

THE CITY OF NORTHAMPTON LOCAL NATURAL HAZARDS MITIGATION PLAN



Adopted by the Northampton Planning Board on November 13, 2008

Prepared by:

The Northampton 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 City of Northampton 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 pre-disaster mitigation plan as a condition for mitigation funding, including the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance Program (FMA), and the Pre-Disaster Mitigation Program (PDM).

Planning Process

The natural hazard mitigation planning process for the City of Northampton 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, and Mayor's office .

- Reviewing existing plans including the City’s Open Space and Recreation Plan, Community Development Plan, Meadows Land Use 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 the city 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 lightening grounding systems.
- Identifying deficiencies in the current strategies and establishing goals for updating, revising or adopting new strategies.
- Adopting and implementing the final Local Natural Hazards Mitigation Plan.

During the planning process, Northampton’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 Hazard Mitigation Team during several brainstorming sessions (see Northampton Natural Hazard Mitigation Plan Risk Assessment Matrix) and others identified by Northampton during their review of existing programs, policies, and regulations. From this list, specific Action Items were prioritized by the Northampton 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 Northampton 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 Northampton is in the best possible position to address natural hazards which impact property and residents.

For example, installing trash racks on culverts could reduce culvert blockages and have a significant impact on mitigating hazards caused by flooding. If installed, such improvements would prevent harm to people and damage to property from localized flooding events.

The local action items represent a multi-faceted approach to addressing natural hazards in Northampton 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 City and assigned appropriate bodies within the City to implement them within a five-year framework (see chart in Chapter 7).

In addition to working in the Northampton Pre-Disaster Mitigation Plan, the city has also been active in open space planning. The efforts of the Northampton Conservation Commission and other groups have resulted in the creation of municipal plans that are useful for flood hazard mitigation purposes. In 2005, the City 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 City, many of which, such as wetlands, aquifer recharge areas, farms, rivers, streams, and brooks, contain floodplain, dam failure inundation or localized flooding areas.

The 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.

Public Committee Meetings (See Appendix B for Agendas)

October 19, 2006 1:00 – 3:00 p.m.: Public informational and organizational meeting, held at Northampton Fire Station.

December 11, 2006 10:00—12:00 p.m.: Working committee meeting held at Northampton Department of Public Works.

January 30, 2007 10:00—12:00 p.m.: Working committee meeting held at Northampton Fire Department.

March 5, 2007 10:00—12:00 p.m.: Working committee meeting held at Northampton Fire Department.

April 18, 2007 10:00—12:00 p.m.: Working committee meeting held at Northampton Fire Department.

October 26, 2007 9:30—11:00 p.m.: Working committee meeting held at Northampton Fire Department.

Public Meetings with the City Council

To be Scheduled in November 2007.

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

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 Hazard Mitigation plans were complete and available for public comment and review on the Commission's website (www.pvpc.org). This press release (Appendix F) resulted in a series of news articles (Appendix F) that further enhanced awareness of the Hazard Mitigation Planning Process. The City of Northampton was a key component of this outreach effort, as many of the officials quoted were from this community.

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 *Northampton 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 Northampton Disaster Committee, to be created as an action step in this plan, will manage this plan; this will entail updating the plan's action step plan every five years and support funding applications for implementing the plan's action steps.

2 – LOCAL PROFILE¹

Community Setting

The City of Northampton, home to 28, 978 residents, contains approximately 35.7 square miles and is mid-way between Connecticut to the south and Vermont to the north. The City is also mid-way between Albany, N.Y. to the west and Boston to the east.

Located on the west side of the Connecticut River, Northampton sits in the valley between the Connecticut and the glacial formed hills to the west and has three distinct villages: DownCity Northampton, Florence and Leeds. The land nearest the Connecticut River has rich, fertile soils and a deep agricultural history. Adjacent to these fertile floodplains of the Connecticut River is the deep, flat glacial outwash, which underlies much of the historic residential, commercial and industrial development in downCity Florence and Northampton.

Further to the west, where the elevation rises and the soil thins out, is the steeply sloping bedrock dominated glacial till where the recent residential development is occurring. While Northampton's natural neighbors are the Connecticut River and surrounding picturesque hills, its political neighbors are the Citys of Westhampton, Williamsburg, Hatfield, Hadley, and the City of Easthampton.

Native Americans camped and fished along the rich floodplains of the Connecticut River in what is now called the Pioneer Valley. The agricultural potential of these floodplain soils attracted European settlers and these settlers founded Northampton, first known as Nonotuck, in 1654. As Northampton developed, industrial, commercial, and institutional sectors surpassed agriculture in economic importance.

Northampton offers a sophisticated rural lifestyle rich in cultural, artistic, academic, and business resources. Northampton features one of the most vibrant downCity centers in New England and was named "Number One Best Small Arts City in America" by author John Villani and is recognized as one of the top 25 Arts Destinations in the nation by American Style magazine. It was also named as one of the Dozen Destinations of Distinction by the National Trust for Historic Preservation.

