

THE TOWN OF WARE

LOCAL NATURAL HAZARDS MITIGATION PLAN



Adopted by the Ware Board of Selectmen on _____

Prepared by:
The Ware Natural Hazards Mitigation Planning Committee

and

The Pioneer Valley Planning Commission

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1 - INTRODUCTION

Hazard Mitigation

The Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA) define Hazard Mitigation as any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards such as flooding, storms, high winds, hurricanes, wildfires, earthquakes, etc. Mitigation efforts undertaken by communities will help to minimize damages to buildings and infrastructure, such as water supplies, sewers, and utility transmission lines, as well as natural, cultural and historic resources.

Planning efforts, like the one undertaken by the Town of Ware and the Pioneer Valley Planning Commission, make mitigation a proactive process. Pre-disaster planning emphasizes actions that can be taken before a natural disaster occurs. Future property damage and loss of life can be reduced or prevented by a mitigation program that addresses the unique geography, demography, economy, and land use of a community within the context of each of the specific potential natural hazards that may threaten a community.

Preparing a Local Natural Hazards Mitigation Plan before a disaster occurs can save the community money and will facilitate post-disaster funding. Costly repairs or replacement of buildings and infrastructure, as well as the high cost of providing emergency services and rescue/recovery operations, can be avoided or significantly lessened if a community implements the mitigation measures detailed in the Plan. FEMA requires that a community adopt a Hazard Mitigation Plan as a condition for mitigation funding from the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance Program (FMA), and the Pre-Disaster Mitigation Program.

Planning Process

The natural hazard mitigation planning process for the Town of Ware included the following tasks:

- Forming a local Hazard Mitigation Planning Committee with representatives from the Fire Department, Police Department, Department of Public Works, Planning Department, Finance Department and Select Board.
- Reviewing existing plans including the Town's Open Space and Recreation Plan, Community Development Plan and relevant zoning documents.
- Identifying the natural hazards that may impact the community.
- Conducting a Vulnerability/Risk Assessment to identify the infrastructure (i.e., critical facilities, public buildings, roads, homes, businesses, etc.) at the highest risk for being damaged by the identified natural hazards, particularly flooding.
- Identifying and assessing the policies, programs, and regulations a community is currently implementing to protect against future disaster damages. Examples of such strategies include:
 - Preventing or limiting development in natural hazard areas like floodplains;
 - Implementing recommendations in existing planning documents including Stormwater Management Plans, Master Plans, Open Space and Recreation Plans, and Emergency/Evacuation Plans that address the impacts of natural hazards; and
 - Requiring or encouraging the use of specific structural requirements for new buildings such as buried utilities, flood-proofed structures, and lightning grounding systems.
- Identifying deficiencies in the current strategies and establish goals for updating, revising or adopting new strategies.
- Adopting and implementing the final Local Natural Hazards Mitigation Plan.

During the planning process, the Town's Local Natural Hazard Planning Committee identified Action Plan items and specific time frames. The actions were selected from a list of local strategies which were compiled by the Ware LEPC during several brainstorming sessions and others identified by the Town during their review of existing programs, policies, and regulations. From this list, specific Action Items were prioritized by the Town's Local Natural Hazards Planning Committee based on the following criteria:

- Select Action Items which have the ability to significantly mitigate the negative impact of natural hazards on people and property;
- Select Action items which the Town has the ability to implement given the financial and staff resources available;
- Select Action Items which will have the greatest influence on achieving Local Goals & Objectives;
- Select a diverse set of Action Items which will address different Natural Hazards that present a high or moderate risk to the region; and
- Select Action items which will address those mitigation measures identified as deficient or in need of attention to ensure that the Town is in the best possible position to address natural hazards which impact property and residents.

For example, updating or adopting a local stormwater bylaw would be a relatively low cost action item, which could have a significant impact on mitigating hazards caused by local flooding. If adopted by the Town, this bylaw encourage stormwater systems that are context-sensitive and prevent harm to people and damage to property. Another action item could be to review and maintain a list of problem culverts and prioritize their replacement.

The local action items represent a multi-faceted approach to addressing natural hazards in the Town and will be undertaken as resources become available and will be integrated into ongoing planning activities. As part of the review and adoption process, the Committee approved the action items that were in keeping with the goals and criteria established by the Town and assigned appropriate bodies within the Town to implement them within a five-year framework.

Public Committee Meetings

(Please see Appendix B for agendas)

October 27, 2006, 10:00 – 12:00 p.m.: Working committee meeting held at the Ware Town Hall.

December 5, 2006 10:00 - 12:00 p.m.: Working committee meeting held at the Ware Town Hall.

January 19, 2007 - 10:00 a.m. - 12:00 p.m.: Working committee meeting held at Ware Town Hall

February 16, 2007 10:00 a.m. - 12:00 p.m.: Working committee meeting held at Ware Town Hall.

April 27, 2007 10:00 a.m. - 12:00 p.m.: Working committee meeting held at Ware Town Hall.

October 1, 2007 10:00 a.m. - 12:00 p.m.: Working committee meeting held at Ware Town Hall.

Public Meetings with the Board of Selectmen

TO BE SCHEDULED

A mailing was made to each committee member, prior to each meeting that contained information from the previous meeting, an agenda sheet, and information to be covered.

Public Involvement in the Planning Process

Throughout the process, the Ware Natural Hazards Mitigation Committee made a concerted effort to make the general public aware of the development of the Town's mitigation plan. Draft copies were made available at the Ware Public Library during the plan development; in addition to this, the Town of Ware posted a final draft of the mitigation plan on the town's website.

On September 13, 2007 the Pioneer Valley Planning Commission sent a press release to all area media outlets to inform the general public that drafts of the region's 16 community Hazard Mitigation plans were complete and available for public comment and review on the Commission's website (www.pvpc.org). This press release (Appendix C) resulted in a series of news articles (Appendix C) that further enhanced awareness of the Hazard Mitigation Planning Process. This action was undertaken to fulfill the requirement that a Hazard Mitigation Plan be developed in a format that is open to the public for comments.

Involving neighboring Jurisdictions

In the initial stages of the planning process for this mitigation plan, the Pioneer Valley Planning Commission conducted a series of outreach

efforts to make the public aware of the regional mitigation process. In October of 2005, the Planning Commission notified all Select Boards and Chief Elected Officials that their community could participate in the region's mitigation planning process. Again, on April 4, 2006, the Planning Commission mailed a notice of planning activities to all Chief Elected Officials and Select Board in the Pioneer Valley. Both mailings explained the purpose of mitigation planning and invited communities to participate in either Round I or Round II of the region's mitigation planning process.

On November 20th, 2007 the Pioneer Valley Planning Commission Presented the planning process that led to the creation of the *Ware Local Natural Hazards Mitigation Plan*. The Western Regional Homeland Security Council is the planning entity responsible for orchestrating the homeland security planning activities of Berkshire, Franklin, Hampden and Hampshire Counties. Collectively, this body is responsible for 101 communities.

Additionally, the Hampshire Regional Emergency Planning Committee was presented with the findings of this plan during its November 15, 2007 meeting. Prior to this briefing, the HREPC was provided with updates of the Hazard Mitigation Planning Process on April 20, 2007 and again on December 21, 2006.

Managing and Updating the Plan

The Ware Local Emergency Planning Committee will manage this plan, oversee implementation, update the plan every five years and support funding applications for implementing the plan's action steps.

2 – LOCAL PROFILE

Community Setting¹

Located in the southeast corner of Hampshire County, the town of Ware is a series of valley and ridges running north and south, carved by the great glaciers. Easternmost is the Ware River valley. Moving west, the Muddy Brook and Flat Brook valleys are located in the geographical center of Ware. The Swift River flows from the Quabbin Reservoir through the western edge of town. Although much development has occurred in Ware in modern times, the town has worked hard to retain a rural character and historic appearance.

The major commercial development in Ware has come, logically, along the two major highways that run through town. Route 9 is the major east-west traverse, and Ware's historic district is located along this road. West of the town center along Route 9, farmhouses, agricultural fields, and stone walls give the passerby a glimpse of real New England tradition. Route 9 runs east through Ware to the city of Worcester, and west to the town of Amherst and the city of Northampton, where Interstate 91 can be accessed.

Route 32 runs north and south through town and has served as the spine of more recent commercial development. Here the development is more true to the sprawling "strip mall" types that occur from coast to coast. Route 32 runs through the town of Palmer where the Massachusetts Turnpike can be accessed.

A major asset to the residents of Ware and the surrounding communities is the Quabbin Reservoir, abutting the northwestern corner of the town. The Reservoir was built in 1927 to provide water to the residents of Boston, and is managed by the Massachusetts Water Resources Authority (MDC). The Quabbin has 38.6 square miles of water surface, and 118 miles of shoreline. The regional State Police Barracks is also located at the Quabbin Reservoir.

¹ The majority of the information for this section was obtained from various websites including: (<http://www.mass.gov/dhcd/iprofile/316.pdf> - October 19, 2006; and Ware's Open Space and Recreation Plan

Infrastructure

Development Trends

Route 9 is the spine of Ware and, as the original town center, is surrounded by historic buildings. The large residences along Route 9 and other roads close to the town center (e.g. Church St.) testify to the prosperity the town once enjoyed when mill manufacturing was at its peak. Newer development has sprung up in recent years, mostly along Route 32. Here the sprawling nature of today's commercial developments provides a less appealing and more generic solution to providing residents with goods and jobs.

Ware's topography has resulted in the construction of critical facilities along the banks of the many rivers that pass through Ware's center. The same is true for residential and commercial development. The Hazard Mitigation Committee indicated that potential flooding from Ware's rivers and streams presents a risk to a large percentage of Ware's population. Development and infrastructure expansion in Ware's northern outlying areas is limited, due to the presence of the Quabbin Reservoir. The watershed lands for Boston's drinking water supply are permanently protected and, therefore, not likely location for growth. For this reason, Ware will continue to experience development of in its southern areas and its town center.

Roads and Highways

Ware is not easily accessible by either Interstate 91 or Interstate 90. The primary east-to-west route in through town is Route 9, which connects Ware to Boston to the east and Amherst/Hadley/Northampton to the west. Route 32 connects ware to Palmer to the south, providing access to the east-to-west routes afforded by Interstate 90, which eventually links up with Springfield, providing north-to-south access to points located along Interstate 91. In total, Ware has of eighty-five miles of roads.²

Rail

Unlike many cities and towns in Massachusetts, Ware is served by an active rail carrier. The Massachusetts Central Railroad has provided efficient and critical transportation services to businesses in Ware since 1979.

² <http://www.dls.state.ma.us/mdmstuf/aag/aag309.doc> - October 19, 2006 .

Public Transportation

The Pioneer Valley Transit Authority provides three different fixed-route bus and shuttle routes to and from the Town of Ware. As of October 2006, The Belchertown Shuttle Travels from Amherst to Ware and Back; the Ware Shuttle services downtown Ware and key points around Ware's downtown; and the Palmer Village shuttle operates a service line from Ware to Eastfield mall in Springfield through Palmer.

Public Drinking Water Supply

Ware's Public Water Supply is supplied by six wells; these six wells supply 70% of the town's water needs. The remaining 30% of Ware's households rely on private water sources. Wells #1 -- #4 are connected to a collection cistern on Barnes Street. The Dismal Swamp Well is located near the Ware River off of Upper Church Street and State Route 32. Well #5 is off Gilbertville Road. Ware's Water Department can meet demand with any one source off-line.

Sewer Service

Ware's wastewater treatment plant and public sewer system serve primarily the downtown and central business district. Sewers serve about 1500 homes and approximately 4500-5000 residents. According to the DPW Superintendent, the wastewater treatment plant and most of the sewer system is aging and is in need of maintenance attention. The system has not experienced any major breakdowns recently, but is very old. Of particular concern are the old vitrified clay sewer pipes which still exist in some areas of town. There are also areas served by asbestos cement pipe and newer PVC plastic pipe.

All outlying areas of Ware are served by on-site septic systems. Ware has many areas of poorly draining soils, and consequently proper on-site sewage disposal is handicapped by this problem. Stormwater management is also handled on-site, and Ware does not have a Stormwater Management Bylaw to address the construction of these systems.

Schools

Ware has the following public schools: Head Start School, Kidstop Preschool, Koziol Elementary School , Ware High School and Ware Middle School

The following private schools are also located in Ware: St. Mary's School
The First Step School, Trinity Christian Nursery School.

Natural Resources³

Ware is located in the eastern most part of Hampshire County, and encompasses 25,660 acres (40.09 square miles). The maximum elevation areas are a peak in the southeastern corner of the town (1050 ft.) and Quabbin Hill (1026 ft.). Approximately two-thirds of the area of the town falls in the 500-1000 ft. elevation range, while the area which runs due south of the Quabbin Reservoir and then east through the commercial district is in the 0-500 ft. range.

The topography of much of Western Massachusetts was radically changed by glaciation during the Pleistocene period nearly one million years ago. The retreat of the last glacier, about 10,000 years ago, removed 10 to 15 feet of bedrock from the most exposed ledges, rounded the hills, deposited debris and created new land forms. The Muddy Brook valley, which is a glacial flute (small valley), is an example of this geologic phenomenon, and a considerable percentage of the soils in the Ware area were formed from glacial till and alluvial deposits. The large stones and boulders left as glacial debris often create serious problems for agricultural use, and the slow permeability of the soils is a severe limitation for septic systems.

The U.S. Natural Resource Conservation Service (NRCS) has classified the soils in Ware into two soil types, each with a distinctive patterns of soils, drainage pattern, topographic relief, development and agricultural constraints and opportunities, and other characteristics. Most of Ware's lands are severely limited by slope for small scale commercial sites, and large rocks, shallow depth to bedrock, droughtiness or occasionally high water table conditions pose serious problems for forest or agriculture development.

Slope is an important factor to consider in determining the development potential of an area. Areas with a slope of 15% or greater are considered to have limitations for building due to the significantly increased physical or financial requirements of such a project. The areas with a slope of 15%

³ The following in the Natural Resources section include excerpts from the Ware Open Space and Recreation Plan (2000).

or greater form a series of north-south bands below the Quabbin until approximately the latitude of the commercial area. The major areas with slopes of less than 15% are located in the Fisherdict Road area in a north-south pattern east of the Quabbin which continues due south to the southern boundary, and into the western corner of town. In general, approximately 50-60 percent of the town's land area has a slope of 15% or less.

Combining soil characteristics with slope gives an indication of whether an area can support septic systems. Many of the soil types found in Ware were found to have moderate to severe (primarily the latter) restrictions for septic tank absorption fields. The only area which offers slight limitations (and therefore the least expense) for installing septic tanks is the Highland Street-Church Street-North Street areas, which is already extensively sewered. This does not mean that septic systems are impossible in other areas, but it does mean that the specific soil conditions must be considered on an individual basis, and lot size adjustments must be made to accommodate the general soil limitations.

Surface Water

Ware is located in the Chicopee River Watershed and is rich in water resources. A number of rivers flow through the town including the Swift River, which flows along the Ware-Belchertown boundary until it joins the Ware River at the Three Rivers junction. The Ware River originates in Hubbardston, MA and flows generally southwesterly through the town.

The Quabbin Reservoir, located in Ware, Pelham, and Belchertown, is owned by the Massachusetts Water Resources Authority, and covers 24,705 acres.

Wetlands

Ware's wetlands are overseen by the town's Conservation Commission. The typical wetland plants (highbush blueberry, ferns, red maple, quaking aspen, birches, junipers, dogwoods) are popular foraging plants for many birds and other wildlife. Development limitations and strict legislation concerning wetland areas prevent these ecosystems from being used for anything more than conservation and recreation use. Recreation opportunities in and around include birdwatching and hiking.

Beaver Dams

Beaver activity has been increasing over the past decade. Several wetland areas have been flooded by beaver dam construction. As a

result, their vegetation has changed from forested wetland to marshy habitat. Sometimes beaver activity is detrimental to property, causing problems for local land owners (e.g., flooding of wells, septic systems, lawns, out-buildings, and roadways). Affected individuals must contact the Board of Health and Conservation Commission for advice and permission to alleviate the beaver problem.

Aquifers

There are a number of aquifer recharge areas in Ware, all of which are located around the major bodies of water. One is located along the Swift River toward River Road and Scygal Road. Another is found from Ware Center along Flat Brook toward the Worcester County Line. The major recharge area is along Beaver Brook until it meets the Ware River where it continues through the center of town as it branches to also include Muddy Brook. Development is limited in the Aquifer's recharge area to protect drinking water quality and supply.

Floodways

The major floodplain areas in Ware are located primarily along the Ware River and the Quabbin Reservoir. Other floodplain areas are located along the Swift River, Flat Brook, Muddy Brook, and in the Beaver Lake and Peppers Mill Pond area. Ware has restrictions on development in these areas to protect the community against resource degradation when unsuitable uses occur along these waterways, and also to prevent an increase in the extent and severity of flooding.

Restricted Development Areas:

- (1) Swift River—From the Quabbin Reservoir south along River Road;
- (2) Beaver Brook — The section of the brook that runs between Beaver Lake and Route 9, from Beaver Lake south to where Beaver Brook flows into the Ware River;
- (3) Penny Brook—Length of Penny Brook to Ware River;
- (4) Ware River—From Ware's northeasternmost fire station along Main Street/Gilbertville Road into Ware Center , continuing on past the St. Williams Cemetery to Gibbs Crossing and the Palmer Town Line (Town's Police Station is between the Ware River and the Muddy Brook's 500 year flood plain);
- (5) Muddy Brook—Mixed commercial along its length, runs parallel to Greenwich Road;

Forests

As of 1985, sixty-four percent of Ware's land was covered with forest. The major forest types in Ware are the Appalachian-Oak (Northern Red Oak, White Oak, Chestnut Oak, American Chestnut) and the Northern Hardwood (Sugar Maple, Beech, Yellow Birch, White Birch, Paper Birch, Hemlock). Many of these species may be harvested for furniture, flooring, and fuel. These mature forests are excellent places for recreation trails, because of the lack of substantial undergrowth. A maturing forest has less recreation opportunities, but is a more popular habitat for wildlife, and provides game for hunting. Over one thousand acres of forested lands are already in conservation, including 89 acres of Town Forest, 268 acres of the State-owned Swift River Wildlife Area, and over 700 acres of privately-owned Chapter 61 forests.

The many unforested fields in Ware provide some of the most scenic views in town. Open lands allow viewsheds to the surrounding community and region. Considering recreation, the typically flat and well-drained lands may easily convert to active recreation fields, like soccer and baseball. Also, converting former agricultural fields to recreation fields means that little or no forest cutting is needed. However, much of Ware's undeveloped, unforested land is still in private ownership, and liability issues make it difficult for owners to permit recreational use by the town. Currently, over 800 acres of privately owned open lands are protected for agricultural use under Chapter 61A.

Wetlands

There are approximately 396 acres of wetlands in Ware. Wetland habitats in town occur primarily along the streams and rivers as well as in lands adjacent to the major ponds in Ware. If open waters are included in this accounting, the total acreage of wetlands in Ware rises to 4,117. These wetlands and flood areas in are shown on Ware's Water Resources Map. Currently, development of some wetland areas in Ware is limited by the Massachusetts Wetlands Protection Act. However, Ware currently has no local wetlands bylaw, and as a result, protection of these critical natural areas is not guaranteed.

Wetlands include rivers, ponds, swamps, wet meadows, beaver ponds, and land within the FEMA-defined 100-year flood area. Wetland areas are

home to frogs, fish, freshwater clams and mussels, beaver, muskrats, great blue herons, waterfowl, and bitterns.

3 – HAZARD IDENTIFICATION & ANALYSIS

Natural Hazard Identification

Historical research, conversations with local officials and emergency management personnel, available hazard mapping and other weather-related databases were used to identify the natural hazards which are most likely to have an impact on the Town of Ware.

Floods

The average annual precipitation for Ware and surrounding areas in northwestern Massachusetts is 42.5 inches. There are three major types of storms that bring precipitation to Ware. Continental storms that originate from the west continually move across the region. These storms are typically low-pressure systems that may be slow-moving frontal systems or more intense, fast-moving storms. Precipitation from coastal storms, also known as nor'easters, that travel into New England from the south constitute the second major storm type. In the late summer or early fall, the most severe type of these coastal storms, hurricanes, may reach Massachusetts and result in significant amounts of rainfall. The third type of storm is the result of local convective action. Thunderstorms that form on warm, humid summer days can cause locally significant rainfall.

