as soon as they are completed, the Town will request bids from construction contractors for individual projects or groupings of drainage improvement construction projects. The cost of improving the Town's stormwater system will be substantial, but realistic estimates are not available at this time.

11.2.4 Stormwater Drainage System Maintenance

The Town's Department of Public Works, with assistance from the Engineering Department, will develop an operation and maintenance procedures plan for the stormwater system within each drainage sub-basin in the Sudbury River Watershed. DPW will then institute a regular maintenance program for culverts and storm drains throughout town. Problem locations will be maintained more frequently based on funding availability. The Town will need to purchase additional maintenance equipment or hire contractors able to do the required work.

11.2.5 Municipal Flood Damage Reduction Projects

- Obtain whatever equipment is required to lessen impacts during flooding events. These items include large portable pumps and generators.
- Evaluate all Town-owned equipment and elevate it above a height that flood waters would likely reach (e.g., ground-mounted transformers, electrical controls, and other vulnerable equipment).

11.2.6 Sudbury River Flood Warning Project

Develop adequate warning/notification systems in the areas prone to flooding to notify of imminent flooding. This may be expanded to include areas located downstream from high hazard dams. The Town has evaluated locations of stream gauges located along the Sudbury River, Beaver Dam Brook, Hop Brook, and Dunsdell Brook. The Town installed simplified stream gauges that show the depth of the river in real time to enable accurate predictions of imminent flooding, and has begun a project to install automated stream gauges in 5 locations along these water courses, to allow for constant monitoring during storm events.

11.2.7 Floodplain Development with Respect to Flood Elevations

The Working Group will explore raising the base elevation requirement for new residential construction to two or three feet above base flood elevation, or greater. An increased elevation standard is eligible for credit from the NFIP Community Rating System Program.

11.2.8 Analyze Repetitive Flood Loss Structures

The Town will contact repetitive loss property owners to discuss mitigation opportunities, and determine interest should project opportunities arise. The Working Group will communicate with the Conservation Commission and MEMA regarding identification of appropriate and feasible mitigation activities for identified repetitive flood properties, and explore incentives to encourage property owners to engage in mitigation.

11.2.9 Public Education and Outreach

The Town of Framingham will continue to develop, enhance, and implement public education and outreach programs aimed at mitigating natural hazards and reducing the risk to citizens, private properties, businesses, and municipal buildings. Many of the educational activities will be, and some already are, regular activities. Others will be one-time educational or public outreach projects. Where resources and programs already exist, the Town will distribute educational materials and/or work with other organizations already providing the appropriate programs.

One of the Working Group's most successful public outreach initiatives was the Flood Facts brochure, a copy of which is attached as Appendix C. The brochure was included in the real property tax bills in the fall of 2009, and remains available in the Board of Selectmen's office. The Working Group will periodically update the booklet, if necessary, seek funds for reprinting and do a second mass mailing.

Town personnel in conjunction with the Multiple Hazard Mitigation Plan Working Group will continue to implement the following hazard mitigation educational actions:

- Develop new natural hazard mitigation educational materials as needed
- Collect existing natural hazard mitigation educational materials (e.g., FEMA brochures)
- Distribute flood hazard mitigation educational materials to residential and commercial property owners within flood prone areas
- Distribute fire hazard mitigation educational materials to residential and commercial property owners within heavily wooded areas
- Distribute wind and winter storm hazard mitigation educational materials to residential property owners
- Visit neighborhoods located in food and fire high risk areas to conduct education and outreach activities
- Fire Station personnel will hold open houses and allow the public to visit, see the equipment, and discuss fire mitigation with the station crew
- Encourage the Building, Fire, and Engineering Departments to work closely with new developers to identify and mitigate conditions that aggravate brushfires
- Distribute educational materials to the residents and public and private sector organizations regarding preparedness for no power situations.

Flood hazard educational materials distributed will include information regarding the following issues:

- Elevating or relocation of furnaces, hot water heaters, electrical panels and other equipment
- Building and installing flood shields for doors and openings to prevent floodwater from entering
- Installation of sump pumps with back-up power
- Installation of backwater valves or plugs, for drains, toilets and other sewer connections
- Identification and relocation of stored hazardous materials or other chemicals
- Emergency public information and instructions concerning flood preparedness and safety including dam hazards.

Fire hazard educational materials distributed will include information regarding the following issues:

- Spacing, consistency and species of vegetation around structures
- Inadequate fuel breaks, or lack of defensible space
- Highly flammable construction materials and proper disposal
- Maintaining appropriate access and egress to wild land areas ensuring all trees, brush, and other debris are removed completely from sites when performing routine maintenance and landscaping to reduce fire risk.

11.2.10 Integrate Multiple Hazard Mitigation Plan into Town's Development Review and Inter-departmental Planning Processes

Under the direction of the Town Manager, Town officials and personnel consistently engage in a team approach to projects. The Town of Framingham has several standing working groups consisting of Town personnel involved in both private development and public infrastructure activities. Specifically:

a. The Planning Board, which is responsible for reviewing most requests for Special Permits or Site Plan Approval from private developers, has established standard operating procedures for review of proposals. Those procedures include a formal meeting of representatives of departments that are directly or indirectly involved in any private development: Engineering/Public Works, Building, Police,

Fire Community and Economic Development and Health Departments together with the Conservation Commission, Disabilities Commission, and Board of Health. Representatives of these boards and departments (some of whom also serve on the Multiple Hazard Mitigation Plan Working Group) review plan submissions and meet to discuss the potential implications of a proposed development. The Departments typically also submit written comments for the Planning Board's consideration during its deliberations.

b. Further, the Building Commissioner convenes a bi-monthly "Infrastructure" meeting to discuss issues of concern to the Building, Community and Economic Development, Police, Fire, Health and Engineering/DPW Departments as well as the Conservation Commission, Zoning Board of Appeals and Planning Board. Again, several of these representatives also serve on the Working Group. The Infrastructure meetings are designed to provide a forum for Town professionals to share ideas from various departments involved in the public and private development and redevelopment of the community.