¹ The majority of the information for this section was obtained from the Northampton Community Development Plan, the Northampton Open Space and Recreation Plan and the city's main website, www.northamptonma.gov

Residents see Northampton as both traditional and innovative. Several village centers provide focal points for outlying residential areas while the downtown is alive days and evenings with a wide selection of retail, services, restaurants, coffee and ice-cream shops, theaters including the only municipally owned theater in the state, clubs featuring an array of music, street musicians and a Center for the Arts. All of this activity provides a perfect atmosphere for strolling. The city also offers strong municipal programs in education, recreation, public safety and public works. It is known for its energy conservation program and its initiative to improve handicap access to downtown establishments.

The community has a strong and diverse economic base consisting of a mixture of traditional operations (wire protrusion, plastic molding) and innovative ones (production of heat sensing devices) and a large institutional base which includes county services and two hospitals. Northampton is also home to Smith College and is strongly influenced by Amherst College, Hampshire College, Mount Holyoke College and the University of Massachusetts as part of the five-college system in the region. The superb quality of life in Northampton contributes to its strong economic base with growing manufacturing, technology and service sectors. The local labor force is diverse, well educated and highly skilled.

According to the 1999 MacConnell Land use data, the total land area of Northampton is approximately 22,849 acres with roughly 24 percent of those acres as developed land. The remaining land is classified as undeveloped with forest as the largest category (49% of all land in City) with 11,237 acres. Cropland is the second largest category with 2,903 acres compared to Urban Open Land and Open Land, which represent individually, the third and fourth largest amount of undeveloped land in the city with 650 and 635 acres, respectively.

Infrastructure

Northampton's location on the Connecticut River was a strong determinant of the growth of the city. The river bottom provided rich alluvial soils for agriculture and the river itself provided power and shipping opportunities for the silk industry. The gentle sloping terrain of the Berkshire foothills, in the western section of City, helped keep development concentrated in the downtown center that grew along the banks of the river, and the existing infrastructure reflects the influence of geography.

Roads and Highways

Northampton sits in the heart of the crossroads of New England and, therefore, has many major thoroughfares running through its borders. The most significant

transit route, Interstate 91, has four exits in Northampton. Other major roadways are Routes, 5, 9, 10 and 66. Route 9 connects Northampton with Cities to the east including Hadley Amherst, BelcherCity, Ware and all points east as well as the westerly Cities of Williamsburg, Cummington and Pittsfield. Route 66 connects Northampton with Westhampton, Huntington and the HillCities to the West. Routes 5 and 10 converge in Northampton, providing connection to Hatfield, Greenfield and Brattleboro, VT. Route 10 runs south from Northampton to connect with Easthampton and Route 141; Route 5 runs south from Northampton to connect with Holyoke, Springfield, and Enfield, Connecticut.

The city is responsible for maintaining 83% of the road network, while Mass Highway is responsible for 8% of the road network. Private colleges are responsible for maintaining 2% of the road network; and the Federal Government is responsible for 1% of the roads in Northampton.

The relationship between the City's on-road traffic, especially large truck traffic, and the existing network of rail infrastructure limits the City's ability to move large loads along Route 9. Over the course of any given year, there will be several incidents at a railroad underpass along Route 9 that result in large semi-trucks becoming lodged underneath the railroad underpass. These incidents have earned the railroad underpass on Route 9 the dubious distinction of being nicknamed, "The Truck Eating Bridge." In the event of an emergency situation, any large vehicles that block the bridge would result in a serious delay in the amount of time available for evacuating residents. For this reason, the Committee has identified mitigation of this condition as a priority. Factors to include are the grade requirements for the railroad, the restriction on lowering the road because it would bring it into a stream bed—which would expose it to flooding—and the periodic accumulation of snow, water and ice, which makes it difficult to move emergency vehicles through this section of Route 9.

Rail

Freight traveling on the Boston and Maine Rail Line runs through the center of downCity Northampton on a daily basis. This is the line that has a bridge that passes over Route 9.

Public Transportation

Northampton has multiple linkages to surrounding communities through both the Pioneer Valley Transit Authority (PVTA) and the Franklin Regional Transit Authority (FRTA).

Bus lines operated by the PVTA travel roundtrip east-to-west along Route 9 en route to and from Amherst, Hadley and South Hadley (M40, B43 and 39-August,

2006). These fixed routes run hourly throughout the day and primarily serve Five College commuters. Bus stops are located in both high-volume sections of City as well intermittent locations along served routes. A PVTA bus route runs between DownCity Northampton and DownCity Florence (R44-August, 2006) during regular business hours. A PVTA bus route runs between DownCity Northampton and the Holyoke Mall (Route 48-August, 2006) between 7:00 am and 7:00 pm. A PVTA trolley runs between Northampton and Williamsburg on an hourly basis during regular business hours (R42-August, 2006). Neighboring Easthampton has two bus routes that connect with Northampton, PVTA's Nashawannuck Express, which operates as a flex route shuttle, and a PVTA bus route (R41-August, 2006).