Floods can be classified as either *flash floods*, which are the product of heavy, localized precipitation in a short time period over a given location or *general floods*, which are caused by precipitation over a longer time period in a particular river basin. There are several local factors that determine the severity of a flooding event, including: stream and river basin topography, precipitation and weather patterns, recent soil moisture conditions, amount of impervious surface area, and the degree of vegetative clearing. Floods occur more frequently and are one of the most costly natural hazards in the United States.

Flash flooding events typically occur within minutes or hours after a period of heavy precipitation, after a dam or levee failure, or from a sudden release of water from an ice jam. Most often, flash flooding is the result of a slow-moving thunderstorm or the heavy rains from a hurricane. In rural areas, flash flooding often occurs when small streams spill over their banks. However, in urbanized areas, flash flooding is often the result of clogged storm drains (leaves and other debris) and the higher amount of impervious surface area (roadways, parking lots, roof tops).

In contrast, *general flooding* events may last for several days. Excessive precipitation within a watershed of a stream or river can result in flooding particularly when development in the floodplain has obstructed the natural flow of the water and/or decreased the natural ability of the groundcover to absorb and retain surface water runoff (e.g., the loss of wetlands and the higher amounts of impervious surface area in urban areas).

A floodplain is the relatively flat, lowland area adjacent to a river, lake or stream. Floodplains serve an important function, acting like large “sponges” to absorb and slowly release floodwaters back to surface waters and groundwater. Over time, sediments that are deposited in floodplains develop into fertile, productive farmland like that found in the Connecticut River valley. In the past, floodplain areas were also often seen as prime locations for development. Industries were located on the banks of rivers for access to hydropower. Residential and commercial development occurred in floodplains because of their scenic qualities and proximity to the water. Although periodic flooding of a floodplain area is a natural occurrence, past and current development and alteration of these areas will result in flooding that is a costly and frequent hazard.

Not including open water areas, there are 1,228 acres of 100-year floodplain in town. Protective regulations and disincentives that limit development in the floodplain exist at several levels

Severe Snowstorms/Ice Storms

Severe winter storms can pose a significant risk to property and human life because the rain, freezing rain, ice, snow, cold temperatures and wind associated with these storms can disrupt utility service, phone service and make roadways extremely hazardous. Severe winter storms can be deceptive killers. The types of deaths that can occur as a result of a severe winter storm include: traffic accidents on icy or snow-covered roads, heart attacks while shoveling snow, and hypothermia from prolonged exposure to cold temperatures. Infrastructure and other property are also at risk from severe winter storms and the associated flooding that can occur following heavy snow melt. Power and telephone lines, trees, and telecommunications structures can be damaged by ice, wind, snow, and falling trees and tree limbs. Icy road conditions or roads blocked by fallen trees may make it difficult to respond promptly to medical emergencies or fires. Prolonged, extremely cold temperatures can also cause inadequately insulated potable water

lines and fire sprinkler pipes to rupture and disrupt the delivery of drinking water and cause extensive property damage.

Hurricanes

Hurricanes are violent rainstorms with strong winds that can reach speeds of up to 200 miles per hour. Hurricanes generally occur between June and November and can result in flooding and wind damage to structures and above-ground utilities. In Massachusetts, major hurricanes occurred in 1904, 1938, 1954, 1955, 1960 and 1976.

Tornadoes

Tornadoes are swirling columns of air that typically form in the spring and summer during severe thunderstorm events. In a relatively short period of time and with little or no advance warning, a tornado can attain rotational wind speeds in excess of 250 miles per hour and can cause severe devastation along a path that ranges from a few dozen yards to over a mile in width. The path of a tornado may be hard to predict because they can stall or change direction abruptly. Within Massachusetts, tornadoes have occurred most frequently in Worcester County and in communities west of Worcester, including towns in eastern Hampden County. There has been one tornado that has touched down in Ware, and several others in the adjacent community of Hardwick. High wind speeds, hail, and debris generated by tornadoes can result in loss of life, downed trees and power lines, and damage to structures and other personal property (cars, etc.). Since the 1950s, there have been fifteen tornadoes in Hampden County.

Of additional concern are microbursts, which often do tornado-like damage and can be mistaken for tornadoes. In contrast to the upward rush of air in a tornado, air blasts rapidly downward from thunderstorms to create microbursts.⁴

Wildland Fires/Brushfires

According to FEMA, there are three different classes of wildland fires: *surface fires*, *ground fires* and *crown fires*.⁵ The most common type of wildland fire is a surface fire that burns slowly along the floor of a forest, killing or damaging trees. A ground fire burns on or below the forest floor and is usually started by lightning. Crown fires move quickly by jumping along the tops of trees. A crown fire may spread rapidly, especially under

⁴ <http://www.fema.gov/regions/vii/2003/03r7n06a.shtm>

⁵ FEMA, "Fact Sheet: Wildland Fires," September 1993.

windy conditions. While wildland fires have not been a significant problem in Ware, there is always a possibility that changing land use patterns and weather conditions will increase a community's vulnerability. For example, drought conditions can make forests and other open, vegetated areas more vulnerable to ignition. Once the fire starts, it will burn hotter and be harder to extinguish. Soils and root systems starved for moisture are also vulnerable to fire. Residential growth in rural, forested areas increases the total area that is vulnerable to fire and places homes and neighborhoods closer to areas where wildfires are more likely to occur.

There were 30 outdoor fires reported in Ware in 2004⁶. As a point of comparison, there were 55 fires reported in Ware during the same time period, including indoor and outdoor fires.

Earthquakes

An earthquake is a sudden, rapid shaking of the ground that is caused by the breaking and shifting of rock beneath the Earth's surface. Earthquakes can occur suddenly, without warning, at any time of the year. New England experiences an average of 30 to 40 earthquakes each year although most are not noticed by people.⁷ Ground shaking from earthquakes can rupture gas mains and disrupt other utility service, damage buildings, bridges and roads, and trigger other hazardous events such as avalanches, flash floods (dam failure) and fires. Un-reinforced masonry buildings, buildings with foundations that rest on filled land or unconsolidated, unstable soil, and mobile homes not tied to their foundations are at risk during an earthquake.⁸

⁶ *Annual Report of the Fire Incident Reporting System, 2004*

⁷ Northeast States Emergency Consortium Web site: www.nesec.org/hazards/earthquakes.cfm.

⁸ Federal Emergency Management Agency Web site: www.fema.gov/hazards/earthquakes/quake.shtm.

**Table 3-1
New England Earthquakes with a Magnitude of 4.2 or more 1924 - 2002**

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
Plattsburg, NY	April 20, 2002	5.1

Source: Northeast States Emergency Consortium Web site:
www.nesec.org/hazards/earthquakes.cfm

**Table 3-2
New England States Record of Historic 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
New York	1737 - 1985	24
<i>Total Number of Earthquakes within the New England states between 1568 and 1989 = 1,239.</i>		

Source: Northeast States Emergency Consortium Web site:
www.nesec.org/hazards/earthquakes.cfm

Massachusetts introduced earthquake design requirements into their building code in 1975. However, these specifications apply only to new buildings or to extensively modified existing buildings. Buildings, bridges, water supply lines, electrical power lines and facilities built before 1975 may not have been designed to withstand the forces of an earthquake. The seismic standards have also been upgraded with the 1997 revision of the State Building Code.

Dam Failure

Although dams and their associated impoundments provide many benefits to a community, such as water supply, recreation, hydroelectric power generation, and flood control, they also pose a potential risk to lives and property. Dam failure is not a common occurrence but dams do represent a potentially disastrous hazard. When a dam fails, the potential energy of the stored water behind the dam is released. Most earthen dam failures occur when floodwaters above overtop and erode the material components of the dam. Often dam breaches lead to catastrophic consequences as the water ultimately rushes in a torrent downstream flooding an area engineers refer to as an "inundation area." The number of casualties and the amount of property damage will depend upon the timing of the warning provided to downstream residents, the number of people living or working in the inundation area, and the number of structures in the inundation area.

Many dams in Massachusetts were built in the 19th century without the benefit of modern engineering design and construction oversight. Dams can fail because of structural problems due to age and/or lack of proper maintenance. Dam failure can also be the result of structural damage caused by an earthquake or flooding brought on by severe storm events.

The Massachusetts Department of Conservation and Recreation (MA DCR) is the agency responsible for regulating dams in the state (M.G.L. Chapter 253, Section 44 and the implementing regulations 302 CMR 10.00). Until 2002, DCR was also responsible for conducting dam inspections but then state law was changed to place the responsibility and cost for inspections on the owners of the dams. As of 2005, it is the responsibility of the dam owner to maintain an inspection schedule that is both vigorous and compliant with DCR's inspection regime. Therefore, it is the responsibility of the town to ensure that dam owners are apprised of their obligations as property owners and to actively engage any dam owners with addresses located outside of Ware to ensure that dams are properly inspected.

The state has three hazard classifications for dams:

- *High Hazard:* Dams located where failure or improper operation will likely cause loss of life and serious damage to homes, industrial or commercial facilities, important public utilities, main highways, or railroads.
- *Significant Hazard:* Dams located where failure or improper operation may cause loss of life and damage to homes, industrial or commercial facilities, secondary highways or railroads or cause interruption of use or service of relatively important facilities.
- *Low Hazard:* Dams located where failure or improper operation may cause minimal property damage to others. Loss of life is not expected.

The inspection schedule for dams is as follows:

- Low Hazard dams – 10 years
- Significant Hazard dams – 5 years
- High Hazard dams – 2 years

The time intervals represent the maximum time between inspections. More frequent inspections may be performed at the discretion of the state. Dams and reservoirs licensed and subject to inspection by the Federal Energy Regulatory Commission (FERC) are excluded from the provisions of the state regulations provided that all FERC-approved periodic inspection reports are provided to the DCR. All other dams are subject to the regulations unless exempted in writing by DCR.

The Massachusetts Emergency Management Agency (MEMA) identifies seventeen dams in Ware. The following classification schedule has been assigned to the following dams:

1	Hardwick Pond Dam	Low Hazard
2	Quabbin Spillway	Low Hazard
3	Peppers Mill Pond Dam	Low Hazard
4	Juda Dam	Low Hazard
5	Ware Industries-Upper	Low Hazard
6	Lower Canal Dam	Low Hazard
7	Pilchs #3 Dam	Low Hazard
8	Martowski Farm Pond	Low Hazard
9	Flat Brook Pool Dam	Low Hazard
10	Skowron Dam	Low Hazard
11	Pines Dam	Low Hazard
13	Snow Pond Dam	Significant Hazard
14	Beaver Lake Dam	Significant Hazard
15	Arthur J Bousquet	Significant Hazard
16	Disantis Farm Pond	Significant Hazard
17	O'Brien Pond Dam	Significant Hazard
12	Quabbin Goodnough Dike	High Hazard

It is also important to consider and plan for the potential critical failure of dams located upstream along the Swift River, especially the Windsor Dam.

The 100-year floodplain covers about 19 percent, or approximately 1,228 acres of the town, including an estimated 650 acres of developed residential land.

Drought

Drought is a normal, recurrent feature of climate. It occurs almost everywhere, although its features vary from region to region. In the most general sense, drought originates from a deficiency of precipitation over an extended period of time, resulting in a water shortage for some activity, group, or environmental sector.⁶

In Massachusetts, six major droughts have occurred statewide since 1930⁹. They range in severity and length, from three to eight years. In many of these droughts, water-supply systems were found to be

⁹ US Geological Survey Water-Supply Paper 2375. "National Water Summary 1989 – Floods and Droughts: Massachusetts." Prepared by S. William Wandle, Jr., US Geological Survey.

inadequate. Water was piped in to urban areas, and water-supply systems were modified to permit withdrawals at lower water levels.

Reduced crop, rangeland, and forest productivity; increased fire hazard; reduced water levels; increased livestock and wildlife mortality rates; and damage to wildlife and fish habitat are a few examples of the direct impacts of drought. Of course, these impacts can have far-reaching effects throughout the region and even the country.

When evaluating the region's risk for drought on a national level, utilizing a measure called the Palmer Drought Severity Index, Massachusetts is historically in the lowest percentile for severity and risk of drought.¹⁰ However, global warming and climate change may have an effect on drought risk in the region. With the projected temperature increases, some scientists think that the global hydrological cycle will also intensify. This would cause, among other effects, the potential for more severe, longer-lasting droughts.

Man-made Hazards – Hazardous Materials¹¹

Technologic, or man-made, disasters are commonly defined as emergencies characterized by a sudden threat to lives, property, public health and the environment, arising from a failure of critical infrastructure systems or the release, or potential release, of oil, radioactive materials, or hazardous chemicals or bio-hazards, into the air, land or water. These emergencies may occur from transportation accidents, unusual events at facilities that use or manufacture chemicals or biological hazards, or as a result of natural or man-made events. While these incidents are most often accidental, intentional acts of sabotage, or terrorism, must increasingly be considered as a discrete category of technological disaster.

Critical Infrastructure Threats - Critical infrastructure is defined as “the linked systems of facilities and activities vital to providing services necessary to support the nation’s economy and quality of life...including electrical power, medical and public health services, transportation, oil and gas production and storage, water supply, emergency services, government services, banking and finance, and telecommunications.” These systems are increasing varied and complex, and are operated with increasingly sophisticated information technology systems. The integration of aging civil infrastructure systems into larger networks and the associated loss of redundancy can lead to reduced reliability and

¹⁰ National Drought Mitigation Center – <http://drought.unl.edu>

¹¹ Commonwealth of Massachusetts State Hazard Mitigation Plan, 2004

intricate interdependencies. Failure of particular components or subsystems within this critical infrastructure can incapacitate the entire system.

Oil, Chemical, Bio-Hazards Spills and Accidents Almost 14,000 oil spills are reported each year in the U.S., mobilizing thousands of specially trained emergency response personnel and challenging the best-laid contingency plans. Although many spills are contained and cleaned up by the party responsible for the spill, some spills require assistance from local and state agencies, and on occasion, the Federal Government. Similarly, the safe handling of industrial chemicals became a significant priority for disaster managers worldwide following the 1984 accident at Union Carbide's Bhopal, India, factory that killed more than 2,000 people. The most recent, and severe, chemical spills in Massachusetts occurred on April 27, 2003 when a barge heading north in Buzzard's Bay toward the Cape Cod Canal ran aground, causing a rupture in its hull. This accident resulted in the spill of approximately 98,000 gallons of heating oil into the Bay. The spill closed shell fishing areas and beaches, causing thousands of dollars in lost wages and property damage.

Building Fires. In 1999, building fires caused \$10 billion in property damages, more than 4,000 deaths (including 100 firefighters) and 100,000 injuries in the U.S. The Worcester Cold Storage Fire on December 3, 1999 caused the deaths of 6 Worcester firefighters. The number of deaths due to fire has decreased during the past 30 years as a result of revised fire standards and codes, yet property losses remain about the same as reported in 1973, when annual property losses exceeded \$11 billion.

Natural Hazard Analysis Methodology

In order to review the likelihood of a specific hazard occurring, to identify the location of occurrence, and to assess the impacts of the hazard event, a *Hazard Identification and Analysis Matrix* was prepared to organize the information that was gathered for this project. The matrix is organized into the following sections: Type of Hazard, Frequency of Occurrence, Severity of Impacts and Hazard Index. The Hazard Index was completed to rank the hazards according to the frequency of occurrence and the amount of potential damage likely to occur. The Hazard Index forms the basis for concentrating the future mitigation efforts outlined in this plan. A description of each of the matrix categories is provided below. The completed Matrix is shown on Table 3-6.

Type of Hazard

The natural hazards identified for Ware include floods, severe snowstorms/ice storms, hurricanes, tornadoes, wildfires/brushfires, dam failure and earthquakes. Many of these hazards result in similar impacts to a community. For example, hurricanes, tornadoes and severe snowstorms may cause wind-related damage. A more detailed description of each type of hazard is included in the earlier section of this chapter.

Frequency of Occurrence

The frequency or likelihood of occurrence for each natural hazard was classified according to the following scale:

Table 3-3
Frequency of Occurrence and Annual Probability of Given Natural Hazard

Frequency of Occurrence	Annual Probability
<i>Very High</i>	70-100% probability in the next year
<i>High</i>	40-70% probability in the next year
<i>Moderate</i>	10-40% probability in the next year
<i>Low</i>	1-10% probability in the next year
<i>Very Low</i>	Less than 1% probability in the next year

Source: information adapted from Hyde County, North Carolina Multi-Hazard Mitigation Plan, September 2002.

Location of Occurrence

The classifications are based on the area of the Town of Ware that would potentially be affected by the hazard. The following scale was used:

Table 3-4
Location of Occurrence and Percentage of Town Impacted of Given Natural Hazard

Location of Occurrence	Percentage of Town Impacted
<i>Large</i>	More than 50% of the town affected
<i>Medium</i>	10 to 50% of the town affected
<i>Small</i>	Less than 10% of the town affected

Source: information adapted from Hyde County, North Carolina Multi-Hazard Mitigation Plan, September 2002.

Severity of Impacts

The severity of direct impacts an affected area could potentially suffer were classified according to the following scale:

**Table 3-5
Severity of Impacts and Magnitude of Multiple Impacts of Given Natural Hazard**

Severity of Impacts	Magnitude of Multiple Impacts
<i>Catastrophic</i>	Multiple deaths and injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of facilities for 30 days or more.
<i>Critical</i>	Multiple injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 week.
<i>Limited</i>	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 day.
<i>Minor</i>	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of facilities.

Source: information adapted from Hyde County, North Carolina Multi-Hazard Mitigation Plan, September 2002.

Hazard Index

The hazard index ratings were determined after assessing the frequency, location and impact classifications for each hazard. The hazard index ratings are based on a scale of 1 (highest risk) through 5 (lowest risk). The ranking is qualitative and is based on local knowledge of past experiences with each type of hazard, as well as assumptions about future occurrences. Committee members discussed the level of risk and estimated the future likelihood of occurrence, based on the town's history.

**Table 3-6
Hazard Identification and Analysis Worksheet for Ware**

TYPE OF HAZARD	FREQUENCY OF OCCURRENCE	LOCATION OF OCCURRENCE	IMPACT	HAZARD RISK INDEX RATING
Flooding	Low	Small	Limited/Critical	3
Severe Snowstorms/Ice Storms	Medium	Large	Limited	3
Severe Thunderstorms (microbursts) which cause wind damage	Low	Small	Minor/Limited	3
Hurricanes	Low	Large	Critical	2
Tornadoes	Very Low	Small	Critical	2
Wildfire/Brushfire	Medium	Medium	Minor	4
Earthquakes	Very Low	Large	Critical	2
Dam Failures	Very Low	Small	Limited/Critical	3
Drought	Low	Large	Minor	5

Source: information adapted from Town of Holden Beach North Carolina Community-Based Hazard Mitigation Plan, July 15, 2003 and the Massachusetts Emergency Management Agency (MEMA).

Detailed Hazard Profiling for Ware

This section examines the location, extent, previous occurrences, and probability of future events in Ware.

Flooding

Location: The 100-year flood zone covers mostly narrow bands of level floodplain land along the Swift River, Beaver Brook, Penny Brook, Ware River, and Muddy Brook. The 500-year flood zone tracks along the same boundaries with a wider swath.

Extent

There are approximately 1,228 acres of land within the FEMA mapped 100-year floodplain and 246 acres of land within the 500-year floodplain within the Town of Ware. 302 1-4 family structures and 0 "other" structures located within the Special Flood Hazard Area (SFHA) in Ware as of May 6, 1999 the most current records in the CIS for the Town of Ware. The estimated number of people living in the floodplain is 695.

Previous Occurrences

Based upon existing records for flood damage, there have been five events that have caused damage in Ware since 1978 with a total damage amount of \$1,292. A severe flood occurred on March 10th, 1998, during which Ware received 4.9 inches of rain in a 30-hour period and the Ware River flooded. No damage was recorded for this event.