Therefore, there are at least two established mechanisms that encourage a collaborative approach to development, thereby insuring that the concerns and activities of all departments are shared. Given the deliberately designed linkages between the Multiple Hazard Mitigation Plan Working Group and these review committees, there is a well-established and effective framework for insuring that the priorities and action items identified in the Multiple Hazard Mitigation Plan Update are incorporated into the ongoing planning processes undertaken by the Town of Framingham.

11.3 Project Status

Table 11.2 provides a list of the projects described in Section 11.2, along with the status and action taken as of the publication of this Plan Update. The Multiple Hazard Mitigation Plan Working Group constantly reviews this list to determine the status of the projects and what actions can be taken to encourage progress. In addition, the Working Group is amendable to adding priorities on an as-needed basis.

Table 11.2 Priority Mitigation Projects

Action or Project	Status
11.3.1 General Hazard Mitigation Action Items	
Integrate priority mitigation measures into comprehensive plans, Capital Improvement Program, and various codes.	In Progress: Stormwater management has been integrated into Planning Board, Conservation Commission, and Engineering codes, regulations and policies.
Identify and pursue funding opportunities to plan and implement mitigation measures.	See items 11.2.2, 11.2.4, 11.2.5
Maintain accurate records of flooding incidents in local neighborhoods.	In Progress a. Documented July 7, 2009 flood (3-hour 100-year storm), affecting residences in the Angelica Brook, Baiting Brook, Dunsdell Brook and Hop Brook areas of town. Developed draft plan for future mitigation actions, some measure of which are planned for implementation in 2010. b. Included a public service message in the fall 2009 tax bill about flooding and steps residents can take to mitigate flood impacts. (Please See Appendix D.) Consider pursuing combined log including Fire, Police, and Highway for recording flooding events to be used for long-term planning and funding for mitigation.
Develop system of warnings and fines for property owners found to be dumping grass	In Progress - The Conservation Commission already has jurisdiction and regulations for this in wetlands. The Town has

Table 11.2 Priority Mitigation Projects

Action or Project	Status
clippings, leaves and yard wastes in wetlands and flood plains.	enacted an illicit discharge bylaw and accompanying regulations for the Town's drainage system. Together, these cover almost all the required areas. The only remaining problems are dumping where the perpetrator cannot be determined.
11.3.2 Master Drainage Plan	Renamed to Stormwater Master Plan (SWMP)
Completion of a Master Stormwater Drainage Plan	
Seek funding to complete the Master Stormwater Drainage Plan.	In Progress – SWMP Phase completed October 2008 for Beaver Dam Brook and Farm Pond sub-basins. Phase II is currently being developed for 5 additional sub-basins (of a total of 22): Lokerville, Angelica Brook, Jacobs Brook, Cochituate, and Sucker Brook. Together, these comprise about 70% of the town's major drainage problems.
Detailed survey and mapping of the town with the storm water drainage system delineated.	See SWMP discussion above.
Hydraulic analyses to determine the capacities of each system.	See SWMP discussion above.
Analysis of the hydrologic condition of the town.	See SWMP discussion above.
Review of the Town's regulations.	See SWMP discussion above.
Recommendations for the development or reconstruction of drainage facilities.	See SWMP discussion above.
Prepare an inventory of culverts that historically create flooding problems.	See SWMP discussion above.
Identify and prioritize candidate culverts for replacement.	See SWMP discussion above.
Conduct engineering studies in each area to identify causes, and develop mitigation actions.	See SWMP discussion above.
Assess use of backflow preventers to stop water from Sudbury River from reversing flow and flooding low lying neighborhoods.	See SWMP discussion above. Flood prevention in known flooding areas needs to be a top priority.
Update Section 11 to include detailed list of priority engineering and construction projects.	See SWMP discussion above.
11.3.3 Stormwater Drainage System Improvements	
Engineer/design a short list of priority stormwater drainage system improvement projects	See SWMP discussion above. Obtained funding via Annual Town Meeting warrant article for drain system improvements at McAdams Rd. (Dunsdell Brook) and Carter Dr. (rehabilitation of an outfall endangering nearby residences).
Obtain funding for short list of priority projects.	See SWMP discussion above.
11.3.4 Stormwater Drainage System Maintenance	
Develop an operation and maintenance procedures plan for the Stormwater Drainage System within each watershed	Completed: A Stormwater Management Plan was developed in 2009 to address operations and maintenance of the Town's stormwater system, including the Saxonville Levee. The document is updated as needed.