In addition to this, Ware's PDM Committee identified the October 9, 2005 flooding event as an event. This resulted in damage to a culvert system on Quarry Street and Morse Avenue. This culvert system is now inadequate for handling storm loads beyond a two-year storm, and local flooding is predicted for as long as current conditions remain unchanged.

Probability of Future Events

Based upon previous data, it seems likely that there is a seven percent chance of minor flooding occurring every year in Ware. This is partly a function of the presence of the Ware River, Swift River, Flat Brook, Muddy Brook, Beaver Lake, the Peppers Mill Pond area and the Mill River, all of which contain floodplain acreage in Ware. The area within the 100-year flood plain still has a one (1) percent chance of a severe flood in any given year.

Snowstorms and Severe Winter Weather

Location: The entire Town of Ware is susceptible to snowstorms.

Extent: The Massachusetts State Hazard Mitigation Plan has identified Ware as a community that is among the state's highest locations for two and three-day snow fall events, but is in the lowest risk area for one-day snow events. The most severe snow Ware can expect is between twelve and thirty-six inches. At worst, the constraints this places on the town highway department, a significant portion of town could be without transportation options, depending on the severity of the storm.

Previous Occurrences

Available records, dating back to 1950, indicate that 86 severe winter storms have occurred in Hampshire County. There were no specific records for Ware, but the committee has agreed to keep records on future severe winter storm events.¹²

Probability of Future Events

Based upon the availability of records for Hampshire County, the likelihood that a severe snow storm will hit Ware in any given year is greater than ten percent.

Hurricanes

Location: Massachusetts is susceptible to hurricanes and tropical storms. Between 1851 and 2004, approximately 32 tropical storms; five Category 1 hurricanes, two Category 2 hurricanes and three Category 3 hurricanes have made landfall. To date, the Commonwealth has not experienced a Category 4 or 5 hurricane. Aside from direct hits from hurricanes and tropical storms, the Commonwealth is often affected by their extra tropical remnants as these storms move up the coast and out into the Atlantic Ocean. Since the destructive hurricane of 1938, four other major hurricanes have struck the Massachusetts coast in 1954, 1955, 1960, 1985, and 1991. The last hurricane to make landfall in New England was Hurricane Bob, a weak category 2 hurricane, in August 1991. Therefore, it is forecasted that, Massachusetts, and the rest of New England, is long overdue for a major hurricane to make landfall. Based on past hurricane

¹² **National Environmental Satellite, Data, and Information Service (NESDIS)**

and tropical storm landfalls, the frequency of tropical systems to hit the Massachusetts coastline is an average of once out of every six years.

Ware's inland location makes it less susceptible to wind damage than flood damage resulting from a strong storm surge.

Extent

In the event of a tropical storm or hurricane, the greatest risk to Ware will be flooding of the Ware River. Wind damage will be limited, but widely spread, perhaps including downed power and communications lines, but flooding damage will be more severe and focused on population centers and croplands; the town's transportation infrastructure and evacuation routes could also be impacted, as Routes 9 and 32 are within the floodplain for the Ware River.

Previous Occurrences

While several hurricanes and tropical storms have passed through the Pioneer Valley Region since records have been kept, none have yet to hit Ware directly. This does not mean that Ware has not suffered from wind and storm damage, as several neighboring communities have had hurricanes and tropical storms pass through them, and the effects of a hurricane are hardly localized.

Probability of Future Events

Based upon the past reporting of one tropical depression within Ware over a period of 150+ years, it is reasonable to say that there is a low frequency of hurricane and tropical storm occurrence in Ware (once every fifty years is less than a one percent chance of any such storm occurring in a given year).

Tornados/Microbursts

Location

The hazard area for tornadoes in Ware varies according to the intensity and size of the tornado. There have not been enough tornadoes in Ware to accurately predict sections of town that are more likely to experience a tornado. However, the Massachusetts State Hazard Mitigation Plan (2004) identifies eastern Ware and the surrounding communities as having

a high frequency of tornados occurrence within Massachusetts. For this reason, all of Ware is equally at-risk.

Extent

The area of damage would vary according to the F-Scale rating and a given Tornado's location. A location in downtown Ware, where the population and commercial activity is concentrated, would have a greater impact than a tornado that ravaged Ware's protected Quabbin watershed lands.

Previous Occurrences

There has been one F2 tornado in ware since 1950.

Probability of Future Events

Based upon the available historical record, as well as Ware's location in a high-density cluster of state-wide tornado activity, it is reasonable to estimate that there is a medium frequency of tornado occurrence in Ware (a 1 % - 5% chance in any given year).

Wildfires/Brushfires

Location: Ware might have a well-defined downtown, but it still contains several thousand acres of largely undeveloped space. The rural-urban interface is most pronounced in those sections of town that are experiencing development, most notably Beaver Lake and West Ware.

Extent

Forested areas in Ware cover many of the city's outlying areas, which can be remote and difficult for emergency crews to access. In Ware 62 percent of the town's total land area is in forest, or about 15, 789 acres, and is therefore at risk of fire. A large wildfire could damage 62 percent of the town's land mass, including vital watershed lends, in a short period of time. However, Massachusetts receives more than 40 inches of rain per year and much of the landscape is fragmented, and together these two traits make wildfires uncommon in Massachusetts. Nevertheless, in drought conditions, a brushfire or wildfire would be a matter of concern.

Previous Occurrences

There are no records of wildfires or burned acreage available for Ware, but the 2005 Massachusetts *Fire Incident Reporting System* recorded 43 “other” fires, a category that includes any fire that does not occur in a building. The fire department is committed to collecting data on and acreage statistics on wildfires in Ware.

Probability of Future Events

Based upon the availability of data, there is a low frequency of wildfires in Ware.

Earthquakes

Location The last major earthquake to strike Massachusetts did so more than 200 years ago in 1755 when an estimated 5.75 strength earthquake struck off of Cape Anne, which is North of Boston. Damage from this event stretched from Northern Massachusetts to Boston, and is thought to have occurred because of compression and buckling along the North American Plate, which stretches from California to the middle of the Atlantic Ocean. Unlike California, where earthquakes occur along fault lines, there is no predictable pattern for where an earthquake will emerge in New England. However, the forces that initiate buckling in New England are include the downward weight of mountains and the upward stress relief that resulted from the retreat of the glaciers. These factors, when combined with the geography of New England and the historical record, indicate that Cape Ann and Eastern Massachusetts are the sections of the Commonwealth that are most likely to experience an earthquake. However, seismologists have concluded that earthquakes in New England can occur anywhere in the region and that there is no way to specify where the greatest risk lies.

Extent: In the event of an earthquake, all of Ware would be affected with some portions more impacted than others, depending on the magnitude of the earthquake and the underlying population density.

Previous Occurrences

In the past 150 years, one earthquake was recorded in Ware in 1941.

Probability of Future Events

Based upon existing records, there is a low frequency of earthquakes in Ware with less than a 1% chance of an earthquake occurring in any given

year. Because engineering studies have determined that the greatest threat to the Quabbin Reservoir’s dam system is from an earthquake, the committee decided to rank earthquakes as a high-risk category, as an earthquake could result in the devastation of Ware’s town center if the Quabbin Reservoir’s dams were to fail as a result of an earthquake.

Dam Failures

Location

Ware has seventeen dams located within its boundaries, each of which is a legacy of Ware’s industrial history. Please refer to the Ware Hazard Map (Appendix E) for the location and distribution of these dams; it should be noted that most dams are located on the Ware River, as that was the center of the town’s economic activity; while manufacturing activity has slackened, there is still a concentration of residential and commercial uses along the ware river.

Extent

Dams in Massachusetts are assessed according to their risk to life and property. Dams with a *Low Hazard* rating may cause minimal property with no expected loss of life; *Significant Hazard* dams may cause loss of life and damage to homes, industrial or commercial facilities, secondary highways or railroads or cause interruption of use or service of relatively important facilities; *High Hazard* dams will most probably cause loss of life and serious damage to homes, industrial or commercial facilities, important public utilities, main highways, or railroads. The following dams have the following ratings:

1	Hardwick Pond Dam	Low Hazard
2	Quabbin Spillway	Low Hazard
3	Peppers Mill Pond Dam	Low Hazard
4	Juda Dam	Low Hazard
5	Ware Industries-Upper	Low Hazard
6	Lower Canal Dam	Low Hazard
7	Pilchs #3 Dam	Low Hazard
8	Martowski Farm Pond	Low Hazard
9	Flat Brook Pool Dam	Low Hazard
10	Skowron Dam	Low Hazard
11	Pines Dam	Low Hazard
12	Snow Pond Dam	Significant Hazard
13	Beaver Lake Dam	Significant Hazard
14	Arthur J Bousquet	Significant Hazard

15	Disantis Farm Pond	Significant Hazard
16	O'Brien Pond Dam	Significant Hazard
17	Quabbin Goodnough Dike	High Hazard

Previous Occurrences

To date, there have been no dam failures in Ware.

Probability of Future Events

As Ware’s high hazard dams age, and if maintenance is deferred, the likelihood of a dam failing will increase, but, currently the frequency of dam failures is very low with a less than one percent chance of a dam failing in any given year.

Drought

Location: A drought would impact all of Ware, most specifically water-dependent activities.

Extent

A drought in Ware would leave widespread damage to plant life. Ware’s Public Water Supply is supplied by six wells; these six wells supply 70% of the town’s water needs. Massachusetts’ wells are permitted according to their ability to meet demand for 180 days at maximum capacity with no recharge; if these conditions extended beyond the thresholds that determine supply capacity, Ware would the damage from a drought could be widespread due to depleted groundwater supplies.

Previous Occurrences

In Massachusetts, six major droughts have occurred statewide since 1930. They range in severity and length, from three to eight years. In many of these droughts, water-supply systems were found to be inadequate. Water was piped in to urban areas, and water-supply systems were modified to permit withdrawals at lower water levels.

Probability of Future Events

In Ware, as in the rest of the state, drought occurs at a medium frequency, with a range of a 1% or a 10% chance of drought occurring in a single given year. However, due to Ware’s smaller population and the

water richness of Western Massachusetts, communities like Ware would not be as severely impacted as some communities in Eastern Massachusetts.

Man-Made Hazards

Location: Ware has several facilities in town that could produce damage from man-made chemical explosions, leaks or spills. Please refer to Ware's Natural Hazard map to see where these uses are distributed. Otherwise, these are:

- Maple St. Quabbin Wire & Cable Co., Inc.
- Maple St. Quabbin Wire & Cable Co., Inc.
- Cummings St. Kanzaki Specialty Papers
- West Street Usps-Ware, Ma Main Post Office
- Palmer Road Wal-Mart Store #2386
- West Street Maarng Ware Armory
- Street Sherman Oil Co., Inc.
- Bank St Verizon Ware Co (Ma854807)
- Robbins Rd Ware Wastewater Treatment Plant
- Belchertown Rd Chrabsz Oil Co., Inc.
- Maple St Quabbin Wire & Cable
- Warren Rd Sherman Oil Co.
- Gilbertville Rd Osterman Bottled Gas Inc.
- Pulaski St L. Sidur & Sons Oil/Trucking
- Gilbertville Rd Ware #1 #501

Extent

There is no reliable indicator of the extent of a man-made hazard in Ware that can be performed as part of this work. Pictometry is a modeling program that enables incident commanders to perform hazard modeling scenarios; Ware could identify the greatest threats and build scenarios for them based upon available data in a future project. The threat of a man-made hazard depends on the substance, the concentration of the substance, air flow, water flow, human demographics and geography.

Previous Occurrences

There have been no documented occurrences of man-made hazards impacting Ware.

Probability of Future Events

Unknown

Vulnerability Assessment

The following is a list of natural and manmade disasters, and the areas affected by them, that have or could affect the Town of Ware. The Past and Potential Hazards Map at the end of this Plan reflects the contents of this list.

In order to determine estimated losses due to natural and man made hazards in Ware, each hazard area was analyzed with results shown below. Human losses are not calculated during this exercise, but could be expected to occur depending on the type and severity of the hazard. Most of these figures exclude both the land value and contents of the structure. The value of all structures in the Town of Ware, including exempt structures such as schools and churches, is \$765,049,285 as of 2006. The median value of a home in Ware is \$168,725 according to the Warren Group. The data below was calculated using FEMA's Understanding Your Risks: Identifying Hazards and Estimating Losses, August 2001. In addition, the Committee completed the Vulnerability Assessment Worksheets which provided more data to estimate the potential losses.

Past and Potential Hazards

Flooding (100-year base flood): Medium Risk

In this section, a vulnerability assessment was prepared to evaluate the potential impact that flooding could have on the portions of Ware located within the 100-year floodplain. Flooding was chosen for this evaluation because it is a natural hazard likely to impact the community and the location of the impact can be determined by mapping of areas inundated during severe flooding events. Flooding can be caused by severe storms, such as hurricanes, nor'easters, and microbursts, as well as ice dams and snow melt.

There are approximately 1,228 acres of land within the FEMA mapped 100-year floodplain and 246 acres of land within the 500-year floodplain within the Town of Ware. According to the Community Information System (CIS) of FEMA, there were 302 1-4 family structures and 0 "other" structures located within the Special Flood Hazard Area (SFHA) in Ware as of May 6, 1999 the most current records in the CIS for the Town of Ware. Utilizing the Town's median home value of \$180,000, a preliminary damage

assessment was generated. For the estimated number of people living in the floodplain, an average household size of 2.3¹³ people was used.

A total of 302 structures are located within the SFHA in Ware, totaling approximately \$54,360,000 of damage, and 695 people impacted. The damage estimate is a rough estimate and likely reflects a worst-case scenario. Computing more detailed damage assessments based on assessor's records is a labor-intensive task and beyond the scope of this project.

Summary of October 9, 2005 Flood¹⁴

General flooding occurred along the Ware River with the most severe flooding impacting the bridges that cross over these waterways. Furthermore, access to and from emergency facilities was reduced, which dramatically reduced response times and increased the susceptibility of Ware's citizens to loss of life and property as a result of flooding.

Flooding: Medium Risk

There is potential for annual flood incidents in Ware due to the community's topography and waterways. Most of the flood hazard areas listed here were identified due to known past occurrence in the respective area. There are many areas with no record of previous flood incidents that could be affected in the future by heavy rain and runoff from surrounding slopes.

Maple Street and Surrounding Area

Sections of Maple Street pass through the FEMA 100-year floodplain. This is a significant risk because an EPA Tier II facility, a Historical Site and several structures are at risk of flooding damage. Approximately six structures, including an EPA Tier II facility could be affected by a flood incident. 100% damage to 100% of the structures, estimated cost of repairing or replacing to be \$1,080,000. Cost for repairing or replacing any dams or bridges, power lines, telephone lines, and contents of structures are not included.

- A portion of Off Monroe Street is within a FEMA mapped 100-year flood zone.
- Annual potential for flooding in floodplain from both spring runoff and heavy summer/fall rains.

¹³ Figure courtesy of 2000 U.S. Census.

¹⁴ Information obtained from the *Incident Report For October 9, 2005 Connecticut River Flood*

- Potential for damage/repair to road surface.

West Street/Muddy Brook¹⁰

An EPA Tier II facility is located within the floodplain for the Muddy Brook. Cost for repairing or replacing any dams or bridges, power lines, telephone lines, and contents of structures are not included.

- Annual potential for flooding in floodplain from both spring runoff and heavy summer/fall rains.
- Potential for damage/repair to road surface.
- Potential Damage resulting from chemical spill.

Ware River / Flat Brook Transmission Lines

Regional transmission lines servicing the Pioneer Valley intersect in Ware slightly east of the Ware River. The East-to-West axis of this transmission system cuts across the Ware River, Flat Brook and Muddy Brook.

Public Drinking Water Supply-Wells

Ware's public drinking water supply has three wells located along Muddy Brook, these are within the 100-year flood plain. There is one well located along the banks of the Ware River. Drifting debris could damage these structures.

Power Plant

The power plant located where Route 32 crosses the Ware River is within the 100 year flood plain's boundaries.

Aviation Infrastructure

Ware has a landing strip slightly west of Ragged Hill Road. This facility is located within the 100 year floodplain. In the event of a major flood, this might not be available to local officials as a drop point or evacuation option.

Bridges

There are nine bridges in Ware that might be inundated in a severe flood. They are:

1. Upper Church Street Bridge
2. East Street Bridge

3. South Street Bridge
4. Muddy Brook Bridge
5. Muddy Brook Bridge/North Street
6. Hardwick Pond Road Bridge
7. Doanne Road Bridge
8. Palmer Road Bridge #1
9. Palmer Road Bridge #2

Localized Flooding-Low Risk

Several sections of town that experience regular flooding are not situated within FEMA's Flood Insurance Rate Maps for Ware. The planning process that produced this document identified the following locations and cost estimates for 100% damage to 100% of the structures within these localized flooding areas.

Church Street /Ware River

There are no structures located in this area.

Greenwich Road/Snow Pond

There are an estimated four structures in this area; 100% damage to 100% of the structures would result in \$720,000 of damage.

Pine Street/Ware River

There are an estimated seven properties in the vicinity of this area of frequent flooding. It is estimated that the maximum damage to this area would be \$1,260,000.

Quarry Street

There are an estimated four properties that might be affected by a severe flooding event in this area of frequent, local flooding. One hundred percent damage to all four properties would result in \$720,000 of damage.

Morse Avenue

There are an estimated five properties that might be affected by a severe flooding event in this area of frequent, local flooding. One hundred percent damage to all five properties would result in an estimated

amount of \$900,000 of damage.

Route 32/Flat Brook

There are an estimated two properties that might be affected by a severe flooding event in this area of frequent, local flooding. One hundred percent damage to these two properties would result in an estimated amount of \$360,000 of damage.

Route 9/Flat Brook

There are an estimated three properties that might be affected by a severe flooding event in this area of frequent, local flooding. One hundred percent damage to these three properties would result in an estimated amount of \$540,000 of damage.

Severe Snowstorms/Ice Storms: Medium Risk

Three types of winter events are heavy snow, ice storms and extreme cold which cause concern. Occasionally heavy snow years will collapse buildings. Ice storms have disrupted power and communication services. Timberland has been severely damaged. Extreme cold affects the elderly. Ware's recent history has not recorded any loss of life due to the extreme winter weather. These random events are difficult to set a cost to repair or replace any of the structures or utilities affected.

- Area has been subject to extremely heavy snow falls, records of early 1900s and into the 1950s and 1960s indicate this.
- High risk town wide due to snow, ice and extreme cold.
- 1969 heavy snow - several 3 feet events.
- December 7, 1997 winter storm – severe weather event caused a power blackout that lasted for several days
- Elderly are affected by extreme weather.

Snow Drift Areas

The following areas in the Town of Ware have been identified as areas where snow drifts form during winter storm events:

- Portions of the west side of Fisherdick Road.
- Northwest corner of the west side of Old Gilbertville Road

Hurricanes/Severe Thunderstorms: Medium-High Risk

Ware's location in Western Massachusetts reduces the risk of extremely high winds that are associated with hurricanes. The Town has experienced

small blocks of downed timber and uprooting of trees onto structures. Hurricanes can and do create flooding. Estimated wind damage 5% of the structures with 10% damage \$3,025,246. Estimated flood damage 10% of the structures with 20% damage \$15,300,986. Cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included.

- 1938 hurricane was a major event - wind damage and flooding statewide.
- Power and phone lines - disruptions of services.
- Flooding/washing of evacuation routes.

Tornadoes/Microbursts: Medium-High Risk

Risk of tornadoes is considered to be high in Hampshire County, for Massachusetts. Tornadoes rarely occur in this part of the country; therefore, assessing damages is difficult. Most buildings in the Town of Ware have not been built to Zone 1, Design Wind Speed Codes. The first edition of the Massachusetts State Building Code went into effect on January 1, 1975. According to the 2000 U.S. Census, approximately 74% of the housing in Ware was built before 1970. Estimated damages to 10% of structures with 20% damages \$15,300,986. Estimated cost does not include building contents, land values or damages to utilities.

- In the last fifty years, one known tornado has touched down in Ware.
- River corridors and hill tops susceptible.
- 9 incidents of tornado activity (F3 or less) occurred in Hampshire County from 1954 to 2006.
- A microburst occurred along Palmer Road in 1985 which caused damage

Wildfires/Brush Fires: Low Risk

As timber harvesting is reduced, wood roads close, debris builds up on the ground, potential for wildfire increases town-wide. Entire town - minimal forest fire protection (dependent on on-call firefighters and problems with accessibility)

No specific wildfire incidents have been identified. Nevertheless, Ware is 62% forested and a dry year could increase the likelihood of a severe incident.

Earthquakes: High Risk

Moderate potential for serious damage in village portions of town Routes 9 and 32. Previous analysis has determined that an earthquake of sufficient magnitude could compromise the Goodnough Dike and/or the

Windsor Dam, resulting in catastrophic casualties and property damage. Structures are mostly of wood frame construction estimated loss 20% of town assessed structural valuation \$153,009,857. Costs of repairing or replacing roads, bridges, power lines, telephone lines, or the contents of the structures are not included.

- A 3.0 earthquake was recorded in the southwestern corner of Ware in 1941 – no record of damage.
- High risk to town resulting from water storage associated with the Quabbin Reservoir

Dam Failure: Medium Risk

The Massachusetts Emergency Management Agency (MEMA) identifies seventeen (17) dams in Ware. Table 3-3 identifies the dams within the town as well as whether they are classified as low, significant, or high hazard. Of the seventeen dams in Ware eleven are classified as *Low Hazard*: Dams located where failure or improper operation may cause minimal property damage to others. Loss of life is not expected. Five dams are classified as *Significant Hazard*: Dams located where failure or improper operation may cause loss of life and damage to homes, industrial or commercial facilities, secondary highways or railroads or cause interruption of use or service of relatively important facilities. The Quabbin Goodnough Dike is classified as *High Hazard*: dams located where failure or improper operation will likely cause loss of life and serious damage to homes, industrial or commercial facilities, important public utilities, main highways, or railroads.

Drought: Very Low Risk

In Massachusetts, six major droughts have occurred statewide since 1930¹⁵. They range in severity and length, from three to eight years. In many of these droughts, water-supply systems were found to be inadequate. Water was piped in to urban areas, and water-supply systems were modified to permit withdrawals at lower water levels.

Man-Made Hazards - Hazardous Materials: Low-Medium Risk

Ware relies on the support of the Fire Department for responding to incidents involving hazardous materials. Public transportation of chemicals and bio-hazardous materials by vehicle transport on Routes 9 and 32 are a concern. There are fifteen (15) sites in the Town of Ware notified by the U.S. EPA as Tier II Hazardous Material sites. These sites are:

¹⁵ US Geological Survey Water-Supply Paper 2375. “National Water Summary 1989 – Floods and Droughts: Massachusetts.” Prepared by S. William Wandle, Jr., US Geological Survey.

- Maple st. Quabbin wire & cable co., inc.
- Cummings st. Kanzaki specialty papers
- West street Usps-ware, ma main post office
- Palmer road Wal-mart store #2386
- West street Maarng ware armory
- Street Sherman Oil Co., Inc.
- Bank st Verizon ware co (ma854807)
- Robbins rd Ware wastewater treatment plant
- Belchertown rd Chrabsz oil co., inc.
- Maple st Quabbin wire & cable
- Warren rd Sherman oil co.
- Gilbertville rd Osterman bottled gas inc.
- Pulaski st L. Sidur & sons oil/trucking
- Gilbertville rd Ware #1 #501

(Past and Potential Hazards Map Located In Back of Plan)

4 – CRITICAL FACILITIES

A Critical Facility is defined as a building, structure, or location which:

- Is vital to the hazard response effort.
- Maintains an existing level of protection from hazards for the community.
- Would create a secondary disaster if a hazard were to impact it.

Critical Facilities within Hazard Areas

Hazards identified in this plan are regional risks and, as such, all critical facilities fall into the hazard area. The exception to this is flooding. There are several critical facilities that fall within the 100-year floodplain as shown in the table at the end of this section.

The Critical Facilities List for the Town of Ware has been identified utilizing Ware's Comprehensive Emergency Management Plan. Ware's Hazard Mitigation Committee has broken up this list of facilities into four categories. The first category contains facilities needed for Emergency Response in the event of a disaster. The second category contains Non-Emergency Response Facilities that have been identified by the Committee as non-essential. These are not required in an emergency response event, but are considered essential for the everyday operation of Ware. The third category contains Facilities/Populations that the Committee wishes to protect in the event of a disaster. The fourth category contains Potential Resources, which can provide services or supplies in the event of a disaster. The Critical Facilities Map at the end of this Plan identifies these facilities.

Category 1 – Emergency Response Services

The Town has identified the Emergency Response Facilities and Services as the highest priority in regards to protection from natural and man-made hazards.

1. Emergency Operations Center

Ware Police Department – North Street

Alternate

Koziol Elementary School – Gould Road

Ware High School – West Street

2. Fire Station

Ware Fire Department – East Main Street

3. Police Station

Ware Police Department – North Street

4. Highway Garage

Ware Highway Department – Mechanic Street

5. Water Department

Department of Public Works – Church Street

6. Emergency Fuel Stations

The Citgo Station in Downtown Ware serves as the fuel depot for Ware’s public safety professionals. Aside from that, there is not another source of emergency fuel in town.

7. Emergency Electrical Power Facility

- Ware Town Hall has power for its critical operations
- The Department of Public Works has a generator for its critical functions
- The Police Station has a portable generator
- The Fire Department has a generator
- The High School, which is the primary shelter, has a generator

8. Emergency Shelters

Belchertown High School – Springfield Road, Belchertown

Ware High School – West Street*** **While the Ware High School is the Town’s emergency shelter, Committee members stated that access routes to this facility would be blocked in the event of a flood.**

Koziol Elementary School – Gould Road

9. Dry Hydrants - Fire Ponds - Water Sources

Numerous locations in Ware

10. Transfer Station

Ware does not have a landfill.

11. Utilities

Water Treatment Plant #1 – Barnes Street

Water Treatment Plant #2 – Gilbertville Road

Massachusetts Water Resource Authority – Belchertown Road

Waste Water Treatment Plant – Robbins Road

12. Helicopter Landing Sites

Mary Lane Hospital – South Street

Private Airport – Route 32

13. Communications

Microwave Police Communications Tower – Gilbertville Road

Microwave Police Communications Tower – Quabbin Reservoir

14. Primary Evacuation Routes

Route 32 and Route 9 into surrounding communities.

Unfortunately, there are six bridges on these routes that are located within the floodplains for Ware, and recent weather events (for example, the October 15, 2005 storm) demonstrated that these bridges can be inundated in heavy rains.

15. Bridges Located on Evacuation Routes

Bridge over Swift River – Route 9, Belchertown Line

Church Street Bridge – Upper Church Street

Muddy Brook Bridge – West Main Street

Beaver Lake Bridge – Babcock Tavern Road

Flat Brook Bridge #1 – Belchertown Road

Ware/Hardwick Covered Bridge – Old Gilbertville Road

Hardwick Pond Road Bridge – Hardwick Pond

Flat Brook Bridge #2 – West Street

South Street Bridge #2 – South Street

Category 2 – Non Emergency Response Facilities

The town has identified these facilities as non-emergency facilities; however, they are considered essential for the everyday operation of Ware.

1. Ware PWS is supplied by six wells. Wells #1,2,3,4 and the collection

cistern are in Ware off of Barnes Street. Wells #1,2,3 and 4 all discharge into a collection cistern. The Dismal Swamp Well is located near the Ware River off Upper Church Street and State Route 32. Ware Water Department can meet demand with any one source off line. Well #5 is off Gilbertville Road.

Drinking Water Storage Distribution Tank – Old Gilbertville Road
Drinking Water Storage Distribution Tanks – Dugan Road

2. Sewer Infrastructure (and Pump Stations)

Ware’s Wastewater Treatment Facility – Robbins Road
Ware’s wastewater facilities are gravity-fed.

3. Problem Culverts

A list of potential problem culverts compiled by the Road Agent is included at the end of this plan as Appendix E.

Category 3 – Facilities/Populations to Protect

The third category contains people and facilities that need to be protected in event of a disaster.

1. Special Needs Population

Upper Church Street
Walter Drive
Colonial Village
Ware Brook Village
Ten Percent of Ware’s Downtown Population Reports Special Needs

2. Elderly Housing/Assisted Living

Town of Ware Housing Authority – 20 Valley View

Town of Ware Housing Authority – 161 West Street

3. Recreation Areas

Veterans Memorial Park, Main St
Memorial Athletic Field, South St
Greenville Park, Church St.
Barnes Street Field
South Street School Area

Ware Junior-Senior High
Water Tower Field
Reed Pool
Banas Property

4. Schools

Head Start School – Malboeuf Road
Kidstop Preschool – Church Street
Kidstop Preschool – West Street
Koziol Elementary School – Gould Road
St. Mary’s School – South Street
The First Step School – Malboeuf Road
Trinity Christian Nursery School – Park Street
Ware High School – West Street
Ware Middle School – West Street

5. Churches

All Saint’s Church – North Street

Saint Mary’s Church – South Street
United Church – Church Street
Holy Cross Church – Maple Street
Kingdom Hall of Jehovah’s Witness – Gilbertville Road
Quabbin Valley Baptist Church – Malboeuf Road
Trinity Episcopal Church – Park and Pleasant Streets
United Church of Ware – Church Street

6. Historic Buildings/Sites

Ware Center Meeting House – Route 9

Ware/Hardwick Covered Bridge – Old Gilbertville Road
Young Men’s Library – Main Street

7. Apartment Complexes

Colonial Village Apartments – 181 West Street

Highland Village Apartments – Highland Street
Hillside Village Apartments – Convent Hill Road

8. Employment Centers

Main Street / West Street Area
Country Bank and Savings Campus
Kanzaki Paper – Cummings Street

9. Camps

No Camps in Ware

10. Mobile Home Parks

Oakwood Mobile Home Park – Monson Turnpike Road

Pond Brook Mobile Home Park – North Street

Category 4 – Potential Resources

Contains facilities that provide potential resources for services or supplies.

1. Food/Water

Big Y Super Market – West Street

Wal-Mart Super Market – Palmer Road

Ware High School – West Street

National Guard Armory – West Street

Koziol Elementary School – Gould Street

Ware Junior High – West Street

2. Hospitals/Medical Supplies

Bay State Mary Lane Hospital - South Street, Ware

Wing Memorial Hospital – Wright Street, Palmer

Critical Facilities and Evacuation Routes Potentially Affected by Hazard Areas

Hazard Type	Hazard Area	Critical Facilities Affected	Evacuation Routes Affected
Flooding (100-year Flood)	<p>Snow's Pond Dam. Breach would affect Barnes St., residents. Also could have major impact to public water supply system.</p> <p>Quarry St., Morse Ave., Milner St., Maple St., Ross Ave., and parts of East St.(Rts.9&32)are potential to severe flooding due to large Beaver Dam located on Coy's Hill.</p> <p>West St.(Rt. 32) by Vernon St., Flood Plain Zone. Beaver Lake Rd., near Babcock Tavern Rd. Potential for severe flood damage to residents. Large Beaver Dam located on Beaver Brook.</p>	Public Water Supply Facilities, bridges	Route 9, Route 32
Sever Snowstorms/Ice Storms	Entire town. Isolated populations along Fisherdick Road, Monson Turnpike Road, Webster Road, and around Beaver Lake	Vulnerable populations	Route 9, Route 32
Severe Thunderstorms (microbursts)	Gibbs Crossing section of town; commercial properties.	Commercial activities, local tax base.	Route 32
Hurricanes	Entire town.	Power lines, built structures housing emergency response equipment, vulnerable populations.	Route 9, Route 32
Tornadoes	Entire Town	Power lines, built structures housing emergency	N/A

		response equipment, vulnerable populations	
Wildfires/Brushfires	Wooded portions of north Ware	Watershed Lands for MWRA	N/A
Earthquake	Entire Town.	Windsor Dam	Route 9 and Route 32
Dam Failures	High hazard dams listed on DCR's registry	Life and property for all parcels located within inundation zones	Route 9 and Route 32
Drought	Entire Town	All affected equally, depending on severity	N/A

(Critical Facilities Map Located In Back of Plan)

5 – CURRENT MITIGATION STRATEGIES

Flooding

The Critical Facilities, Infrastructure, 1999 Land Use & Natural Hazards Map for the Town of Ware shows the 100-year flood zone identified by FEMA flood maps. The 100-year flood zone is the area that will be covered by water as a result of a flood that has a one percent chance of occurring in any given year. The 100-year flood zone covers mostly narrow bands of level floodplain land along the Swift River, Beaver Brook, Penny Brook, Ware River, and Muddy Brook.

The major floods recorded in Ware during the 20th century have been the result of rainfall alone or rainfall combined with snowmelt. One of the goals of this Natural Hazards Mitigation Plan is to evaluate all of the town's existing policies and practices related to natural hazards and identify potential gaps in protection.

Management Plans

The Comprehensive Emergency Management (CEM) Plan for Ware lists the following generic mitigation measures for flood planning:

- Identify areas in the community that are flood prone and define methods to minimize the risk. Review National Flood Insurance Maps.
- Disseminate emergency public information and instructions concerning flood preparedness and safety.
- Community leaders should ensure that Ware is enrolled in the National Flood Insurance Program.
- Strict adherence should be paid to land use and building codes, (e.g. Wetlands Protection Act), and new construction should not be built in flood prone areas.
- Ensure that flood control works are in good operating condition at all times.
- Natural water storage areas should be preserved.

- Maintain plans for managing all flood emergency response activities including addressing potentially hazardous dams.

The Comprehensive Emergency Management (CEM) Plan for Ware lists the following generic preparedness and response measures for floods:

- Place EOC personnel on standby during stage of flood 'watch' and monitor NWS/New England River Forecast Center reports.
- Ensure that public warning systems are working properly and broadcast any information that is needed at this time.
- Review mutual aid agreements.
- Monitor levels of local bodies of water.
- Arrange for all evacuation and sheltering procedures to be ready for activation when needed.
- Carry out, or assist in carrying out needed flood-proofing measures such as sand bag placement, etc.
- Regulate operation of flood control works such as floodgates.
- Notify all Emergency Management related groups that will assist with flood response activities to be ready in case flood 'warning'.
- Broadcast warning/notification of flood emergency.
- Coordinate traffic control and proceed with evacuation of affected populations as appropriate.
- Open and staff shelters and reception centers.
- Undertake, or continue to carry out, flood proofing measures.
- Dispatch search and rescue teams.
- Dispatch emergency medical teams

Evacuation Options

The majority of land subject to the 100-year floodplain in town, which is located along the Swift River, Beaver Brook, Penny Brook, the Ware River and Muddy Brook. According to the Ware CEM Plan, local officials have

stated that there are local shelters available for flooding victims, including people with Special, non-institutional needs. In that case, the shelter is the Koziol Elementary School. Emergency management personnel should assess existing floodplain and dam failure data to determine an appropriate evacuation plan.

In addition, Ware has eight bridges situated either in or near the 100-year floodplain, which could make evacuation efforts as a result of dam failure more difficult. Some of the roads that residents would most likely take to reach safety travel through flood-affected areas.

Flood Control Structures

FEMA has identified no flood control structures within the Town of Ware.

Land Use Regulations that Mitigate Impacts from Flooding¹⁶

The Town of Ware has adopted several land use regulations that serve to limit or regulate development in floodplains, to manage stormwater runoff, and to protect groundwater and wetland resources, the latter of which often provide important flood storage capacity. These regulations are summarized below and their effectiveness evaluated in Table 4-1.

Subdivision Rules and Regulations

Ware's most recent draft of its Subdivision Rules and Regulations (1987) which govern the subdivision of land were adopted for the purpose of "protecting the safety, convenience and welfare of the inhabitants of [Ware] by regulating the laying out and construction of ways in subdivisions providing access to the several lots therein, but which have not become public ways, and ensuring sanitary conditions in subdivisions and in proper cases parks and open areas. The powers of a planning board and of a board of appeals under the subdivision control law shall be exercised with due regard for the provision of adequate access to all of the lots in a subdivision by ways that will be safe and convenient for travel; for lessening congestion in such ways and in the adjacent public ways; for reducing danger to life and limb in the operation of motor vehicles; for securing safety in the case of fire, flood, panic and other emergencies; for insuring compliance with the applicable zoning ordinances or by-laws; for securing adequate provision for water, sewerage, drainage, underground utility services, fire, police, and other

¹⁶ All bulleted items and direct quotes in the Ware Local Natural Hazards Mitigation Plan are taken from the Town of Ware's zoning bylaw and subdivision regulations. Other references to those documents contained herein are paraphrases of the same.

similar municipal equipment, and street lighting and other requirements where necessary in a subdivision; and for coordinating the ways in a subdivision with each other and with the public ways in the city or town in which it is located and with the ways in neighboring subdivisions. It is the intent of the subdivision control law that any subdivision plan filed with the planning board shall receive the approval of such board if said plan conforms to the recommendation of the board of health and to the reasonable rules and regulations of the planning board pertaining to subdivisions of land; provided, however, that such board may, when appropriate, waive, as provided for in section eighty-one R, such portions of the rules and regulations as is deemed advisable." The Subdivision Rules and Regulations contain several provisions that mitigate the potential for, and impact of, flooding.

For details on how this occurs, please refer to Appendix F for complete text excerpted from relevant sections.

Ware Zoning By-Laws

The Town of Ware has established a set of bylaws designed in part to "to promote the general welfare, health, safety and convenience of the inhabitants of Ware, to protect the community and its natural resources, to promote sound growth, to conserve the value of land and buildings, to preserve and increase the town's Amenities, to encourage housing for all income levels, to encourage economic activity, to encourage the most appropriate use of land within the town, and to provide the Town of Ware the protection authorized by the General Law, Chapter 40A, as amended." The Zoning By-Laws include several provisions that mitigate the potential for flooding.

For details on how this occurs, please refer to Appendix G for complete text excerpted from relevant sections.

River and Stream Protection

The Town of Ware follows the standards established by the Wetlands Protection Act, which protects water bodies and wetlands through the town Conservation Commission. The Town also has instituted its Floodplain/Wetland Overlay District, an overlay district that provides restrictions and standards regarding the types of development that can be located within the town's floodplains, as well as restrictions on negative impacts to the flood storage capacity of the land. The Water

Supply Protection District also limits development within the watersheds of the town's drinking water supplies.

Ware Open Space and Recreation Plan

Recent efforts by the Town of Ware Conservation Commission and others have resulted in the creation of municipal plans that are useful for flood hazard mitigation purposes. In 2007, the town completed its Open Space and Recreation Plan. The intent of the document is not to address hazard mitigation or flood control in a direct or comprehensive way; however, it inventories the natural features and environments in the town, many of which, such as wetlands, aquifer recharge areas, farms, rivers, streams, and brooks, contain floodplain, dam failure inundation or localized flooding areas.

The current plan highlights the importance of balancing future development with the preservation of the community's natural and scenic resources. The preservation of open space and farmland will provide flood storage capacity, which reduces the amount of impervious surfaces in an area, as well as other benefits not directly related to natural hazard mitigation.

National Flood Insurance Program

The Town of Ware participates in the National Flood Insurance Program. As of 2006, there were 27 policies in effect in Ware for a total of \$5,553,300 worth of insurance. The town is not a member of the Community Rating System, which entitles policyholders to a discount on flood insurance premiums. The CRS ranking is based on the steps that a town has taken to control flood losses.

The Community Rating System reduces flood insurance premiums to reflect what a community does above and beyond the National Flood Insurance Program's (NFIP) minimum standards for floodplain regulation. The objective of the CRS is to reward communities for what they are doing, as well as to provide an incentive for new flood protection activities. To participate in the CRS, a community must fill out an application and submit documentation that shows what it is doing and that its activities deserve at least 500 points. More information including instructions and applications is available at <http://training.fema.gov/EMIWeb/CRS/m3s1main.htm>.