Table 11.2 Priority Mitigation Projects

Action or Project	Status
Institute a regular maintenance program for culverts and storm drains throughout the Town	Completed: Catch basin cleaning is now done at least bi-annually (more frequently in problem areas). Streets are swept on the following basis: • Downtown areas: nightly • Arterial / collector roads: once per month • All other roads: once per year
Obtain funding required for additional maintenance.	In Progress
Purchase additional maintenance equipment or hire contractors able to do the required maintenance.	In Progress
11.3.5 Municipal Flood Damage Reduction Projects	
Obtain equipment required to lessen impacts during flooding events. This was split into two objectives as follows.] a. Identify equipment required to lessen impacts during flooding events. b. Obtain funding and thereafter equipment required to lessen impacts during flooding events	In Progress: A 71-hp pump was purchased for use by DPW during major storm events in locations where pumping alleviates flooding, including a flood gate at Sherwin Ter. (Eames Brook) and Hemenway Rd. (Hop Brook). A pump support structure was constructed in 2009 at Sherwin Ter. to reduce risk of physical harm to DPW staff during emergency pumping operations. Purchase of a 2nd pump is under consideration. Three small portable pumps were purchased to provide backup support for smaller flooding situations. The Fire Department also purchased three 6-hp pumps for medium-sized jobs.
Evaluate Town-owned buildings above a height that flood waters would likely reach.	In Progress: The Callahan Senior Center may benefit from rehabilitation of a berm between the Center and the Sudbury River. This action is being evaluated.
Develop and implement plans to mitigate repetitive loss structures in Town	Completed: Design and install backflow preventers in 3 locations in Town. These include Main Street along Sucker Brook, Auburn Street and Auburn Street Extension along the Sudbury River. A FEMA grant was awarded for this project., of which approximately $11,000 was reimbursed to the Town. Two of the backflow preventers were installed. The third, at Sucker Brook, could not be installed due to regulations regarding compensatory flood storage as required by the state's Wetland Protection Act.
11.3.6 Sudbury River Flood Warning Project	
Develop adequate warning/notification systems	Completed: Connect CTY Program in place since 2007.
Evaluate the location of existing stream gauges.	Completed: Saxonville Levee Drain Pumping Station manual gauge and Saxonville Levee USGS automated gauge.
Install simplified stream gauges that would track the depth of the Sudbury River in real time	In Progress: Manual gauges have been placed at: • Beaver Dam Brook at the Second St. bridge • Sudbury River at the Route 9 bridge (Worcester Center pumping station) Note: the above gauges are planned to be automated (funding approved in 2009) along with automating the following: • Existing gauge at Saxonville Levee Drain Pumping Station • New gauge at Beaver Dam Brook near Bates Rd. (at CSX overpass) • New gauge at McAdams Rd. (Dunsdell Brook)

Table 11.2 Priority Mitigation Projects

Action or Project	Status
11.3.7 Floodplain Development with respect to Flood Elevations	
Explore raising the base elevation requirement for new residential construction	Completed – Zoning bylaw appears to deal with this issue relatively well, as tested recently in a Plan Review for the construction at South St.
11.3.8 Analyze Repetitive Flood Loss Structures	
Contact repetitive loss property owners to discuss mitigation opportunities	Will be dependent on resolution for 3rd item under 11.2.1
Communicate with Conservation Commission and MEMA regarding identification of mitigation activities for repetitive flood properties	Will be dependent on resolution for 3rd item under 11.2.1
Explore incentives to encourage property owners to engage in mitigation.	Not Started
11.3.9 Public Education and Outreach	
Assure educational activities are carried out each year	In Progress: 2008 Flood Facts Brochure produced, distributed to 3,000 floodplain properties
Develop, enhance, and implement public education and outreach programs	In Progress: -Information and links are on Town's website for the Police Dept. and DPW that contains this material.
Develop new natural hazard mitigation educational materials	See above (Flood Facts brochure 2008)
Collect existing natural hazard mitigation educational materials	Completed for flood information.
Distribute flood hazard mitigation educational materials to residential and commercial property owners within flood prone areas	Completed – Flood Facts brochure- 2008
Distribute fire hazard mitigation educational materials to residential and commercial property owners within heavily wooded areas	Completed - Information and links have been added to the Town's websites that have this material, and the Fire Dept. conducts several educational programs at the schools every year.
Distribute wind and winter storm hazard mitigation educational materials to residential property owners	Completed - Information and links have been added to the Town's website for the Police Dept. that contains this material.
Fire Station personnel will hold open houses and allow the public to visit, view equipment, and discuss fire mitigation	Completed - The Fire Dept. has implemented this as an ongoing program.
Encourage the Building, Fire, and Engineering Departments to work closely with new developers to identify and mitigate conditions that aggravate brushfires	Completed – Mitigation of public safety matters are conducted during the planning and permitting stages of projects.
Distribute educational materials to residents and public and private sector organizations re: preparedness for no power situations	Completed - Information and links have been added to the Town's website for the Police Dept. that contains this material.
11.3.10 Integrate Multiple Hazard Mitigation Plan into Town's Development Review and Inter-departmental Planning Processes.	Ongoing.

12.0 Appointment of Multiple Hazard Mitigation Plan Working Group

The Board of Selectmen appointed a Multiple Hazard Mitigation Plan Working Group in State FY 2006. The Working Group is responsible for ensuring the MHMP is an active and relevant document, and that the MHMP priorities are implemented in a timely manner. The Working Group consists of staff and officials from the following Town Departments: Police, Fire, Public Works, Conservation, and Community and Economic Development. In addition, at least one Framingham resident with interest in, or experience, with natural hazard mitigation has served on the Working Group since its inception. The Working Group regularly seeks input from other Town entities, including Board of Selectmen, Framingham' Emergency Management Agency, Planning Board, Board of Health, and Department of Building and Wire, as well as MEMA, DCR, and local businesses and residents.

The Working Group meets an average of six (6) times per year. In 2010, members include Alison Steinfeld (Community and Economic Development), Donna Nelson (citizen member), Sheila Lynch (citizen member), Sampath Bade (representative for the Conservation Commission and citizen member), Deputy Chief Steven Trask (Police Department), Assistant Chief John Magri (Fire Department), and Katherine Weeks, P.E. (Department of Public Works).

13.0 Plan Maintenance

Maintenance of the Town's Plan, including the Plan Update, includes a schedule for monitoring and evaluating the Plan on an ongoing basis and producing an update every five years. The Working Group reviews the goals, objectives and the priority projects to determine their relevance to changing situations in the town as well as changes in State or Federal policy and to make revisions as necessary. The Working Group also reviews and monitors the risk assessment portion of the Plan to determine if this information should be updated or modified, given any new available data. The Working Group will continue to monitor the progress on implementation of priority projects, difficulties that may be encountered, success of coordination efforts and strategies that may be developed or revised. Every five years the Plan Update will be submitted to the State Hazard Mitigation Officer and the Federal Emergency Management Agency for review.