**Table 5-1
Existing Flood Hazard Mitigation Measures**

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Improvement
<p>Subdivision Rules and Regulations</p>	<p>Requires a definitive plan that shows layout of water and sewer as well as 100-year flood elevation.</p> <p>Development Impact Statement requires a description of existing natural and man-made hydrological features; descriptions of alterations of water bodies; soil and water limitations.</p> <p>Requires stormwater drains on streets be designed to meet 10 year storm; 25 year storm when near natural waterways.</p> <p>Requires easements for natural waterways; 20 foot buffer from natural course and no less than 5 feet of annual high water mark.</p>	<p>Entire Town, all new developments</p>	<p>Effective for New Construction</p>	<p>Conservation Commission Order of Conditions-Requiring annual inspection of waterways to clean out debris.</p>

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Improvement
Zoning Bylaws: Site Plan Review Flood Hazard District Water Supply Protection District Rural Quabbin Zoning District	<p>Requires drainage structures that are designed for 25-year storm</p> <p>Restricts development, allows only conservation, farming and forestry, and passive recreation, and reconstruction of residential; mobile homes in Flood Plain in AS1 – AS130 must be elevated.</p> <p>Restricts hazardous chemicals, industrial uses and minimizes impervious surfaces on lot (max 50%); as well as limits sedimentation.</p> <p>The Commonwealth owns this land, and development is not permitted</p>	<p>Entire Town</p> <p>Delineated on FIRM</p> <p>Primary and Secondary Recharge Areas</p> <p>Quabbin Watershed</p>	<p>Somewhat Effective</p> <p>Very Effective</p> <p>Somewhat Effective</p> <p>Very Effective</p>	<p>Adoption of a Sedimentation Bylaw that is in compliance with NPDES Phase II regulations</p> <p>Increasing lot size to reduce development pressures in critical resource areas.</p>
Special Permits	<p>Planning Board evaluates impacts of local flooding.</p>	<p>Entire Town</p>	<p>Effective</p>	<p>Maintain commitment to evaluating flood</p>

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Improvement
				hazards
Town of Ware Open Space and Recreation Plan	Ware is updating its OSRP, and will be completed with this work in 2007	Entire Town	Effective	Prioritize funding according to ecological benefit and mitigation potential.
Participation in the National Flood Insurance Program	As of 2006, there were 27 homeowners with flood insurance policies.	Areas identified by the FEMA maps.	Somewhat effective, provided that the town remains enrolled in the National Flood Insurance Program.	<p>The town should evaluate whether to become a part of FEMA's Community Rating System.</p> <p>Education and outreach to homeowners.</p> <p>As a condition of the Town's Housing Rehabilitation Program, the first year of flood insurance is paid for by the town; modify agreement to require flood insurance to protect Ware's investment in these</p>

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Improvement
				properties.
Beaver Management Strategy	There is a need for controlling the beaver population in critical locations whereby dam flooding can cause significant damage to public and private property as well as produce public safety hazards.	Areas within the 100-Year Floodplain.	Would be effective in controlling the negative impacts of flooding caused by beaver activity.	<p>Develop a Beaver Management Strategy in cooperation with the Ware Board of Health.</p> <p>Community outreach for legal approaches to conflicts over beaver habitat.</p>

Severe Snowstorms/Ice Storms

Winter storms can be especially challenging for emergency management personnel even though the storm has usually been forecast. The Massachusetts Emergency Management Agency (MEMA) serves as the primary coordinating entity in the statewide management of all types of winter storms and monitors the National Weather Service (NWS) alerting systems during periods when winter storms are expected.¹⁷ The average snowfall in Ware falls between the range of 48.1 to 72 inches per year, making it more likely to receive snow than the Connecticut River Valley Towns and less likely to receive snow than towns located in the Berkshire Hills.

Management Plans

The CEM Plan for Ware lists the following generic mitigation measures for severe winter storms:

- Develop and disseminate emergency public information concerning winter storms, especially material which instructs individuals and families how to stock their homes, prepare their vehicles, and take care of themselves during a severe winter storm.
- As it is almost guaranteed that winter storms will occur annually in Massachusetts, local government bodies should give special consideration to budgeting fiscal resources with snow management in mind.
- Maintain plans for managing all winter storm emergency response activities.

To the extent that some of the damages from a winter storm can be caused by flooding, all of the flood protection mitigation measures described in Table 4-1 can also be considered as mitigation measures for severe snowstorms/ice storms.

The CEM Plan for Ware lists the following generic preparedness and response measures for severe winter storms:

- Ensure that warning/notification, and communications systems are in readiness.

¹⁷ Comprehensive Emergency Management Plan for the Town of Leverett, August 1999.

- Ensure that appropriate equipment and supplies, (especially snow removal equipment), are in place and in good working order.
- Review mutual aid agreements.
- Designate suitable shelters throughout the community and make their locations known to the public.
- Implement public information procedures during storm 'warning' stage.
- Prepare for possible evacuation and sheltering of some populations impacted by the storm (especially the elderly and special needs).
- Broadcast storm warning/notification information and instructions.
- Conduct evacuation, reception and sheltering activities.
- If appropriate, activate media center. Refer to Resource Manual for media center information.
- Dispatch search and rescue teams.
- Dispatch emergency medical teams.
- Take measures to guard against further danger from power failure, downed trees and utility lines, ice, traffic problems, etc.
- Close roads, and/or limit access to certain areas if appropriate.
- Provide assistance to homebound populations needing heat, food, and other necessities.
- Provide rescue and sheltering for stranded/lost individuals.

Restrictions on Development

There are no restrictions on development that are directly related to severe winter storms. The Town of Ware Subdivision Rules and Regulations set grade limits on streets that are included in an Alternative Procedures Plan (Section 2300) and as part of its Section 4000 Required Improvements, and restrictions on utility placement (Section 4400. Municipal Services), which, although not specified as weather hazard

mitigation, can serve to minimize accident potential and power loss from severe winter.

For Details on how the Town Of Ware uses its Subdivision Regulations to protect the Town from winter storms, please refer to Appendix.

Other Mitigation Measures

Severe snowstorms or ice storms can often result in a small or widespread loss of electrical service. The emergency shelters in Ware have emergency generators that will provide electric power in the event of primary power failure. However, the churches, which are also designated as temporary shelters, do not have the capacity to produce emergency power as of December, 2006.

State Building Code

For new or recently built structures, the primary protection against snow-related damage is construction according to the State Building Code, which addresses designing buildings to withstand snow loads. The Town of Ware has arrangements for building inspection services.

**Table 5-2
Existing Severe Snowstorms/Ice Storms Hazard Mitigation Measures**

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Improvement
Subdivision Regulations – Design Standards for Roads	Ware’s subdivision regulations set a maximum grade of 6% for driveways.	Entire Town	Effective for new construction.	<p>Increasing lot size in hilly areas of town through a Hillside Preservation Bylaw. This will give homeowners more flexibility with driveway construction.</p> <p>Increase the allowable units served by a common driveway to four. This will minimize damage to the landscape and result on roads that are easier to traverse in harsh weather.</p>
Subdivision Regulations – Utilities (electric and telephone)	Ware requires that all new subdivisions have buried utilities.	Entire Town	Very Effective	Work with utility companies to underground existing utility lines in locations where repetitive outages occur.
State Building Code	Ware has adopted the 6 th edition of the state building code	Entire Town	Effective	None.

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Hurricanes

Of all the natural disasters that could potentially impact Ware, hurricanes provide the most lead warning time because of the relative ease in predicting the storm's track and potential landfall. MEMA assumes "standby status" when a hurricane's location is 35 degrees North Latitude (Cape Hatteras) and "alert status" when the storm reaches 40 degrees north Latitude (Long Island).¹⁸ The flooding associated with hurricanes can be a major source of damage to buildings, infrastructure and a potential threat to human lives. Therefore, all of the flood protection mitigation measures described in Table 4-1 can also be considered hurricane mitigation measures. High winds that oftentimes accompany hurricanes can also damage buildings and infrastructure. Ware has a 500-year wind probability rating of 120 m.p.h. The climatological record for Massachusetts indicates that Ware has never been the direct recipient of a hurricane-force event, but that a tropical storm has passed through Belchertown to the east and Palmer to the south; and that three hurricanes (two Category 2 and one Category 1) have hit Hampshire and Hampden Counties.

Town of Ware telecommunications facilities bylaw, restrictions on development, and mobile home and State Building Code regulations, as listed in Appendix G, are equally applicable to wind events such as hurricanes and tornadoes.

Management Plans

The CEM Plan for Ware includes the following generic mitigation measures for hurricane planning and response:

- Develop and disseminate emergency public information and instructions concerning hurricane preparedness and safety.
- Community leaders should ensure that Ware is enrolled in the National Flood Insurance Program.
- Develop and enforce local building codes to enhance structural resistance to high winds and flooding. Build new construction in areas that are not vulnerable to direct hurricane effects.

¹⁸ Comprehensive Emergency Management Plan for the Town of Leverett, August 1999.

- Maintain plans for managing all hurricane emergency response activities.

The CEM Plan for Ware includes the following generic preparedness and response measures for hurricanes:

- Ensure that warning/notification systems and equipment is ready for use at the 'hurricane warning' stage.
- Review mutual aid agreements.
- Designate suitable wind and flood resistant shelters in the community and make their locations known to the public.
- Prepare for coordination of evacuation from potentially impacted areas including alternate transportation systems and locations of special needs facilities.
- Activate warning/notification systems to inform public of protective measures to be taken including evacuation where appropriate.
- Conduct evacuation of affected populations.
- Open and staff shelters and reception centers.
- Dispatch search and rescue teams.
- Dispatch emergency medical teams.
- Activate mutual aid activities.
- Take measures to guard against further danger from downed trees and utility lines, debris, etc.

Evacuation Options

According to the Ware CEM plan, local officials have stated that the Ware High School and the Ware Middle School Elementary School are the appropriate shelter for residents in the case of a hurricane.

Restrictions on Development

The only restrictions on development that are wind-related are the provisions in the zoning bylaw related to telecommunications facilities.

Mobile Homes

According to the Town of Ware Zoning Bylaws, 4.22, Mobile homes are prohibited in all districts unless located in a mobile home park; and According to Section 4.430, "A mobile home may be placed on the site of a residence which has been rendered uninhabitable by accident provided it is used for a period not to exceed 12 months as the primary residence of the owners of the residence which has been rendered uninhabitable."

State Building Code

For new or recently built structures, the primary protection against wind-related damage is construction that adheres to the State Building Code, which, when followed, results in buildings that withstand high winds. The Town of Ware provides building inspection services.

Tornadoes

Worcester County and areas just to its west, including portions of Hampshire County, have been dubbed the "tornado alley" of the state because the majority of significant tornadoes in Massachusetts's weather history have occurred in that region.¹⁹ According to the *Institute for Business and Home Safety*, the wind speeds in most tornadoes are at or below design speeds that are used in current building codes.²⁰ Like earthquakes, the location and extent of potential damaging impacts of a tornado are completely unpredictable. Most damage from tornadoes comes from high winds that can fell trees and electrical wires, generate hurtling debris and, possibly, hail. Between 1950 and 2004, one tornado has struck Ware, but the abutting towns of West Brookfield and New Braintree, in Worcester County, have received four tornado strikes in the same period of time. Ware falls within the high density cone of probability for Massachusetts.

Management Plans

The CEM Plan for Ware includes the following generic mitigation measures for tornado planning and response:

- Develop and disseminate emergency public information and instructions concerning tornado safety, especially guidance

²¹ National Weather Service Storm Prediction Center

²⁰ www.ibhs.org.

regarding in-home protection and evacuation procedures, and locations of public shelters.

- Strict adherence should be paid to building code regulations for all new construction.
- Maintain plans for managing tornado response activities. Refer to the non-institutionalized, special needs and transportation resources listed in the Resource Manual.

The CEM Plan for Ware includes the following generic preparedness and response measures for tornadoes:

- Designate appropriate shelter space in the community that could potentially withstand tornado impact.
- Periodically test and exercise tornado response plans.
- Put Emergency Management on standby at tornado 'watch' stage.
- At tornado 'warning' stage, broadcast public warning/notification safety instructions and status reports.
- Conduct evacuation, reception, and sheltering services to victims.
- Dispatch search and rescue teams.
- Dispatch emergency medical teams.
- Activate mutual aid agreements.
- Take measures to guard against further injury from such dangers as ruptured gas lines, downed trees and utility lines, debris, etc.
- Acquire needed emergency food, water, fuel, and medical supplies.
- Take measures relating to the identification and disposition of remains of the deceased.

Evacuation Plans

The Ware Middle School and the Ware High School are the appropriate shelters.

**Table 5-3
Existing Hurricane & Tornado Hazard Mitigation Measures
(Wind-related)**

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Improvement
Zoning regulations for Tele-communications Facilities	Wireless Communications Bylaw requires that the setback for a structure be 150% of the tower's maximum height	Entire Town	Very	Consider adding safety and prevention of wind-related damage as a stated purpose.
Subdivision Regulations – Utilities (electric and telephone)	The town requires all utilities for new subdivisions to be underground.	Entire town.	Somewhat effective for ensuring that utility service is uninterrupted by severe storms in new areas of residential development.	Work with utility companies to underground new utility lines in general and existing utility lines in locations where repetitive outages occur.

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Improvement
Zoning Regulations regarding new mobile homes	Prohibited unless grandfathered	Where this use is Permitted	Does not address the potential for wind-related damage to mobile homes.	Review existing bylaw, determine if existing regulations can be amended to require anchoring.
State Building Code	The Town of Ware has adopted the Massachusetts State Building Code.	Entire town.	Effective.	None.

Debris Management Plan	A debris management plan could be developed. ²¹	Entire town.	Effective.	Consider participation in the creation of a Regional Debris Management Plan.
Shelters	The shelters in Ware are designated for all emergency situations.	Entire town.	Somewhat effective.	Emergency generators for sites that have been designated as overflow/alternate shelters. Educated citizens about Ware's Reverse 911 dialing capacities, so that they know what to do when a call comes.

²¹ Natural disasters can precipitate a variety of debris, including trees, construction and demolition materials and personal property. After a natural disaster, potential threats to the health, safety and welfare of impacted citizens can be minimized through the implementation of a debris management plan. Such a plan can be critical to recovery efforts after a disaster, including facilitating the receipt of FEMA funds for debris clearance, removal and disposal. Additional information is available at <http://www.fema.gov/rrr/pa/dmgbroch.shtm>.

Wildfires/Brushfires

Hampshire and Hampden Counties have approximately 469,587 acres of forested land, which accounts for 62 percent of total land area. Forest fires are therefore a potentially significant issue. In Ware approximately 62 percent of the town's total land area is in forest, or about 15,789 acres, and is therefore at risk of fire. In 2004, there were 30 outdoor fires reported in Ware in 2004. As a point of comparison, there were 55 fires reported in Ware during the same time period, including indoor and outdoor fires ²².

Regulatory Measures

Burn Permits: The Ware Fire Department is the sole agency responsible for issuing burn permits in Ware.

Mobile Home Site Plan Review: The Ware Fire Department reviews site plans for Mobile Home site plans to guarantee adequate provision of water and fire fighting capacity.

Subdivision Review: Once a subdivision has been approved, no lot shall be built upon without adequate provision of on-site water and fire fighting supplies. Furthermore, the Board of Health may require on-site provision of water and fire fighting supplies to the extent required by the Fire Chief.

Public Education/Outreach: The Ware Fire Department has an outreach program in place that allows the Ware Fire Department to partner with the senior center to inspect and replace smoke detectors. Furthermore, the Ware Fire Department has an active Triad program.

Restrictions on Development: All industrial development (as per Section 5.6) must have fire-fighting and fire-suppression located on-premise when the use has storage facilities for inflammable and explosive materials

²² *Massachusetts Fire Incident Reporting System, 2005.*

**Table 5-4
Existing Wildfire/Brushfire Hazard Mitigation Measures**

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	How Can Ware Improve This
Burn Permits	Residents are issued one burn permit; required to call on the day of proposed burning to determine whether or not burning is allowed.	Entire town.	Effective.	None.
Subdivision Review: Fire Safety	The Fire Department is involved in the review of mobile home site plans, subdivision definitive plans and all other site plans. Ware requires adequate fire safety measures on development sites	Entire town. Entire town.	Effective. Effective	None
Public Education/Outreach	Ware's Fire Department participates in the	Entire town.	Effective.	None.

	Student Awareness Fire Education Program (SAFE).			
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Earthquakes

Based upon historical evidence, one earthquake was recorded in Ware in 1941 and that is the only time an earthquake has struck the town in recent history. To the south, Palmer recorded an earthquake in 1854 and, on the other side of the known fault line, several towns along the Connecticut River Valley floor have recorded earthquakes.

Although there are five mapped seismological faults in Massachusetts and none in Ware (a known fault line does pass through the abutting town of Belchertown), there is no discernable pattern of previous earthquakes along these faults nor is there a reliable way to predict future earthquakes along these faults or in any other areas of the state. Consequently, earthquakes are arguably the most difficult natural hazard to plan for. Most buildings and structures in the state were constructed without specific earthquake resistant design features.

Earthquakes can involve 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;
- Major transportation accidents, (railroad, chain highway crashes, aircraft, and marine);
- Extended power outage;
- Fire and/or explosion;
- HAZMAT accident; and,
- Water contamination.

Management Plans

The Ware CEM Plan lists the following generic mitigation measures for earthquakes:

- Community leaders in cooperation with Emergency Management Personnel should obtain local geological information and identify and assess structures and land areas that are especially vulnerable to earthquake impact and define methods to minimize the risk.
- Strict adherence should be paid to land use and earthquake resistant building codes for all new construction.
- Periodic evaluation, repair, and/or improvement should be made to older public structures.
- Emergency earthquake public information and instructions should be developed and disseminated.
- Earthquake drills should be held in schools, businesses, special care facilities, and other public gathering places.

The Ware CEM Plan lists the following generic preparedness and response measures for earthquakes:

- Earthquake response plans should be maintained and ready for immediate use.
- All equipment, supplies and facilities that would be needed for management of an earthquake occurrence should be maintained for readiness.
- Emergency Management personnel should receive periodic training in earthquake response.
- If the designated Emergency Operations Center (EOC) is in a building that would probably not withstand earthquake impact, another building should be chosen for an earthquake EOC.
- Mass Care shelters for earthquake victims should be pre-designated in structures that would be most likely to withstand earthquake impact.
- EOC will be activated and response will immediately be engaged to address any and all earthquake effects listed.
- Emergency warning/notification information and instructions will be broadcast to the public.

- Search and rescue teams will be dispatched.
- Emergency medical teams will be dispatched.
- Firefighters will address fires/explosions, and HAZMAT incidents.
- Law enforcement personnel will coordinate evacuation and traffic control.
- Reception centers and shelters will be opened and staffed.
- Animal control measures will be taken.
- Law enforcement personnel will protect critical facilities and conduct surveillance against criminal activities.
- Immediate life-threatening hazards will be addressed such as broken gas lines, downed utility wires, and fire control resources.
- Emergency food, water, and fuel will be acquired.
- Activate mutual aid.
- Measures will be taken relating to identification and disposition of remains of deceased by the Chief Medical Examiner.

Evacuation Options

The Ware CEM lists two shelters for victims of earthquakes. They are the Ware Middle School and the Ware High School.

The maximum peak population affected by an earthquake is estimated at 6,174 people.

State Building Code

State and local building inspectors are guided by regulations put forth in the Massachusetts State Building Code. The first edition of the Massachusetts State Building Code went into effect on January 1, 1975 and included specific earthquake resistant design standards. These seismic requirements for new construction have been revised and updated over the years and are part of the current, 6th Edition of the Massachusetts State Building Code. Given that most structures in Massachusetts were built before 1975, of many buildings and structures do

not have specific earthquake resistant design features. According to the 2000 U.S. Census, 57 percent of the housing in Ware was built before 1970. In addition, built areas underlain by artificial fill, sandy or clay soils are particularly vulnerable to damage during an earthquake.

Restrictions on Development

There are no seismic-related restrictions on development.

**Table 5-5
Existing Earthquake Hazard Mitigation Measures**

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Potential Changes
State Building Code	The Town of Ware has adopted the 6 th Edition of the State Building Code.	Entire town but applies to new construction only.	Effective for new buildings only.	Evaluate older structures to be used as shelters and the Elementary School to determine if they are earthquake resistant.
Debris Management Plan	A debris management plan could be developed.	Entire town.	Effective.	Consider participation in the creation of a Regional Debris Management Plan.
Shelters	Ware’s High School is the most likely shelter for earthquake victims.	Entire town.	Effective.	Consider identifying shelters for all natural disasters in Ware; Identify any problems with existing structures that might compromise integrity in an earthquake.