The Working Group will continue to seek public input on the MHMP. Copies of the Plan will be catalogued and kept at the Public Libraries, Community and Economic Division, Department of Public Works, Conservation Department, and Police and Fire Departments. In addition, copies of the MHMP and any proposed changes will be posted on the Town's official website. The site will also include directions relative to how and to whom comments should be submitted.

Since all meetings of the Multiple Hazard Mitigation Plan Working Group are open to the public, the Working Group's ongoing reviews of the Plan are conducted in an open forum. At least one public hearing will be held every five years during each plan update process. The meetings and public hearings will provide the public a forum for which they can express concerns, opinions, or ideas about the MHMP. The Working Group will publicize all meetings and public hearings and, whenever possible, televise the meetings on public access television and streaming video.

14.0 Adoption of Multiple Hazard Mitigation Plan Update

The draft Multiple Hazard Mitigation Plan Update was approved by a vote of 4-0-0 by the Framingham Board of Selectmen on June 8, 2010 and subsequently submitted to MEMA as a draft. The final Multiple Hazard Mitigation Plan Update was adopted by the Framingham of Selectmen at its meeting on September 27, 2011. Minutes of said meeting together with a Certificate of Adoption is attached hereto as Appendix E.

Appendix A
Bibliography

Alverez, Leonardo and Poyourow, Daniel. Land Suitability for Urban Growth, Framingham, MA-N.W. Quad. June 1980.

Amdahl, Gary. Disaster Response : GIS for Public Safety,. ESRI Press 2002.

City of Marlborough. Open Space Preservation and Recreation Plan. 1997.

Clackamas County, Oregon, Natural Hazards Mitigation Plan, January 2004. http://co.clackamas.or.us.

Earth Tech. Landfill Report – 9/90 Crossing Project. May 1996.

Esty, G., Falcone, J., and Stetson, R. Framingham Reservoirs 1 & 2 Taskforce Pollution/Public Health Study Group Final Report. June 1995.

Federal Emergency Management Agency, Planning for a Sustainable Future. February 2003.

Federal Emergency Management Agency, Understanding Your Risks Identifying Hazards and Estimating Losses, August 2001.

Federal Emergency Management Agency. Flood Insurance Study, Town of Framingham, Massachusetts. March 1992.

Gorgone, Robin. Lake Cochituate : Storm Drain Survey, 1999.

Greater Callahan Working Group. Greater Callahan Open Space Preservation and Greenway Plan, October 2000.

IEP and Camp, Dresser and McKee, Inc. Waushakum Pond Diagnostic/Feasibility Report. October, 1988.

Kutner, David. Draft Storm Water Management Regulations. April 8, 1993.

Margolis, Karen and Patrick Fairbairn. The Sudbury River – A Community Resource. April 1989.

Massachusetts Department of Environmental Management, On-line Mitigation Planning Resources, http://www.mass.gov/dem/programs/mitigate/hazguide_appendices.pdf

Massachusetts Department of Environmental Management. Cochituate State Park and Management Plan, Working Draft. May 2002.

Massachusetts Department of Environmental Management. Management Plan for Callahan State Park and the Nobscot Hill Parcel. Draft

Massachusetts Department of Environmental Management, Cochituate State Park and Callahan State Park Management Plan, Draft. June 2000.

Massachusetts Department of Housing & Community Development website, April 2004. www.mass.gov.

Massachusetts Water Resources Authority website, Protecting the Sudbury and Foss Reservoir Watersheds, May 2003, http://www.mwra.state.ma.us/04water/html/sudres.htm.

Metropolitan Area Planning Council, MetroWest Water Supply Protection Study, June 1989.

Metropolitan Area Planning Council. MetroPlan 2000, April 1994.

Metropolitan Area Planning Council. MetroWest Public Access Feasibility Study, A Consideration of the MWRA Weston and Sudbury Aqueducts, Final Feasibility Report. July 1998.

Metropolitan District Commission, A Study of the Upper Sudbury River Watershed, May 1979

Metropolitan District Commission, A Study of the Upper Sudbury River Watershed, May 1979

Metropolitan District Commission. Public Access Plan for the MDC Sudbury Watershed. June 1994.

Metropolitan District Commission, Emergency Action Plan for the Sudbury and Framingham Reservoirs Nos. 1, 2 and 3, 1995

Metropolitan District Commission, Sudbury Reservoir Water Treatment Plant, Draft Environmental Impact Report.

Metropolitan District Commission, Watershed Protection Plan, June 1997.

Metropolitan District Commission. Sudbury Watershed System Public Access Plan Update. September 2002.

Nevada Seismological Laboratory, http://www.seismo.unr.edu, 2005.

Sudbury Valley Trustees and Metropolitan Area Planning Council. Greenprint for Growth, SuAsCo Watershed. August 2001.

Sudbury Valley Trustees, Sudbury, Assabet and Concord Wild and Scenic Rivers: Unprotected Land Inventory. January 2003.

Sudbury Valley Trustees. Greenways Plan for the SuAsCo Watershed. April 2000.

Town of Framingham Planning Board, Buildout Analysis of Residential Zoning Districts. 2000.

Town of Framingham Planning Department, The Sudbury River, A Community Resource: Opportunities and Strategies (Bay Circuit Study). April 1989.

Town of Framingham Planning Department, Waushakum Pond Management Plan. September 1995.

Town of Framingham, Zoning By-Law. April 2004.

Town of Framingham, Department of Public Works, Effects of a Moderate Precipitation Event on the Stormwater System and the Waste water System, April 2004.

Town of Framingham, Emergency Management Agency website, June 2004. www.framinghamma.org.

Town of Framingham, Framingham Reservoirs 1 and 2 Task Force Final Report. 1995

Town of Framingham, Master Plan. October 1988.

Town of Framingham, Open Space Preservation and Recreation Plan. August 2003.

Town of Marshfield, Marshfield Natural Hazards Mitigation Plan, November 2001.

Town of Scituate, Scituate Flood Mitigation Action Plan, May 2001.

Town of Sudbury. Open Space and Recreation Plan. 1997.

Town of Westwood, Westwood Flood Hazard Mitigation Plan, December 2001.

U.S. Department of the Interior, National Park Service, Division of Rivers and Special Studies, and SuAsCo Wild and Scenic Study Committee. Sudbury, Assabet, and Concord Rivers Wild and Scenic River Study, River Conservation Plan. March 1995.

U.S. Department of the Interior, National Park Service, North Atlantic Region, Division of Rivers and Special Studies. Sudbury, Assabet, and Concord Rivers Wild and Scenic River Study, Draft Resource Assessment and Eligibility Report. January 1993.

U.S. Department of the Interior, National Park Service, Rivers Program. Sudbury, Assabet, and Concord Wild and Scenic River Study, Draft Report. September 1996.

United States Department of the Interior. Geological Survey, Map of Flood-Prone areas, March 1980.

US Census Bureau website, August 2004. http://quickfacts.census.gov.

US Geological Survey Earthquake Hazards Program website, http://quake.wr.usgs.gov

Weston Observatory, Department of Geology and Geophysics website, Boston College, http://www.bc.edu/bc_org/avp/cas/wesobs/default.html

MULTIPLE HAZARD MITIGATION PLAN UPDATE 2010

Presented by
The Multiple Hazard Mitigation Plan Working Group

Public Hearing—Board of Selectmen
June 8, 2010

Multiple Hazard Mitigation Plan – Overview

- Original approved Plan – June 2005
- Federal Disaster Mitigation Act of 2000
  requires municipalities to have an all-hazards mitigation plan in place to qualify for pre- and post-disaster funding awarded by FEMA
- Prepared by the Multiple Hazard Mitigation Planning Group
- Allows the Town to be eligible for federal grants beyond reimbursements during declared emergencies.

Multiple Hazard Mitigation Planning Group

- Appointed by the BOS
- Membership

Sampath Bade	Conservation Commission & Citizen
Sheila Lynch	Citizen
John Magri	Assistant Fire Chief
Donna Nelson	Citizen
Alison Steinfeld	Director of Community and Economic Development
Steven Trask	Deputy Police Chief
Katherine Weeks	Sr. Stormwater & Environmental Engineer—DPW

- Group meets to oversee implementation of the Plan and to prepare the Update

What is Hazard Mitigation?

- Definition – "any sustained action taken to reduce or eliminate **long-term** risk to life and property from **natural hazards** (flooding, storms, high winds, hurricanes, wildfires, earthquakes, etc.)"
- Mitigation assists in helping to minimize damages that occur as the result of a natural disaster to structures, infrastructure, and other resources.

Framingham Hazard Matrix (1)

Natural Hazard	Likelihood of Occurrence	Impacts	Hazard Rank (impact and frequency)
Flood-Related Hazards			
Riverine	Highly likely	Critical	10
Coastal	Unlikely	--	1
Erosion	Likely	Limited	7
Dam Failures	Unlikely	Catastrophic	8
Thunderstorms	Likely	Critical	8
Hurricanes	Likely	Critical	8
Wind-Related Hazards			
Hurricanes	Likely	Critical	8
Downspouts	Possible	Limited	5
Tornadoes	Possible	Critical	7

Framingham Hazard Matrix (2)

Natural Hazard	Likelihood of Occurrence	Impacts	Hazard Rank (impact and frequency)
Fire-Related Hazards			
Drought	Likely	Limited	7
Wildfires	Likely	Limited	6
Urban Fires	Likely	Limited	6
Geologic Hazards			
Earthquakes	Possible	Catastrophic	8
Landslides	Possible	Limited	5
Sink Holes	Unlikely	Negligible	3
Winter Storms Related			
Winter Storm	Highly likely	Critical	10
Blizzard	Likely	Critical	9
Ice Storm	Likely	Critical	9
Nor-easter	Likely	Critical	9

Completed Mitigation Projects (1)

Sudbury River Flood Warning Project

- Connect CTY provides warning system (2007), system covers entire Town for any public emergency

Public Education and Outreach

- Flood Facts Brochure produced, distributed to 3,000 floodplain properties (2008)
- Included a public service message in fall 09 tax bill about flooding and steps to take to mitigate flood impacts
- Information and links added to Town's website
- Fire Dept. holds open houses to allow public to view equipment and discuss fire mitigation
- Mitigation of public safety matters addressed during planning and permitting stages of development projects

Completed Mitigation Projects (2)

Stormwater

- Phase I of Stormwater Master Plan (completed for Beaver Dam Brook and Farm Pond sub-basins)
- Stormwater Management Plan developed to address O&M of stormwater system

General

- Stormwater management has been integrated into Planning Board, ConCom and Engineering codes, regulations and policies
- Maintain accurate records of flooding incidents in neighborhoods

Municipal Flood Damage Reduction

- Pump equipment purchased by DPW and Fire Dept. to minimize impacts during flooding

In-Progress Mitigation Projects

Sudbury River Flood Warning Project

- Installing automated gauges at Beaver Dam Brook at the Second St. bridge and Sudbury River at the Route 9 bridge, Saxonville Levee Pumping Station to track river levels

Stormwater Master Plan

- Phase II Study under way for Lokerville, Angelica Brook, Jacobs Brook, Cochituate and Sucker Brook sub-basins.
- Master Plan to include Capital Improvements Plan for major flood mitigation

Anticipated Mitigation Projects

Analyze Repetitive Flood Loss Structures

- Contact repetitive loss property owners to discuss mitigation opportunities
- Communicate with ConCom and MEMA regarding identification of mitigation activities for repetitive flood properties
- Explore incentives to encourage property owners to engage in mitigation.