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Dam Failures

The only mitigation measures in place are the state regulations that control the construction and inspection of dams.

The Ware CEM plan states that there are three categories of dam failure or overflow and that action should be taken according to hazard rating:

Type 1: Slowly developing condition

- Activate EOC
- Activate all communication networks
 - Establish communications with Command Post
 - On a 24-hour basis.
- Release public information
- Notify
 - MEMA Region Headquarters
 - American Red Cross
 - Downstream communities
- Review Plans for evacuation and sheltering
 - Evacuation
 - Routes
 - Notification
 - Sheltering
 - Availability and capacity
 - Food, supplies and equipment
 - Shelter owners and managers
 - Other communities (if out of town sheltering is required)
- Require “Stand By” status of designated emergency response forces.

Type 2: Rapidly developing condition

- Establish a 24-hour communications from dam site to EOC.
- Assemble, brief and assign specific responsibilities to emergency response forces.
- Release public information.

- Obtain and prepare required vehicles/equipment for movement.
- Prepare to issue warning.

Type 3: Practically instantaneous failure

- Issue warning
- Commence immediate evacuation.
- Commit required resources to support evacuation.
- Activate shelters or coordinate activation of shelters located outside the community.
- Notify:
 - MEMA Region Headquarters
 - Red Cross
- Initiate other measures as required to protect lives and property.

Management Plans and Regulatory Measures

The Ware CEM Plan contains the following generic mitigation measures for dam failure:

- Develop and conduct public education programs concerning dam hazards.
- Maintain up-to-date plans to deal with threat and actual occurrence of dam over-spill or failure.
- Emergency Management and other local government agencies should familiarize themselves with technical data and other information pertinent to the dams, which impact Ware. This should include determining the probable extent and seriousness of the effect to downstream areas.
- Dams should be inspected periodically and monitored regularly.
- Repairs should be attended to promptly.

- As much as is possible burdens on faulty dams should be lessened through stream re-channeling.
- Identify dam owners.
- Determine minimum notification time for down stream areas.

The Ware CEM Plan contains the following generic preparedness and response measures for dam failure:

- Pre-place adequate warning/notification systems in areas potentially vulnerable to dam failure impact.
- Pre-place procedures for monitoring dam site conditions at first sign of any irregularity that could precipitate dam failure.
- Identify special needs populations, evacuations routes, and shelters for dam failure response.
- Have sandbags, sand, and other items to reinforce dam structure or flood proof flood prone areas.
- Disseminate warning/notification of imminent or occurring dam failure.
- Coordinate evacuation and sheltering of affected populations.
- Dispatch search and rescue teams.
- Coordinate evacuation and sheltering of affected populations.
- Activate mutual aid if needed.
- Acquire additional needed supplies not already in place, such as earth moving machinery.
- Establish incident command post as close to affected area as safely possible.
- Provide security for evacuated public and private property.

Evacuation Options

The Ware CEM Plan identifies the Windsor Dam and the Goodnough Dike as two local High Hazard dams with the greatest potential impact on persons and property in town. In the event of the catastrophic failure of an upstream dam such as the Windsor Dam, there is potential for catastrophic damage to portions of town along River Road. Evacuation would have to occur rapidly to the Belchertown High School, the Ware High School or the Koziol Elementary School.

Permits Required for New Dam Construction

Massachusetts State Law (M.G.L. Chapter 253 Section 45) regulates the construction of new dams. A permit must be obtained from the Department of Conservation and Recreation (DCR) before construction can begin. One of the permit requirements is that all local approvals or permits must be obtained.

Dam Inspections

The DCR requires that dams rated as Low Hazards are inspected every ten (10) years; that dams rated as Medium/Significant Hazards are inspected every five (5) years; and that dams rated as High Hazards be inspected every two (2) years. As of 2005, it is the responsibility of the dam owner to make sure he or she is in compliance with DCR's rules and regulations for inspecting their property. For this reason, the town must work with landowners and DCR to ensure that inspections are occurring in a timely, efficient and safe manner.

Zoning

There is no mention made regarding the construction of new dams in the Town of Ware zoning or subdivision regulations.

Restrictions on Development

There are no town restrictions on dam locations. The DCR issues permits for new dams and does have the authority to deny a permit if it is determined that the design and/or location of the dam is not acceptable.

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**Table 5-6
Existing Dam Failure Hazard Mitigation Measures**

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Potential Changes
Permits required for new dam construction	State law requires a permit for the construction of any dam.	Entire town.	Effective. Ensures dams are adequately designed.	None.
Dam Inspections	DCR issues inspection regulations for dams, based in their hazard (low, medium, high hazard). It is the responsibility of the dam owner to make sure they are in compliance with DCR's rules and regulations.	Entire town.	Low. Oversight of inspection activities is difficult to enforce.	<p>Develop a contact for private dam owners, inform them of their obligations under the DCR's policy changes, designate a staff person who will ensure compliance.</p> <p>Identify sources of funding for dam safety inspections.</p> <p>Incorporate dam safety into development review process.</p>

Evacuation Plans	Comprehensive evacuation plans would ensure the safety of the citizens in the event of dam failure.	Inundation areas in town.	None.	None.
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6 – INCORPORATION

Existing plans, studies, reports and technical information were incorporated throughout the planning process. This included a review and incorporation of significant information from the following key documents:

- ☞ *The Ware Comprehensive Emergency Management Plan* (particularly the Critical Infrastructure Section) – the Critical Infrastructure section was used to identify those infrastructure components in Ware that have been identified as crucial to the function of the Town; also, this resource was used to identify special needs populations as well as potential emergency shortcomings.
- ☞ *The Ware Open Space and Recreation Plan* – this Plan was used to identify the natural context within which the Town mitigation planning would take place. This proved useful insofar as it identified water bodies, rivers, streams, infrastructure components (i.e. water and sewer, or the lack thereof), as well as population trends. This was incorporated to ensure that the Town’s mitigation efforts would be sensitive to the surrounding environment. During the OSRP update, the Town can use the work of the PDM Plan to incorporate identified hazard areas into open space and recreation planning. This could either take the form of acquiring parcels of land that are currently undeveloped, but situated within an identified hazard area, as permanent open space, thereby minimizing the likelihood that critical infrastructure components will be constructed in an area prone to damage from natural hazards.
- ☞ The Pioneer Valley Planning Commission developed a Forest Management Plan for the Town of Ware in 2007 to help maximize retention of working Open Space. This is incorporated into hazard mitigation when it serves the purpose of minimizing development in hazard areas.
- ☞ *Ware Community Development Plan*—this Plan was used to identify any action items that might prove successful, based on previous planning efforts.
- ☞ *Ware Zoning Bylaw* - The Town’s Zoning Bylaw was used to gather identify those actions that the Town is already taking that are reducing

the potential impacts of a natural hazard (i.e. floodplain regulations) to avoid duplicating existing successful efforts.

- ☞ *Draft State of Massachusetts' Multi-Hazard Mitigation Plan* - This plan was used to insure that the Town's PDM was consistent with the State's Plan.

7 – FUTURE MITIGATION STRATEGIES

Goal Statements and Action Items

As part of the natural hazards mitigation planning process that will be undertaken by the Ware Natural Hazards Planning Committee, existing gaps in protection and possible deficiencies will be identified and discussed. The committee will then develop general Goal Statements and Action Items that, when implemented, will help to reduce risks and future damages from natural hazards. The Goal Statements, Action Items, town department(s) responsible for implementation, and the proposed timeframe for implementation for each category of natural hazard are described below.

Several of the Action Items have multiple benefits because, if implemented, these Action Items will mitigate or prevent damages from more than one type of natural hazards. For example, updating the Subdivision Regulations to require the input of the Fire Department in the review of preliminary plans will prevent property damage from wildfires.

The public will have the opportunity to comment on all activities through Town Meeting. Before the town can authorize spending items, they must be approved at Ware's Town Meeting. For this reason, the public will have the opportunity to give approval to, or reject, every single project.

General Mitigation Action Items

Goal Statement: To mobilize Ware's municipal resources for the purpose of reducing the likelihood of damage to life and property from a natural hazard.

Action Item: *Update Ware's Hazard Mitigation Plan every five years.*

Responsible Department/Board: Select Board,
Emergency Management Director, Town Manager,
Local Emergency Planning Committee
Proposed Completion Date: Ongoing

Action Item: *Education and outreach to senior citizens, students and special-needs population regarding the hazards that Ware is subject to,*

shelter locations, evacuation routes and general actions that Ware is taking to lessen the impact of a Natural Hazard.

Responsible Department/Board: Select Board,
Emergency Management Director, Town Manager,
Local Emergency Planning Committee, School
Department

Proposed Completion Date: Ongoing

Action Item: *Annual review of Ware's Local Hazard Mitigation Plan with Department heads to evaluate successes and shortcomings of the implementation program.*

Responsible Department/Board: Select Board,
Emergency Management Director, Town Manager,
Local Emergency Planning Committee, Select Board,
Department of Public Works, School Department,
Council on Aging, Planning Department, Police
Department

Proposed Completion Date: Ongoing

Action Item: *Construction of a municipal fuel supply depot to provide town vehicles with a fuel source in the event of a prolonged emergency situation.*

Responsible Department/Board: Select Board,
Emergency Management Director, Department of
Public Works Director

Proposed Completion Date: 2009

Flooding

Overall, the Town of Ware's existing land use regulations regulate development, reduce or eliminate localized flooding events and control the quantity and quality of stormwater runoff. Long-range planning documents such as the town's Open Space and Recreation Plan and Community Development Plan also address flood prevention and mitigation either directly or indirectly in the goals and objectives listed in these documents.

Goal Statement: To take actions that are designed to lessen the impact of a flood in Ware and implement mitigation actions that will reduce the

loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding.

Action Item: Replace the four (4) inadequate culverts on Quarry Street and Morse Avenue; this entails repairing damage from Hurricane Katrina's remnants and increasing capacity beyond the current two-year storm capacity.

Responsible Department/Board: Select Board, DPW, Conservation Commission

Emergency Management Director, Town Manager

Proposed Completion Date: 2008

Action Item: Street upgrades to Maple Street to prevent road damage from flooding.

Responsible Department/Board: Select Board, DPW, Conservation Commission

Emergency Management Director, Town Manager

Proposed Completion Date: 2012

Action Item: The town should evaluate whether to become a part of FEMA's Community Rating System.

Responsible Department/Board: Select Board, Emergency Management Director, Town Manager

Proposed Completion Date: 2007

Action Item: Establish a plan to prioritize and acquire undeveloped properties within flood zones throughout Town.

Responsible Department/Board: Board of Selectmen, Town Manager, Conservation Commission

Proposed Completion Date: 2008

Action Item: Prepare a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town.

Responsible Department/Board: Board of Selectmen, Department of Public Works, Town Manager

Proposed Completion Date: 2009

Action Item: Obtain funding for the repair of a derelict stormwater pump for downtown ware off of Pulaski Street

Responsible Department/Board: Board of Selectmen,
Department of Public Works, Town Manager
Proposed Completion Date: 2008

Action Item: Develop a stormwater management bylaw and bring it to Town Meeting.

Responsible Department/Board: Board of Selectmen,
Department of Public Works, Town Manager
Proposed Completion Date: 2012

Severe Snow Storms/Ice Storms

Goal Statement: Take actions that reduce the impact of Severe Snow and Ice Storms on Ware. Ware's location in New England makes severe winter storms frequent, but the town will implement mitigation actions that minimize the loss of life, damage to property, damage to infrastructure, and the disruption of governmental services and general business activities from severe snow and ice storms.

Action Item: Develop a pamphlet for special needs populations that allows special needs individuals to become familiar with sheltering protocol (e.g. standard practice in Ware to open shelters if power is out for 24 hours).

Responsible Department/Board: Emergency Management Director, Select Board, Council on Aging, School Department
Proposed Completion Date: 2009

Action Item: Construct a municipal salt and sand storage shed to provide Ware's Department of Public Works with a currently-lacking reliable supply of salt and sand in the event of a severe winter event.

Responsible Department/Board: Emergency Management Director, Select Board, Department of Public Works Director.
Proposed Completion Date: 2011

Hurricanes, Tornadoes and Microbursts

The Action Items listed above, under flooding, address the flooding that can result from a hurricane or Tornado/Microburst.

Goal Statement: To mitigate the impacts of high-wind events in Ware through adopting policies and measures that will lessen loss of life, damage to property, damage to infrastructure, and the disruption of governmental services and general business activities that would accompany the high winds associated with hurricanes and tornadoes/Microbursts.

Action Item: Work with the Hampshire Regional Emergency Planning Committee to establish a (Continuity of Operations – Continuity of Government) COOP-COG plan for the Town of Ware; the COOP-COG would develop alternate sites and locations for the handling of all municipal functions.

Responsible Department/Board: Emergency Management Director, Select Board, Town Manager

Proposed Completion Date: 2008

Action Item: Develop an evacuation plan for Ware and publicize the findings to the Town of Ware, making special efforts to target special need populations.

Responsible Department/Board: Select Board, Planning Board, Community Development, Emergency Management Director, Department of Public Works Director.

Proposed Completion Date: 2009

Wildfires/Brushfires

Goal Statement: To mitigate the impacts of large wildfires on Ware through minimizing the urban-rural interface with the goal of minimizing the loss of life, damage to property, damage to infrastructure, and the disruption of governmental services and general business activities due to wildfires/brushfires.

Action Items: Protect woodland areas near the Quabbin Reservoir through conservation easements or fee-simple acquisition to prevent development in heavily wooded areas, thereby reducing the urban-rural interface.

Responsible Department/Board: Planning Board, Conservation Commission, Fire Department, Emergency Management Director

Proposed Completion Date: Ongoing

Action Items: Continue education on the dangers of fire on the public schools to reduce wildfires and brushfires in Ware.

Responsible Department/Board: Fire Department

Proposed Completion Date: 2010

Earthquakes

Goal Statement: To make structural and policy changes prior to a large earthquake to mitigate the impacts of an earthquake on the Town of Ware with the intent of minimizing loss of life, property damage, damage to infrastructure, and the disruption of governmental services and general business activities due to earthquakes.

Action Item: Relocate Town hall; currently, the Town of Ware's municipal offices are in a structurally unsound building that requires several hundred thousand dollars of upgrades before it could function as an earthquake-safe town hall.

Responsible Department/Board: Building Inspector, Emergency Management Director, Town Manager, Select Board

Proposed Completion Date: Ongoing—2020

Action Item: Identify suitable alternate location for town government that is earthquake resistant and develop a feasible plan for transferring governmental services to that facility in the event of a catastrophic earthquake.

Responsible Department/Board: Building Inspector, Emergency Management Director, Town Manager, Select Board

Proposed Completion Date: 2010

Dam Failure

Goal Statement: To mitigate the threat that Ware's aging dams pose to the Town of Ware through quantifying the anticipated scope of any impact with the purpose of reducing loss of life, damage to property, damage to infrastructure, and the disruption of governmental services and general business activities due to dam failures.

Action Item: Dam analyses for all high risk dams in Ware with the purpose of mapping out inundation zones and identifying conditions that would lead to a dam breach.

Responsible Department/Board: Emergency Management Director, Department of Public Works, Select Board

Proposed Completion Date: 2010

Action Item: Dam breach analysis of Dam on East Street with the purpose of estimating the impact this dam would have on Ware's town center if it were to fail.

Responsible Department/Board: Emergency Management Director, Department of Public Works, Select Board

Proposed Completion Date: 2009

Drought

Goal Statement: To minimize the loss of life, damage to property, damage to infrastructure, and the disruption of governmental services and general business activities due to drought.

Action Item: Purchase a water buffalo truck to serve as an emergency distribution point in the event of a serious failure of the Town's water system.

Responsible Department/Board: Department of Public Works, Select Board, Emergency Management Director.

Proposed Completion Date: 2009

Action Item: Develop long-term capital plan for purchasing properties around the wellhead recharge areas to minimize impervious surface area around the town's drinking water recharge areas.

Responsible Department/Board: Department of Public Works, Community Development, Conservation Commission

Proposed Completion Date: 2010

Man-Made Hazards

Goal Statement: To minimize the loss of life, damage to property, damage to infrastructure, and the disruption of governmental services and general business activities due to man-made disasters.

Action Item: Maintain involvement in Incident Command System, Hampshire Regional Emergency Planning Commission and draw upon the technical expertise of this association.

Responsible Department/Board: Emergency Management Director, Property Owners, Department of Public Works, Fire Department, Town Manager.

Proposed Completion Date: Ongoing

Prioritized Implementation Schedule

Summary of Critical Evaluation

The Ware Hazard Mitigation Planning Committee reviewed each of the actions identified above, as well as the existing mitigation strategies using the following factors to prioritize mitigation projects:

- Ability to reduce disaster damage
- Social acceptability
- Ability to compare or be compared with other actions
- Technical feasibility and potential success
- Impact on the environment
- Administrative workability
- Ability to meet regulations
- Political acceptability
- Ability to save or protect historic structures
- Legal implementation
- Ability to meet other community objectives
- Economic impact
- The duration of implementation period
- Environmental compatibility

Project Prioritization

The Ware Hazard Mitigation Planning Committee created the following prioritized schedule for implementation of prioritized item. The table lists items in order of priority,

Note: As additional information becomes available regarding project leadership, timeline, funding sources, and/or cost estimates, the Plan will be reviewed and amended accordingly.