Municipal Flood Damage Reduction

- Evaluate feasibility of dredging program for aging drainage channels

Public Hearing

- Seeking public input
- Plan on Town's official web site at www.framinghamma.gov
- Provide additional comments to Community and Economic Development Division
- Deadline for additional comments to be incorporated into draft: June 10th
- BOS endorsement of the draft

TOWN OF FRAMINGHAM

Memorial Building, 150 Concord Street, Room 121, Framingham, MA 01702
508-532-5400 | 508-532-5409 (fax) | selectmen@framinghamma.gov | www.framinghamma.gov

Town Manager
Julian M. Suso, ICMA-CM

Assistant Town Manager
David R. Williams

Board of Selectmen
A. Ginger Esty, Chair
Laurie Lee, Vice Chair
Charles J. Sisitsky, Clerk
Dennis L. Giombetti
Jason A. Smith

April, 2010

Dear Fellow Framingham Taxpayer,

Welcome to spring! I trust that this letter finds you and your family well. Below are some items of particular interest that I would like to call to your attention.

2010 U.S. Census

By the time you read this letter, you will have already received your 2010 U.S. Census form in the mail. Most residents have no doubt filled out the Census and returned it already. For those residents who, for whatever reason, have not yet done so I want to urge you to take just a moment now (the Census has only ten questions) and finish filling out your Census questionnaire and mail it back in without further delay. An accurate Census count is vitally important to the Town of Framingham and all of its residents! This will have a huge impact on the ability of Framingham to secure future federal tax dollars to benefit all residents of the Town in a variety of areas. THANK YOU.

DEPARTMENT OF PUBLIC WORKS CAPITAL CONSTRUCTION

Over the last several years, the Framingham Department of Public Works (DPW) has overseen an increasing number of capital improvement projects. This work is due largely to regulatory requirements and a rapidly aging and deteriorating utility infrastructure. The amount of construction will increase significantly in 2010. DPW will oversee several projects this year with significant construction activities in the Downtown area, Concord Street between Downtown and Saxonville, and Edgell Road immediately north of Route 9. The DPW is committed to minimizing the impacts of this construction to the extent possible. We will be notifying residents and business owners of this work through mailings, public meetings, and a capital construction website. The website, www.buildingframingham.com, is anticipated to be operational by mid-April and will be regularly updated with construction and traffic related information. We appreciate your patience through this challenging period as we work diligently and reinvest in the Town's critical utility infrastructure.

TOWNWIDE PARKING

As you may know, staff members have been working over the past several months in a thorough review and analysis of the parking situation in Framingham. This has included public meetings and hearings to seek comments from interested residents and businesses. A set of comprehensive proposals for changes in the Town's Parking Regulations were recently presented to and approved by the Board of

Selectmen as a result of this analysis. This is only a brief summary of the new Parking Regulations approved by the Board of Selectmen, which are taking effect at the times noted below.

1. The current ban on overnight parking Townwide has already been eliminated.
2. Parking will now be restricted Townwide to an odd/even system year-round. Unless otherwise posted, parking is only permitted on even sides of the street during even-numbered years and odd sides of the street during odd-numbered years, effective May 1.
3. The Townwide two (2) hour parking restriction has been eliminated. In its place, the Town has established two well-defined parking districts. Within these districts a three (3) hour parking restriction will be enforced between 6AM and 6PM, Monday through Friday, effective May 1.

For further details or questions please refer to the Town website or you may contact Police Chief Steve Carl at sbc@framinghamma.gov or Town Manager Julian Suso at town.manager@framinghamma.gov.

MULTIPLE HAZARD MITIGATION PLAN

The Town is in the process of updating Framingham's five-year Multiple Hazard Mitigation Plan, which is required by the federal Disaster Mitigation Act of 2000. This update will focus on the town's capability to deal with natural hazards, minimize future disaster losses, identify mitigation activities, and help to secure funding for future hazard mitigation projects. A draft plan will be placed on the Town's website (www.framinghamma.gov) in late April together with instructions on how you can provide input into the planning process. We encourage you to participate to insure that the updated plan incorporates the concerns of Framingham's residents.

ADULT SUMMER READING PROGRAM

The Framingham Public Library is pleased to announce their first ever Adult Summer Reading Program. Adults look forward to summer as much as kids do! This program will offer reading incentives and fun activities geared toward adult library patrons. All the perks and privileges that our younger readers enjoy will be yours. Check the Library's website at www.framinghamlibrary.org for more information.

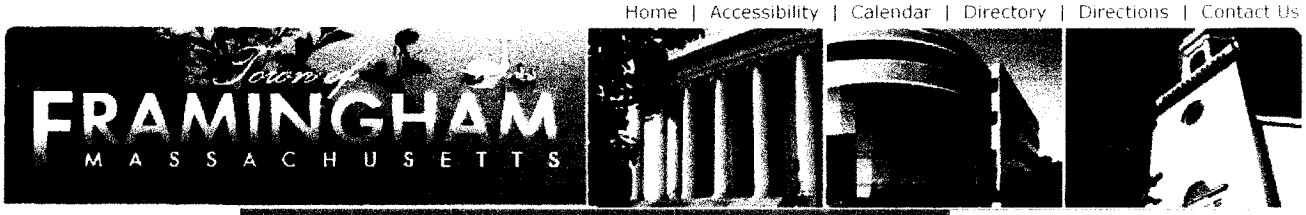
HOUSE TOUR

The Framingham History Center will have its annual house tour on Sunday, May 16 from 12 noon to 4 PM. This tour is one of the best in the area, and this year marks the tenth anniversary of this fine event. As in the past, there will be a diverse selection of sites for those interested in history, architecture, or exploring our Town. For information, contact the Framingham History Center at (508)872-0484 or online at www.framinghamhistory.org.

Sincerely,

Julian M Suso

Julian M Suso
Town Manager



Town News

May 27, 2010

Multiple Hazard Mitigation Plan Update

The Multiple Hazard Mitigation Plan Working Group has updated the Town's Multiple Hazard Mitigation Plan as required by the Federal Disaster Mitigation Act of 2000. The draft Update expands the Town's capability to deal with natural hazards, minimize future disaster losses, identify mitigation activities, and secure funding for future hazard mitigation projects. The Town and the Working Group would appreciate comments on the Plan Update. Please click on the link below to read the Plan Update and submit your comments to: Alison Steinfeld, Director of Community and Economic Development, acs@framinghamma.gov. You are also encouraged to attend a public hearing being conducted by the Board of Selectmen on Tuesday, June 8, 2010 at 7 pm in the Ablondi Room in Memorial Building. Please submit your comments by 5 pm on June 10th.

Plan Update...

⇐ **Previous**
Selectmen Appointed Committee Vacancies

Next ⇒
FOX 25 News to Broadcast From Framingham

Other News in Town News

Memorial Building Summer Meetings - Press Release
June 4, 2010

Selectmen Appointed Committee Vacancies
May 14, 2010

FOX 25 News to Broadcast From Framingham
May 25, 2010

Ballot Votes - Article 27 2010 Annual Town Meeting
May 27, 2010

Town Meeting Adjournments
May 5, 2010

Appendix B.3—Multiple Hazard Mitigation Plan Update Distribution List

In recognition of the importance of providing all potentially interested parties with an opportunity to participate in the development of the Plan Update, the Multiple Hazard Mitigation Planning Group, on behalf of the Town of Framingham, notified the following entities via e-mail of the availability of the draft Update on the Town's official web site. All parties were encouraged to review the document and submit comments to the Community and Economic Development Division, which was responsible for sharing all comments and suggestions with the entire Working Group.

Communities

Natick
Sherborn
Wayland
Marlborough
Sudbury
Ashland
Southborough

Academia

Framingham State College
MassBay Community College

Non-profits

SuAsCo Watershed Community Council
Garden in the Woods

Regional

MetroWest Chamber of Commerce
MetroWest Regional Collaborative
Metropolitan Area Planning Council

Legislative Delegation

Pam Richardson, State Representative
Tom Sannicandro, State Representative
Karen Spilka, State Senator

Appendix B.4—Comments on Draft Multiple Hazard Mitigation Plan Update

As of June 29, 2010, no public comments were submitted relative to the Plan Update.

Appendix C

Framingham Flood Facts

(flyer distributed to all Framingham tax payers)

Important to Remember When It Floods!

- If you have to evacuate, move to higher ground away from rivers, streams, creeks, and storm drains.
- Do NOT walk through moving water. Six inches of moving water can make you fall. Walk through still water using a stick to check the firmness of the ground in front of you.
- Do NOT drive *into* flooded areas. If floodwaters rise around your car or if your car stalls, abandon the car immediately and move to higher ground. You and the vehicle can be quickly swept away.
  - Six inches of water will reach the bottom of most cars causing loss of control and possible stalling.
  - One foot of water will float many vehicles.
  - Two feet of rushing water can carry away most vehicles - including SUVs and pick-ups.
- Do NOT drive around barricades. They are there for your safety.

How can I prepare in advance for flooding emergencies?

- Have a flooding emergency kit including:
  - First aid kit
  - Canned food
  - 3 gallons of water per person
  - Protective clothing, rainwear, and bedding or sleeping bags
  - Written instructions for turning off power, gas and water. (you'll need a professional to turn them back on)
- Identify where you can go if told to evacuate (a friend's house a hotel/motel or shelter, on higher ground)
- Determine multiple escape routes to your evacuation destination
- Prepare a Call List
  - Any dangerous situation: 911
  - High Water - Fire Dept.: 508-532-5940
  - NSTAR Gas, Electric: 800-592-2000
  - Red Cross: 508-595-3700
  - Friends and Family

Framingham Flood Facts

Dear Resident,

We hope you find the information in this brochure useful in understanding and preparing for flood events.

On behalf of the Board of Selectmen,
Jason Smith, Chairman
Julian Suso, Town Manager

How do I know when it will flood?

- Weather Forecasts on TV or radio
- Online Sudbury River forecast at Saxonville using the USGS website: NOAA's website http://waterdata.usgs.gov/nwis/uv?01098530 or see the same information at: www.erh.noaa.gov/er/nerfc -- Click on the Massachusetts map, then Saxonville site.
- Connect CTY, the Town's emergency calling service calls you in emergency situations. To learn more about it or sign up if you're not already in the system, go to the Police Department's website http://www.framinghampd.org/index.html and in the left-hand column, click on the button Connect-CTY.

What does the town provide for help?

- Connect CTY announcements (see above)
- Public Works has a limited supply of sandbags for pick up *only* in case of emergencies. Call 508-532-6030. Caution: Filled sandbags weigh up to 70 pounds. Use mechanical assistance such as a wheelbarrow to move them.
- Designated shelters around town.

What do I do when it floods?

- If there is time before evacuation, take some or all of these precautions
  - Move your furniture, valuables, and essential items to higher floors.
  - Fill your car gas tank in case an evacuation notice is issued.
  - Listen to local radio and TV stations for information and advice. If told to evacuate, do so as soon as possible.
  - Disconnect electrical appliances. Do not touch electrical equipment if you are wet or standing in water.
  - If you have natural gas appliances in danger of flooding, turn off the gas.
  - Turn off utilities at the main switches or valves if instructed to do so.
  - Secure the building.
  - Call the people on your Call List as needed.

Can I do anything to prevent damage from flooding?

- Elevate appliances that are in danger of flooding or install new ones (furnace, water heater, electric panel) on patio blocks, bricks, cinder blocks or skids.
- Invest in or rent pump(s) from the hardware store, either sump or submersible depending on your potential flooding situation.
- Construct barriers (sandbags, berms, embankment, floodwalls) to stop floodwater from entering the building.
- Seal walls in basements with waterproofing compounds to avoid seepage. Do not necessarily seal the floors. (Consult with a flood expert before doing this type of work.)
- Label circuit breakers (fuses) and know which circuits/fuses power the electricity on the lowest level of the building.
- Invest in industrial strength de-humidifiers to dry out flooded areas after the water has receded.
- Consider raising the height of all electrical fixtures on the lowest level of the building.
- Install "check valves" in sewer traps to prevent flood water from backing up into the drains (consult with the Town).