**PRIORITIZED IMPLEMENTATION SCHEDULE
(ACTION PLAN)**

IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

The Ware Hazard Mitigation Planning Committee created the following prioritized schedule for implementation:

MITIGATION ACTION	RESPONSIBLE DEPARTMENT/BOARD	PROPOSED COMPLETION DATE	POTENTIAL FUNDING SOURCE(S)	ESTIMATED COST	PRIORITY
Acquisition plan for undeveloped parcels in Ware's flood zone	Board of Selectmen, Town Manager, Conservation Commission, Community Development	2007	Town Staff / Volunteers	N/A	Medium
The town will evaluate whether to become a part of FEMA's Community Rating System	Board of Selectmen, /community Development Department, Town Manager	2007	Town Staff	N/A	Medium
Replace four culverts at Quarry Street/Morse Ave	Board of Selectmen, DPW, Conservation Commission	2007	Town Staff, HMGP	\$75,000	Very High
Repair derelict stormwater pump on Pulaski Street to enhance protections to downtown in flooding events.	Select Board, Town Manager, Department of Public Works	2008	Town Funds	\$75,000	High
Establish Continuity of Government Plan for municipal government to develop alternate sites and locations for government services in the event of a devastating disaster.	Emergency Management Director, Select Board.	2008	Town Staff / Volunteers, Western Regional Homeland Security Advisory Council.	5,000	Medium

Purchase water buffalo truck to serve as an emergency distribution point in the event of a serious failure of the town's two municipal wells.	Department of Public Works, Select Board, Emergency Management Director	2009	Town Funds	\$30,000-\$50,000	Low
Dam breach analysis for dam on East Street to determine the potential impacts on downtown Ware.	Emergency Management Director, Department of Public Works, Select Board	2009	Town Funds, HMGP	\$10,000 - \$25,000	High
Develop an evacuation plan for Ware and publicize the findings to the Town of Ware, making special efforts to target special need populations.	Select Board, Planning Board, Community Development, Emergency Management Director, and Department of Public Works Director.	2009	Town Staff / Volunteers/Hazard Mitigation Grant Program	\$10,000	Medium
Develop a pamphlet for special needs populations that familiarizes special needs individuals with sheltering protocol in Ware.	Emergency Management Director, Select Board, Council on Aging, School Department.	2009	Town Staff / Volunteers	N/A	Medium
Prioritize the replacement of culverts that flood repeatedly in Ware.	Board of Selectmen, Department of Public Works, Town Manager	2009	Hazard Mitigation Grant Program / Town Staff	\$1,0000	High
Construction of a flood resistant municipal fuel supply depot to	Select Board, Emergency Management Director, Department of Public Works.	2009	Town Staff / Town Funding/HMGP	\$100,000	High

provide town vehicles with a fuel source in the event of a prolonged emergency situation and mitigate its impacts.					
Identify suitable alternate location for transferring town government for a temporary period.	Building Inspector, Emergency Management Director, Town Manager, Select Board.	2010	Town Staff / Volunteers	N/A	High
Dam breach analyses for all high risk dams in ware to map out inundation zones.	Emergency Management Director, Department of Public Works, Select Board	2010	HMGP	\$50,000 - \$100,000	High
Develop long-term capital plan for purchasing properties around the wellhead recharge areas to minimize impervious surface area and provide long-term stability of municipal drinking water supplies, thereby mitigating the impacts of a drought by providing best-case-scenario water levels.	Department of Public Works, Community Development Department, Conservation Commission	2010	HMGP, Massachusetts Executive Office of Environmental Affairs	More than \$100,000	Medium
Construction of municipal salt and sand	Emergency Management Director, Select	2011	Town Staff, HMGP Funds	More than \$250,000	High

storage shed for Ware highway vehicles to secure supply of road treatment chemicals prior to snowstorm; currently lacking.	Board, Department of Public Works.				
Develop a stormwater management bylaw.	Planning Board, Conservation Commission, DPW	2012	PVPC Local Technical Assistance, Planning Board Assistance Program	\$2,000	Medium
Upgrade to Maple Street to minimize flood damage	DPW, EMD, Select Board	2012	HMGP, Capital budget	\$100,000	Low
Maintain involvement in Incident Command System, Hampshire Regional Emergency Planning Commission and draw upon technical expertise of these associations.	Emergency Management Director	Ongoing	Town Staff/Volunteers	N/A	Medium
Update Ware's Pre-Disaster Plan every 5 years.	Emergency Management Director, Town Manager, Local Emergency Planning Committee.	Ongoing	MEMA PDM Grant Program	\$5,000	Medium
Education and outreach to senior citizens, students and special-needs populations regarding the hazards Ware is susceptible to and mitigation activities that the town is	Emergency Management Director, Town Manager, LEPC, School Department	Ongoing	Town Staff/Volunteers	Less \$5,000	Medium

conducting for the benefit of Ware's citizens.					
Relocate Town Hall to a location that is capable of withstanding an earthquake.	Building Inspector, Emergency Management Director, Town Manager, Select Board.	Ongoing	Town Staff / Volunteers	Greater than \$500,000	Low
Protect woodland areas near the Quabbin Reservoirs vast woodlands to minimize rural-urban interface and mitigate the damage potential of wildfires before they occur	Planning Board, Conservation Commission, Emergency Management Director	Ongoing	Town Staff/Massachusetts Department of Conservation and Recreation, Massachusetts Water Resources Authority, HMGP	Greater than \$500,000	Medium
Continue education on the dangers of fire in the public schools to spread awareness about how to reduce wildfires and brushfires in Ware.	Fire Department	Ongoing	Town Staff	N/A	Low

8 – PLAN ADOPTION & IMPLEMENTATION

Plan Adoption

Upon completion, copies of the Draft Local Hazards Mitigation Plan for the Town of Ware were distributed to the town boards for their review and comment. A public meeting was held by the Ware Select Board to present the draft copy of the Ware Local Natural Hazards Mitigation Plan to town officials and residents and to request comments from this committee and the general public. The Natural Hazards Mitigation Plan was formally approved by the Select Board and forwarded to the Massachusetts Emergency Management Agency (MEMA) and the Federal Emergency Management Agency (FEMA) for their approval.

Plan Implementation

The implementation of the Ware Local Natural Hazards Mitigation Plan will begin following its formal adoption by the Ware Select Board and approval by MEMA and FEMA. Specific town departments and boards will be responsible for ensuring the development of policies, bylaw revisions, and programs as described in Sections 5 and 6 of this plan. The Ware Natural Hazards Planning Committee will oversee the implementation of the plan.

Plan Monitoring and Evaluation

The measure of success of the Ware Local Natural Hazards Mitigation Plan will be the number of identified mitigation strategies implemented. In order for the town to become more disaster resilient and better equipped to respond to natural disasters, there must be a coordinated effort between elected officials, appointed bodies, town employees, regional and state agencies involved in disaster mitigation, and the general public.

The Ware Natural Hazards Planning Committee will meet on an annual basis or as needed (i.e., following a natural disaster) to monitor the progress of implementation, evaluate the success or failure of implemented recommendations, and brainstorm for strategies to remove obstacles to implementation. Following these discussions, it is anticipated that the committee may decide to reassign the roles and responsibilities for implementing mitigation strategies to different town departments and/or revise the goals and objectives contained in the plan. At a

minimum, the committee will review and update the plan every five years, beginning in the fall of 2009. The meetings of the committee will be organized and facilitated by the Emergency Management Director or the Ware Select Board.

**CERTIFICATE OF ADOPTION
TOWN OF WARE, MASSACHUSETTS
BOARD OF SELECTMEN
A RESOLUTION ADOPTING THE WARE
HAZARD MITIGATION PLAN**

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

WHEREAS, several public planning meetings were held between October 2006 and October 2007 regarding the development and review of the Ware Hazard Mitigation Plan; and

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

WHEREAS, a duly-noticed public hearing was held by the Ware Board of Selectmen on _____, 2007 to formally approve and adopt the Ware Hazard Mitigation Plan.

NOW, THEREFORE BE IT RESOLVED that the Ware Board of Selectmen adopts the Ware Hazard Mitigation Plan.

ADOPTED AND SIGNED this [DATE] 2007.

Nancy Talbot
Chair, Ware Board of Selectmen

Gerald Matta
Ware Board of Selectmen

Catherine Buelow-Cascio
Ware Board of Selectmen

Richard North
Ware Board of Selectmen

ATTEST

John Desmond
Ware Board of Selectmen

APPENDICES

Appendix A

TECHNICAL RESOURCES

1) Agencies

Massachusetts Emergency Management Agency (MEMA).....	508/820-2000
Hazard Mitigation Section	617/626-1356
Federal Emergency Management Agency (FEMA)	617/223-4175
MA Regional Planning Commissions:	
Berkshire Regional Planning Commission (BRPC).....	413/442-1521
Cape Cod Commission (CCC).....	508/362-3828
Central Massachusetts Regional Planning Commission (CMRPC).....	508/693-3453
Franklin Regional Council of Governments (FRCOG).....	413/774-3167
Martha’s Vineyard Commission (MVC).....	508/693-3453
Merrimack Valley Planning Commission (MVPC).....	978/374-0519
Metropolitan Area Planning Council (MAPC).....	617/451-2770
Montachusett Regional Planning Commission (MRPC).....	978/345-7376
Nantucket Planning and Economic Development Commission (NP&EDC).....	508/228-7236
Northern Middlesex Council of Governments (NMCOG).....	978/454-8021
Old Colony Planning Council (OCPC).....	508/583-1833
Pioneer Valley Planning Commission (PVPC).....	413/781-6045
Southeastern Regional Planning and Economic Development District (SRPEDD).....	508/823-1803
MA Board of Building Regulations & Standards (BBRS).....	617/227-1754
MA Coastal Zone Management (CZM).....	617/626-1200
DCR Water Supply Protection.....	617/626-1379
DCR Waterways.....	617/626-1371
DCR Office of Dam Safety.....	508/792-7716
DFW Riverways.....	617/626-1540
MA Dept. of Housing & Community Development.....	617/573-1100
Woods Hole Oceanographic Institute.....	508/457-2180
UMass-Amherst Cooperative Extension.....	413/545-4800
National Fire Protection Association (NFPA).....	617/770-3000
New England Disaster Recovery Information X-Change (NEDRIX – an association of private companies & industries involved in disaster recovery planning).....	781/485-0279
MA Board of Library Commissioners.....	617/725-1860
MA Highway Dept, District 2.....	413/582-0599
MA Division of Marine Fisheries.....	617/626-1520
MA Division of Capital & Asset Management (DCAM).....	617/727-4050
Massachusetts Association of Regional Planning Agencies (MARPA).....	413/781-6045
University of Massachusetts/Amherst.....	413/545-0111
Natural Resources Conservation Services (NRCS).....	413/253-4350
MA Historical Commission.....	617/727-8470
U.S. Army Corps of Engineers.....	978/318-8502
Northeast States Emergency Consortium, Inc. (NESEC).....	781/224-9876 US
Department of Commerce: National Oceanic and Atmospheric Administration: National Weather Service; Tauton, Massachusetts	508/824-5116
US Department of the Interior: US Fish and Wildlife Service	413/253-8200
US Geological Survey	508/490-5000

2) Mitigation Funding Resources

404 Hazard Mitigation Grant Program (HMGP)	Massachusetts Emergency Management Agency
406 Public Assistance and Hazard Mitigation	Massachusetts Emergency Management Agency
Community Development Block Grant (CDBG).....	DHCD, also refer to RPC
Dam Safety Program.....	MA Division of Conservation and Recreation
Disaster Preparedness Improvement Grant (DPIG)	Massachusetts Emergency Management Agency
Emergency Generators Program by NESEC [*]	Massachusetts Emergency Management Agency
Emergency Watershed Protection (EWP) Program.....	USDA, Natural Resources Conservation Service

Flood Mitigation Assistance Program (FMAP)	Massachusetts Emergency Management Agency
Flood Plain Management Services (FPMS).....	US Army Corps of Engineers
Mitigation Assistance Planning (MAP).....	Massachusetts Emergency Management Agency
Mutual Aid for Public Works.....	Western Massachusetts Regional Homeland Security Advisory Council
National Flood Insurance Program (NFIP)	Massachusetts Emergency Management Agency
Power of Prevention Grant by NESEC [‡]	Massachusetts Emergency Management Agency
Roadway Repair & Maintenance Program(s).....	Massachusetts Highway Department
Section 14 Emergency Stream Bank Erosion & Shoreline Protection	US Army Corps of Engineers
Section 103 Beach Erosion.....	US Army Corps of Engineers
Section 205 Flood Damage Reduction.....	US Army Corps of Engineers
Section 208 Snagging and Clearing	US Army Corps of Engineers
Shoreline Protection Program.....	MA Department of Conservation and Recreation
Various Forest and Lands Program(s).....	MA Department of Environmental Protection
Wetlands Programs	MA Department of Environmental Protection

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

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

3) Websites

Sponsor	Internet Address	Summary of Contents
Natural Hazards Research Center, U. of Colorado	http://www.colorado.edu/litbase/hazards/	Searchable database of references and links to many disaster-related websites.
Atlantic Hurricane Tracking Data by Year	http://wxp.eas.purdue.edu/hurricane	Hurricane track maps for each year, 1886 – 1996
National Emergency Management Association	http://nemaweb.org	Association of state emergency management directors; list of mitigation projects.
NASA – Goddard Space Flight Center “Disaster Finder:	http://www.gsfc.nasa.gov/ndrd/dis_aster/	Searchable database of sites that encompass a wide range of natural disasters.
NASA Natural Disaster Reference Database	http://ftpwww.gsfc.nasa.gov/ndrd/main/html	Searchable database of worldwide natural disasters.
U.S. State & Local Gateway	http://www.statelocal.gov/	General information through the federal-state partnership.
National Weather Service	http://nws.noaa.gov/	Central page for National Weather Warnings, updated every 60 seconds.
USGS Real Time Hydrologic Data	http://h20.usgs.gov/public/realtime.html	Provisional hydrological data
Dartmouth Flood Observatory	http://www.dartmouth.edu/artsci/geog/floods/	Observations of flooding situations.
FEMA, National Flood Insurance Program, Community Status Book	http://www.fema.gov/fema/csb.html	Searchable site for access of Community Status Books
Florida State University Atlantic Hurricane Site	http://www.met.fsu.edu/explores/tropical.html	Tracking and NWS warnings for Atlantic Hurricanes and other links
National Lightning Safety Institute	http://lightningsafety.com/	Information and listing of appropriate publications regarding lightning safety.
NASA Optical Transient Detector	http://www.ghcc.msfc.nasa.gov/ot_d.html	Space-based sensor of lightning strikes
LLNL Geologic & Atmospheric Hazards	http://www.ep.es.llnl.gov/wwwep/g_hp.html	General hazard information developed for the Dept. of Energy.
The Tornado Project Online	http://www.tornadoject.com/	Information on tornadoes, including details of recent impacts.
National Severe Storms Laboratory	http://www.nssl.uoknor.edu/	Information about and tracking of severe storms.
Independent Insurance Agents of America IIAA Natural Disaster Risk Map	http://www.iaa.ix.com/ndcmap.html	A multi-disaster risk map.
Earth Satellite Corporation	http://www.earthsat.com/	Flood risk maps searchable by state.
USDA Forest Service Web	http://www.fs.fed.us/land	Information on forest fires and land management.

Appendix B

Documentation of the Planning Process

Ware Hazard Mitigation Planning Committee

Meeting #1

AGENDA

October 27, 2006

10:00 a.m.

Ware Town Hall

1) Introduction

2) Purpose of Committee

- Why selected to serve on Committee
- What we are doing and why

3) What is Hazard Mitigation Planning?

- PowerPoint Presentation on Hazard Mitigation

4) Step 1: Organize Hazard Mitigation Team

- Establish a chairperson/point of contact

5) What must we do to prepare a Hazard Mitigation Plan?

- Explain/set milestones (4-5 committee meetings)
- Agree on next committee meeting date

6) Question and Answer Period

Ware Hazard Mitigation Planning Committee

Meeting #2

AGENDA

December 5, 2006

10:00 a.m.

Ware Town Hall

1) Identify Hazards (past and potential) on Base Map

- What are the hazards?
- What is at risk from those hazards?

2) Develop Base Map with Critical Facilities

- Identify Critical Facilities on Base Map. The following list contains items that should be clearly identified on the map, as they apply to your community:

- | | |
|--------------------------------|---------------------------------------|
| - Emergency Operations Center | - Nursing Homes |
| - Emergency Fuel Facilities | - Elderly Housing |
| - Town/City Hall | - Day-Care Facilities |
| - Police Station | - Correctional Facilities |
| - Fire Station | - Other Congregate Care Facilities |
| - Public Works Garages | - Shelters |
| - Water Treatment Facilities | - Special Needs Populations |
| - Sewage Treatment Plants | - Hazardous Materials Facilities |
| - Water Tower/Supply Pumps | - Access Roads to Critical Facilities |
| - Power Plants | - Evacuation Routes |
| - Electrical Power Substations | - Unique or Historic Resources |
| - Schools | - Commercial Economic Impact Areas |
| - Major Highways and Roadways | - Socio-Economic Impact Areas |
| - Bridges | - Areas with Second Language Needs |
| - Dams | - Hospitals |

3) Question and Answer Period

4) Set Goals for Next Meeting

Ware Hazard Mitigation Planning Committee

Meeting #3

AGENDA

January 19, 2007

10:00 a.m.

Ware Town Hall

1) Review Identification of Hazards

- Past and Potential
- Critical Facilities

2) Analyze Development Trends

- Looking at Community Change
- Map out Development Patterns

3) Existing Protection Measures

- Review of Draft Existing Protection Measures

4) Question and Answer Period

5) Set Goals for Next Meeting

Ware Hazard Mitigation Planning Committee

Meeting #4

AGENDA

February 16, 2007

10:00 a.m.

Ware Town Hall

1) Identify What's in Place & Identify gaps in the current protection

- Review Draft Existing Protection Measures
- Identify gaps in existing protection

2) Review of Draft Goal Statements

3) Brainstorm Mitigation Actions

- What actions can be taken?
- Evaluating Action Feasibility

4) Prioritize Final List of Actions

- Select Actions which Best Suit Community's Needs
- Include actions that can be implemented quickly

5) Question and Answer Period

6) Set Goals for Next Meeting

Ware Hazard Mitigation Planning Committee
Meeting #5

AGENDA

April 27, 2007

10:00 a.m.

Ware Town Hall

1) Develop Strategy to Implement Selected Prioritized Actions

- Who will be responsible for implementing each prioritized action;
- When will these actions be implemented?
- How will the community fund the projects?

2) Develop Process for Adoption and Monitoring of the Plan

3) Review & Revise as Necessary Final Draft of the *Ware Hazard Mitigation Plan*

4) Discuss Next Steps for the *Ware Hazard Mitigation Plan* including FEMA/MEMA Review and Adoption by the Board of Selectmen.

5) Question and Answer Period

Appendix C-Public Notices

On September 27, 2007 the Pioneer Valley Planning Commission Issued the following press release to all media outlets in Western Massachusetts:

PRESS RELEASE

CONTACT: Andrew Smith, Pioneer Valley Planning Commission, (413) 781-6045

FOR IMMEDIATE RELEASE

September 12, 2007

Public Input Sought on Hazard Mitigation Plans

The Pioneer Valley Planning Commission has completed final working drafts of Hazard Mitigation Plans for thirteen communities in the region: Agawam, Chester, Chesterfield, Easthampton, Hadley, Hampden, Hatfield, Holland, Holyoke, Ludlow, Monson, Northampton, Ware and South Hadley.

This planning effort is being undertaken to help communities assess the risks they face from natural hazards, identify action steps that can be taken to prevent damage to property and loss of life, and prioritize funding for mitigation efforts. A mitigation action is any action taken to reduce or eliminate the long-term risk to human life and property from hazards.

The draft plans are posted for public review and comment on PVPC's website at www.pvpc.org. Please submit comments to PVPC's Andrew Smith at (413) 781-6045 or asmith@pvpc.org no later than November 30, 2007. Communities with approved plans will be eligible for Hazard Mitigation Grant Program funding from the Massachusetts Emergency Management Agency.

These Hazard Mitigation Plans are being developed with assistance from the Pioneer Valley Planning Commission with funding provided by the Massachusetts Emergency Management Agency.

—30—

The Following Press Stories Ran in response to this Press Release



Predisaster plans' readied for grants

Sunday, September 23, 2007

By NANCY H. GONTER
ngonter@repub.com

It's the public's turn to weigh in on plans prepared by local communities to keep the damage from natural disasters to a minimum. Sixteen "predisaster mitigation plans," developed by the Pioneer Valley Planning Commission working with local officials from each community, are part of an effort to secure grant money from the Massachusetts Emergency Management Agency, said Catherine M. Miller, principal planner with the commission.

"This comes from an effort by the Federal Emergency Management Agency that while we are aware you can't prevent natural disasters from happening, you can prevent the long term consequences," Miller said.

The plans, which average more than 100 pages each, can be viewed on the agency's Web site at www.pvpc.org Plans for Agawam, Chester, Chesterfield, Easthampton, Hadley, Hampden, Hatfield, Holland, Holyoke, Ludlow, Monson, Northampton, South Hadley, Southwick, Ware and Wilbraham are available, she said.

"This is largely an education exercise so people know local government is looking into these things and thinking about what the consequences of natural disasters would be. It's reassuring to know local governments are looking at this kind of thing especially after all the awareness following (hurricane) Katrina," Miller said.

Comments may be made by calling Andrew Smith at the Commission at (413) 781-6045 or by e-mailing him at asmith@pvpc.org by Nov. 30.

The plans were developed with a state grant of \$224,962 which was supplemented by local communities for total cost of just under \$300,000, she said.

Each plan looks at the risks communities may face from natural disasters such as flooding, tornadoes, drought and earthquakes, and what can be done to prevent damage to property and loss of life. They also prioritize projects for funding for mitigation efforts, Miller said.

An example of a mitigation project is Greenfield's purchase of the Wedgewood Gardens mobile home park which was badly flooded by the Green River in 2005 and had previously been flooded, although that was not part of this program, Miller said.

The commission is working with 32 communities in this area and a second round of 16 more communities will soon be started. They are Amherst, Belchertown, Brimfield, Chicopee, Cummington, Goshen, Granby, Huntington, Palmer, Southampton, Springfield, Westfield, West Springfield, Westhampton, Williamsburg and Worthington.

After that, a plan for the entire region will be prepared, Miller said.

Northampton Deputy Fire Chief Dana Cheverette, a member of the local committee that worked with the commission on the city's plan, said going through the process of preparing the plan was helpful.