Appendix D - Public Service Message regarding flooding

July 2009

Dear Fellow Resident,

As we all make preparations for yet another beautiful New England summer, I would like to share some useful information with you:

Concerts on the Green 2009

I am pleased to announce that there will be a limited summer concert series on the Village Green beginning in July! Although the downturn in the economy hampered fundraising efforts for this annual summer event, we have recently been able to secure enough donations to ensure concerts on each Friday in July, beginning on the third. Although an official schedule of bands has yet to be announced, these free concerts will run each Friday from 6:30 – 8:30 p.m. and feature a variety of music that will satisfy all tastes. Although efforts are continuing to secure additional funding which may allow some concerts in August, this has yet to be confirmed. For more information and to find out about any weather cancellations, please contact the Town's Building Services Department at 508-532-5485. See you on the Green!

First Annual Hospice and Future Care Considerations Forum

The Callahan Center will be sponsoring a First Annual Hospice & Future Care Considerations Forum on Saturday, September 12, 2009 from 9 a.m. to noon. The event will include a continental breakfast followed by a panel presentation. The event is free and geared toward adult children and older adults/seniors. Please contact the Social Service Department at the center at 508-532-5980 to reserve your seat and ask additional questions.

Fundraising Raffle for Police Officer Phil Hurton

The British Beer Company is holding a fundraising event for Framingham Police Officer Phil Hurton, who was shot twice in the face and both hands while pursuing a suspect back in April. Proceeds from the raffle will support the Hurton Family Fund, which assists Officer Hurton and his family while he is recovering from his injuries. Raffle tickets are $10 each and may be purchased at any of the eight British Beer Company locations, including the one on Route 9 East in Framingham. The grand prize is a getaway weekend at the Seaside Inn in Falmouth and dinner for two at the Falmouth British Beer Company location. The drawing will be held on August 24, 2009 at 8 p.m. at the Framingham location and you do not need to be present to win. On behalf of the Town, I would also like to commend Officer Hurton for his bravery and wish him a continued speedy recovery! Officer Hurton and his family remain in our prayers.

Public Safety Message from the Hazard Mitigation Working Group on Flooding

Hundreds of properties in Framingham are in the 100-year floodplain. Here are some important tips for emergencies when your home is in danger of flooding. For more flood information, check out the Public Works Department on the Town's website, click on the Highway Department and then select "Flood Facts".

To prepare for floods:

- Have emergency supplies on hand including first aid kit, canned food, 3 gallons of water per person, rainwear, bedding / sleeping bags, and instructions for turning off power, gas and water.
- Identify one or two safe places to go if you must evacuate (such as designated shelters around town).
- Elevate appliances in danger of flooding (furnace, water heater, electrical panel) on patio blocks or bricks.
- Label circuit breakers and know which circuits power the electricity on the lowest level of the building.

To know when it will flood:

- Listen to weather forecasts on TV or radio.
- Find the online Sudbury River forecast using either http://waterdata.usgs.gov/nwis/uv?01098530 or www.erh.noaa.gov/er/nerfc [and click on the Massachusetts map, then Sudbury River at Saxonville].
- The Town's emergency Mass Notification System calls you in emergency situations. To sign up for this service if you don't already have it, go to the Police Department website http://www.framinghampd.org/index.html. In the left-hand column click in the box "One Step Notification".

In case of you need to evacuate during a flood:

- Stay out of rooms where outlets or fixtures are under water to avoid possible electrocution.
- Evacuate to higher ground away from rivers, streams, creeks, and storm drains.
- Do NOT walk through moving water. Six inches of moving water can make you fall.
- If floodwaters rise around your car or if your car stalls, abandon the car immediately and move to higher ground. You and the vehicle can be quickly swept away. One foot of water will float many vehicles. Two feet of rushing water will carry away most vehicles.
- Do NOT drive into flooded areas. Do NOT drive around barricades. They are there for your safety.

For more information on flooding please contact Katherine Weeks in the Department of Public Works at 508-532-6010.

Sincerely,

Julian M. Suso
Town Manager

Appendix E

TOWN OF FRAMINGHAM

Memorial Building, 150 Concord Street, Room 121, Framingham, MA 01702
508-532-5400 | 508-532-5409 (fax) | selectmen@framinghamma.gov | www.framinghamma.gov

Interim Town Manager
Valerie Mulvey

Assistant Town Manager
David R. Williams

Board of Selectmen
Jason A. Smith, Chair
Charles J. Sisitsky, Vice Chair
Laurie Lee, Clerk
A. Ginger Esty
Dennis L. Giombetti

Certificate of Adoption
Town of Framingham, Massachusetts
Board of Selectmen
A Resolution Adopting the Town of Framingham's
Hazard Mitigation Plan

WHEREAS, the Town of Framingham established a Committee to prepare the Hazard Mitigation plan; and

WHEREAS, the Town of Framingham Hazard Mitigation Plan contains several potential future projects to mitigate potential impacts from natural hazards in the Town of Framingham; and

WHEREAS, a duly-noted public meeting was held by the Board of Selectmen on September 27, 2011; and

WHEREAS, the Town of Framingham authorizes responsible departments and/or agencies to executes their responsibilities demonstrated in the plan; and

NOW, THEREFORE BE IT RESOLVED that the Town of Framingham Board of Selectmen adopts the Hazard Mitigation Plan, in accordance with M.G.L. c. 40.

ADOPTED AND SIGNED this November 29, 2011

Jason Smith
Chair
Framingham Board of Selectmen