"You identify the flood plans and you identify the area where you need to put your resources. In 1988 when the Oxbow area flooded, a lot of people got isolated. Now we know where the people could get isolated," Cheverette said.

Sunday's news briefs

Posted by The Republican Newsroom September 30, 2007 12:04PM

Predisaster plan drafts

The Pioneer Valley Planning Commission has completed final working drafts of predisaster mitigation plans for 13 communities in the region. The draft plans are posted for public review and comment on the commission's Web site at www.pvpc.org. The deadline for comments is Nov. 30.

This planning effort is being undertaken to help communities assess the risks they face from natural hazards, identify action steps that can be taken to prevent damage to property and loss of life, and prioritize funding for mitigation efforts. Communities with approved plans will be eligible for Hazard Mitigation Grant Program funding from the Massachusetts Emergency Management Agency.

Affected are Agawam, Chester, Chesterfield, Easthampton, Hadley, Hampden, Hatfield, Holland, Holyoke, Ludlow, Monson, Northampton and South Hadley.

Appendix D

List of Acronyms

FEMA	Federal Emergency Management Agency
MEMA	Massachusetts Emergency Management Agency
PVPC	Pioneer Valley Planning Commission
EPA	Environmental Protection Agency
DEP	Massachusetts' Department of Environmental Protection
NWS	National Weather Service
HMGP	Hazard Mitigation Grant Program
FMA	Flood Mitigation Assistance Program
SFHA	Special Flood Hazard Area
CIS	Community Information System
DCR	Massachusetts Department of Conservation and Recreation
FERC	Federal Energy Regulatory Commission
TRI	Toxics Release Inventory
FIRM	Flood Insurance Rate Map
NFIP	National Flood Insurance Program
CRS	Community Rating System
BOS	Board of Selectmen
DPW	Department of Public Works
LEPC	Local Emergency Planning Committee
EMD	Emergency Management Director
Con Com	Conservation Commission
Ag Com	Agricultural Commission
EOC	Emergency Operations Center
CEM Plan	Comprehensive Emergency Management Plan
EMA	Emergency Management Agency
RACES	Radio Amateur Civil Emergency Service
WMECO	Western Massachusetts Electric Company

HAZMAT Hazardous Materials

Appendix E Past and Potential Hazards/Critical Facilities Map

Appendix F: Subdivision Regulations, Excerpts

A. Flooding.

Preliminary Plan Contents [in pertinent part]:

(5) The proposed system of drainage in a general way, the location and direction of flow of adjacent natural waterways, and all water bodies or areas classified as wetlands adjacent to or within the proposed subdivision.

Definitive Plan Contents [in pertinent part]:

e. All information required in the Preliminary Plan.

n. Existing and proposed topography at a two foot contour for gentle slopes and a five foot contour for steep slopes.

p. Existing and proposed drainage including drainage areas inside the subdivision, areas outside the subdivision which drain into it, and the route, for all existing and proposed drainage discharging from the subdivision, to the primary receiving water course or other body of water. Cross sections of each drainage ditch or pond shall be included. If surface water drains will discharge onto adjacent existing streets, or onto adjacent properties not owned by the applicant, the applicant shall clearly indicate what course the discharge will take, and shall present to the Board evidence from his engineer that such discharge is satisfactory.

q. Proposed layout of water supply and sewage disposal systems. Size and location of existing and proposed water supply mains and their appurtenances, hydrants, sewer pipes and their appurtenances and/or sewage disposal systems, storm drains and their appurtenances, and easements pertinent thereto, and curbs and curb dimensions. These layouts shall include profiles (shown in pencil until after they have been constructed).

r. Location of Base Flood elevation if encountered within 100 feet of subdivision.

t. Location of all the following improvements unless specifically waived in writing by the Board: street paving, sidewalks, street lighting standards, all utilities above and below ground (i.e. telephone, cable TV, gas), curbs,

gutters, storm drainage, all easements, and when required by the Fire Department, the fire alarm boxes.

(4) The proposed drainage, catch basins, manholes, pipes and any other drainage facilities shall be shown on both plan and profile;

- Section 3340. Development Impact Statement (DIS). The impact of the proposed subdivision is to be described according to the following criteria...:

b. Surface Water and Subsurface Conditions

- (1) Describe location, extent, and type of existing water and wetlands, including existing surface drainage characteristics, both within and adjacent to the project.
- (2) Describe any alteration of shore lines, marshes, or seasonal wet areas.
- (3) Describe any limitations imposed on the project by soil and water conditions and methods to be used to overcome them.

- Rules and Regulations Governing the Subdivision of Land, Section III:

J. Utilities

1. Stormwater System

a. Stormwater drains, including any of their related structures, shall be designed and installed by the applicant, wherever and whenever in the opinion of the Planning Board such are necessary to provide adequate disposal of surface water from all streets and lots within the subdivision and those lands and roadways immediately adjacent to the subdivision.

b. The storm drainage system shall be designed and constructed in accordance with the Massachusetts Department of Public Works (MDPW) standards. Computations supporting the design

of the drainage system may be required by the Board. The area to be used in the design computations of the storm drainage system, shall include the entire natural drainage basin tributary to the area being developed, including adjacent undeveloped land which shall be based on ultimate development of the area in accordance with the existing zoning laws.

c. The piping for the stormwater drainage system shall be designed using the 10 year storm curve for street drains and the 25 year storm curve for culverts over existing natural waterways.

d. Catch basins shall be designed for both sides of the proposed ways, on continuous grades, at intervals of not more than three hundred (300) feet, at low points and sags in the way, and near the corners of the way at intersected ways.

e. The following are minimum sizes and strengths of stormwater pipes. Existing conditions and design criteria, using MDPW standards, shall determine the actual sizes and strengths of pipe to be used in all cases.

(1) Main Lines--Twelve (12) inch reinforced concrete Class IV unless volume indicates a larger size is required.

(2) Catch Basin Connections--Twelve (12) inch reinforced concrete pipe, Class IV.

(3) When deemed appropriate by the Planning Board, PVC pipe complying with ASTM standards may be used.

- **SECTION II. PROCEDURE FOR THE SUBMISSION AND APPROVAL OF PLANS, 2.0 Definitive Plan Contents [utilities]:**

t. Location of all the following improvements unless specifically waived in writing by the Board: street paving, sidewalks, street lighting standards, all utilities above and below ground (i.e. telephone, cable TV, gas), curbs, gutters, storm drainage, all easements, and when required by the Fire Department, the fire alarm boxes.

F. Streets

3. Grade

a. Grades of streets shall be not less than 0.5%. Grades shall not be more than 6.0% for principal streets nor more than 10.0% for secondary streets.

- **G. Easements.**

2. Where a subdivision is traversed by a water course, drainage way, channel or stream, the Planning Board may require that there be provided a stormwater easement or drainage right-of-way of adequate width to conform substantially to the lines of such water course, drainage way, channel or stream, and to provide for construction or other necessary purposes.

- 5. Conservation Restrictions

Watercourses shall be located within easements conforming substantially with the lines of their courses, whose width shall not be less than 20 feet and whose boundaries shall not be closer than five (5) feet horizontally from the annual high water line. No building shall be constructed and no paving shall be permitted within such easement except as permitted under the Zoning By-Law.

Watercourses shall remain open except at street crossings. In any subdivision, the developer may grant to the Town a conservation restriction over any portion of the subdivision providing the area subject to the restriction has the approval of the Conservation Commission and the Board of Selectmen.

B. Winter Storms

- **2.62 Procedure for Review[of Site Plans]**

- 2.643 Driveway Standards

All driveways in projects subject to site plan approval shall be built to conform with the construction and paving standards described for public ways in the Ware Subdivision Control Regulations, or other standards adopted by the Planning Board in its rules and regulations. Common driveways shall be allowed by the Planning Board in cases where curb cuts are thereby minimized and better site planning and traffic safety is attained. A driveway width requirement shall be set by the Planning Board within the following guidelines:

1) Minimum width of all driveways shall be twelve feet. Such minimum width shall only be allowed in cases where there is inadequate land for a greater width, or good site planning dictates the use of the minimum width.

2. Maximum width shall be no greater than that required by the Subdivision Control Regulation. Such maximum width shall only be required in cases where use of the driveway is similar to that of a public way in terms of types of vehicles, speed of vehicles and total traffic load.

- [Subdivision Rules and Regulations] Grade

a. Grades of streets shall be not less than 0.5%. Grades shall not be more than 6.0% for principal streets nor more than 10.0% for secondary streets.

- Section III, Design Standards, J

- 4. Utility Lines

a. All lines and/or wires used for the transmission of electricity, cable television, telephone, fire alarms, etc shall be placed underground within the subdivision, in location as approved by the Planning Board, and in accordance with the Building Code of the Town of Ware, as amended.

(1) All lines and appurtenances for the distribution of electricity shall be buried at the minimum depth given in the following table based on the National Electric Code (p. 70-632).

Appendix G: Zoning Bylaws, Excerpts

Flooding

- Section 2.6 Site Plan Approval
 - Purpose o accomplish the purposes set forth in Section 1.0 of this By-law as to the specific goals of facilitating traffic channelization and control, assuring adequate drainage of surface water, protecting the environment, property values, abutting properties and visual amenities, and to facilitate the administration of the Section, no building permit or special permit for the construction, exterior alteration, relocation, occupancy or change in use of any building, structure or premises, shall be granted until the provisions of this By-law have been fulfilled..
 - 2.620 Said site plan shall...shall show [in pertinent part] the following:
 - (d) Provisions for waste disposal, drainage, dust, erosion control and other utilities.
 - (e) The location and direction of flow of adjacent natural waterways and all water bodies or areas classified as wetlands or buffer zones adjacent to or within the proposed subdivision shall be shown on said plan. These areas shall be determined and mapped by a wetlands biologist or other appropriate professional in conformance with the requirements of Chapter 131, the Massachusetts Wetlands Protection Act, as amended.

2.64 Site Design Standards for Non-Residential Development

Plans subject to this section shall show:

2.640 Storm Water Runoff--For any site containing 80,000 square feet of land area or more, the peak rate of storm water runoff from the development site shall not exceed the rate existing prior to the new construction based on a 10 year design storm. The applicant shall provide the analysis, certified by a Massachusetts registered professional Engineer or professional Geologist, necessary to document the previous and proposed run-off rates. The Planning Board may authorize the use of storm water

drainage facilities located off the development site and designed to serve one or more lots provided it finds that:

(a) The peak rate of storm water runoff from such off site facilities does not exceed the rate existing prior to the new construction based on a 25 year design storm

(b) The applicant has retained the rights and powers necessary to assure that the off site storm water drainage facilities will be properly maintained in good working order

- **Section 6.0 Floodplain / Wetlands District**

Section 6.0, Purpose: The purposes of the floodplain district are to protect the public health, safety, and general welfare, to protect human life and property from the hazards of periodic flooding, to preserve the natural flood control characteristics and the flood storage capacity of the floodplain, and to preserve and maintain the groundwater table and water recharge areas within the floodplain.

Section 6.1 District Delineation: (a) The general boundaries of the Floodplain District are shown on the Town of Ware Flood Insurance Rate Map (FIRM), dated August 8, 1980; as Zone A, A-30, to indicate the one-hundred-year water surface elevations shown on the FIRM and further defined by the Flood Profiles contained in the Flood Insurance Study, dated August 8, 1980. The floodway boundaries are delineated on the Town of Ware Flood Boundary--Floodway Map (FBFM), dated August 8, 1980, and further defined by the Floodway Data Tables contained in the Flood Insurance Study. These two (2) maps as well as the accompanying Study are incorporated herein by reference and are on file with the Board of Selectmen, Town Clerk and Planning Board. 4430. Use Regulations.

(b) Within Zone A where the one-hundred year flood elevation is not provided on the FIRM, the developer/applicant shall obtain any existing flood elevation data, and it shall be reviewed by the Inspector of Buildings. If the data is sufficiently detailed and accurate, it shall be relied upon to require compliance with this By-law and the State Building Code, Section 744.

6.02 Use Regulations

6.020 The Floodplain/wetlands district shall be considered as overlying other districts. Any uses permitted in the portions of the districts so overlaid shall be permitted, subject to all the provisions of this section.

6.021 All development, including structural and nonstructural activities, whether permitted by right or by special permit must be in compliance with Chapter 131, Section 40, of the Massachusetts General Laws and with the requirements of the Massachusetts State Building Code pertaining to construction in the floodplains (Section 744).

6.022 Permitted Uses; Special Permits

(a) The following uses of low flood damage potential and causing no obstructions to flood flows shall be allowed, provided that they are permitted by the Town of Ware Zoning By-law, and they do not require structures, fill or storage of materials or equipment:

(1) Agricultural uses, such as farming, grazing, truck farming, horticulture, etc.

(2) Forestry and nursery uses.

(3) Outdoor recreational uses, including fishing, boating, play areas, etc.

(4) Conservation of water, plants and wildlife.

(5) Wildlife management areas, foot, bicycle and/or horse paths, provided such uses do not affect the natural flow pattern of any water course.

(6) Conservation of water plants and wildlife.

(7) Temporary nonresidential structures used in conjunction with fishing, growing, harvesting, storage or sale of crops raised on the premises.

(8) Buildings lawfully existing prior to the adoption of these provisions.

(9) Reconstruction of buildings lawfully existing prior to the adoption of these provisions that have been destroyed by fire or other natural catastrophe, provided that reconstruction is started within eighteen (18) months of the date of the disaster, and provided that reconstruction complies with all laws, rules or regulations in existence at the time reconstruction begins.

(b) No structure or building shall be erected, constructed, substantially improved or otherwise created or moved and no earth or other materials dumped, filled, excavated or transferred, unless a special permit is granted by the Planning Board, acting as the special permit granting authority.

6.06 Mobile Home Standards

Within Zone A1-A30, which is the area of the 100-year flood plain where base flood elevations and flood hazard factors have been determined, mobile homes shall be allowed in mobile home parks and as an accessory use as specified in Section 4.4 provided that:

(a) Stands or lots are elevated on compacted fill or on pilings so that the lowest floor of the mobile home will be at or above the base flood elevation level.

(b) Adequate surface drainage and access for a hauler are provided.

(c) In the instance of elevation on pilings, lots are large enough to permit steps, piling foundations are placed in stable soil no more than ten (10) feet apart, and reinforcement is provided for piers more than six (6) feet above ground level.

- 6.1 WATER SUPPLY PROTECTION DISTRICT

6.10 Purpose

The purpose of this Water Supply Protection District is:

6.100 To promote the health, safety, and general welfare of the community;

6.101 To protect, preserve and maintain present and potential sources of water supply for the public health and safety;

6.102 To protect, preserve and maintain the existing and potential groundwater supply and groundwater recharge areas within the town;

6.103 To reduce erosion of topsoil and the subsequent sedimentation of surface water bodies;

6.104 To prevent blight and pollution of the environment.

6.13 Water Supply Protection District Delineation

The water supply protection district is defined as all lands within the Town of Ware lying within the primary and secondary recharge areas of groundwater aquifers and watershed areas and reservoirs which provide public water supply. These areas are designated as the "Ware Water Supply Protection District," as depicted on the map entitled "Water Supply Protection District," prepared for the Ware Planning Board, and on file in the Planning Board office. The Water Supply Protection District is hereby incorporated as part of the "Zoning Map of Ware, Massachusetts dated 2/9/87 on file in the Town Clerk's office. Where the bounds as delineated are in doubt or in dispute, the burden of proof shall be upon the owner(s) of the land in question to show where they should properly be located. However, the Planning Board retains its authority to determine property location with regard to said Water Supply Protection District. At the request of the owner(s) the Town may engage a professional geologist, soil scientist, or engineer trained in hydro geology to determine more accurately the location and extent of a protection area, and charge the owner(s) for the cost of the investigation.

6.14 Water Supply Protection Use Regulations

6.141 The following uses shall be permitted within the water supply protection district as a matter of right where allowed by law or regulation in the underlying zone.

(a) Conservation of soil, water, plants, and wildlife;

(b) Outdoor recreation, nature study, boating, fishing and hunting where otherwise legally permitted;

- (c) Duckwalks, landing, foot and bicycle paths;
- (d) Proper operation and maintenance of existing water bodies and dams, flash boards and other water control, supply and conservation devices;
- (e) Maintenance and repair of any existing structure provided there is no increase in impermeable areas;
- (f) Agricultural uses provided that fertilizers, herbicides and other leachable materials are not stored outdoors;
- (g) Necessary public utilities and facilities designed so as to prevent contamination of surface water and groundwater;

4531. (h) Residential development.

6.141 The following uses shall be permitted within the water supply protection district as a matter of right where allowed by law or regulation in the underlying zone.

- (a) Conservation of soil, water, plants, and wildlife;
- (b) Outdoor recreation, nature study, boating, fishing and hunting where otherwise legally permitted;
- (c) Duckwalks, landing, foot and bicycle paths;
- (d) Proper operation and maintenance of existing water bodies and dams, flash boards and other water control, supply and conservation devices;
- (e) Maintenance and repair of any existing structure provided there is no increase in impermeable areas;
- (f) Agricultural uses provided that fertilizers, herbicides and other leachable materials are not stored outdoors;
- (g) Necessary public utilities and facilities designed so as to prevent contamination of surface water and groundwater;

6.142 The following uses are prohibited within the Water Supply Protection District:

(b) The rendering impervious of more than 50% of any lot, except by Special Permit;

(e) The storage or disposal of hazardous or toxic wastes and materials in violation of state and federal laws and regulations.

6.143 The following restrictions exist within the Water Supply Protection District:

(b) All runoff from impervious surfaces shall be re-charged on the site by being diverted to stormwater infiltration basins covered with natural vegetation. Stormwater infiltration basins must be designed to handle a 25 year storm. Dry wells shall be used only where other methods are infeasible, and shall be preceded by oil, grease, and sediment traps to facilitate removal of contamination. Any and all recharge areas shall be permanently maintained in full working order by the owner.

6.145 In addition to meeting the Special Permit requirements required in Section 2.5 of the Ware Zoning By-law, each application for a special permit in the Water Supply Protection District shall be accompanied by five copies of a site plan. The site plan, to be prepared by an Engineer registered in the Commonwealth of Massachusetts, shall include, at the minimum, the following:

(i) A siltation and sedimentation control plan including:

(1) Sediment and erosion control structures such as diversions, waterways, slope stabilization structures, sediment basins, etc., in sufficient detail to implement their installation together with referred standards for soil erosion and sediment as appropriate, and design calculations as required for each structure;

(2) Seeding and/or sodding requirements for all exposed areas including seedbed preparation, seed mixtures, lime, fertilizer, and mulching requirements with referenced standards;

(3) Schedule or sequence of operation with starting dates for clearing and/or grading, timing for storm drain and culvert installation, duration of exposure of soils and critical area stabilizations, both temporary and permanent. Indicate dates when critical area stabilization, paving, seeding, mulching or sodding is to be completed;

(4) General notes for sediment control that spell out the procedures for implementing the plan.

B. High Wind Events

- Section 5.8 Wireless Communication Lots
- **5.80 The purpose of this regulation is to maximize the use of existing towers** and other structures in order to reduce the number of Wireless Service Facilities needed to serve the community. All providers shall be encouraged to co-locate their facilities on a single structure or site. This regulation will protect residential areas from potential adverse impacts of such facilities. It will also endeavor to protect public safety and avoid potential damage to adjacent properties from facility failure through proper engineering and careful siting of facilities. Section 4930. Conditions. The following conditions apply:
- **5.83 General Design Requirements [in pertinent part]:**
 - a. Wireless Service Facilities (non-freestanding) are permitted by Special Permit, and may not exceed ten (10) feet above the height of the roof, building or structure, as applicable.

b. New Wireless Service Facilities shall be considered by the Planning Board only upon a finding by the Planning Board that existing or approved facilities cannot accommodate the wireless communications equipment planned for the proposed facility.
 - c. Freestanding wireless service facility shall be set back from the nearest lot line a distance at least 150% their height measured at the mean finished grade of the base structure by a distance of 150% of the height of the facility, or a distance of 300 feet, whichever is greater.
 - d. No freestanding wireless service facility shall exceed 150 feet in height as measured from ground level at the base of the facility.