A bus route maintained by FRTA runs between Northampton and Greenfield (Valley Route-Northampton) six times during regular business hours.

The Pioneer Valley Transit Authority provides demand-response transportation services for the elderly and disabled residents within their jurisdiction, which includes Northampton.

Public Drinking Water Supply

City Water is available to Florence, Leeds and Northampton and along those routes where development has occurred. The Northampton Water Department supplies 28,840 residents with drinking water.

Although Northampton gets approximately 2% of its drinking water supply from wells in the Florence section of Northampton, which could be increased to 15% on a sustainable basis or even higher on a short-term emergency basis, the primary water supply is from surface water supplies from reservoirs in the neighboring Citys of Conway, Williamsburg, and Hatfield. The City has and continues to work with all of these communities to acquire water supply lands and jointly preserve the watersheds. Additionally, much of Hatfield's drinking water aquifer is located in Northampton, and the City has aggressively regulated this area and acquired open space to protect Hatfield's water supply.

Sewer Service

Northampton, Leeds and Florence have municipal sewer services, as do the connecting points in between.

Schools

Public Schools in Northampton include Bridge Street School, Jackson Street School, Leeds School, Ryan Road School, the Florence Learning Center, JFK

Middle School, Northampton High School and Smith Vocational & Agricultural High School.

Natural Resources

The rich alluvial floodplains of the Connecticut River define Northampton's eastern boundary. In the bottomlands, wetlands and farm fields continue to provide the same scenic and ecological benefits to Northampton that have existed for thousands of years since the end of the last ice age (and the corresponding formation and draining of Glacial Lake Hitchcock) some 12,000 years ago. On the city's western boundary, the foothills of the Berkshires begin their slow, steady rise to the peak of Mount Greylock. To the north and south, the Connecticut River Valley stretches north to Vermont and South to Connecticut. These features, the river, the valley and the hills, frame Northampton and provide a home to not only Northampton's dynamic population of 28,000 individuals but also to hundreds of species of flora and fauna.

Tree species and forest composition reflect this variety of landforms. Because of Northampton's latitude, those species associated with northern hardwood forests are most common. In Northampton's floodplain, elms, willows, silver maples, sycamores, green ash and cottonwood, along with other species common to frequently inundated areas, are common. In higher, drier terrain, oaks, hickories, maples, black birch and scarlet oak are common species in fields, front lawns and gentle hills. On shady hillsides, it is common to find oaks, hickories, white birch and other species associated with transitional hardwood forests.

The forests and wetlands that fill Northampton's landscape also play host to a wide variety of wildlife. Bear, bobcat, minx, fishers, moose and deer have all been sighted in Northampton, and the city's wetlands and water bodies are important homes for salamanders, frogs, turtles and snakes as well as many fish species.

To all its residents and visitors, Northampton offers a peaceful blend of rural tranquility and urban sophistication and is peacefully shared with bears, barred owls, and other resident wildlife.

Water Resources

Northampton water resources include open water bodies, wetlands, floodplain, and drinking water supply and aquifers. These water resources are all sensitive ecological resources, but they also provide excellent agricultural, forest, open

space, scenic, recreation, and wildlife habitat resources for the city's residents. Ninety-eight percent of Northampton's drinking water comes from the following three sources: the West Whately Reservoir, the Ryan Reservoir and the Mountain Street Reservoir. Another surface water source, the Roberts Meadow Reservoir, serves as a back up reservoir. Surface water sources meet all of Northampton's drinking water needs in all but the hottest and driest periods of the year. To boost supply during periods of high demand, the City obtains a small, supplemental portion of its drinking water from two active wells located in Florence.

In 1972, Northampton amended its zoning ordinance to establish a Watershed Protection District, which contains regulations that limit development and restrict the use of toxic chemicals within the watersheds of the city's main water supplies. To augment these protections, the city adopted the Water Supply Protection District in 1986, which served the double purpose of limiting damage to tributaries of the city's and abutting communities' surface water supplies and drinking water aquifers while protecting the citizens from flooding hazards.

Rivers and Streams

The Connecticut River forms Northampton's eastern boundary and is the City's most significant river. The Mill River and the Manhan River are two smaller, but important, rivers for the city to monitor and protect. The Mill River runs parallel to DownCity Northampton, was once diverted, and has had an Army Corps impoundment and levee system constructed to reduce flooding risk. The Manhan River flows through Northampton's southwestern edge, enters Easthampton, and then drains into Northampton's Oxbow Lake. There are nine major brooks: Marble Brook, Turkey Brook, Beaver Brook, Day Brook, Roberts Meadow Brook, Clark Brook, Broad Brook, Hannum Brook and Parsons Brook.

Wetlands

Among other items, Northampton's *Flood and Natural Hazards Mitigation Plan* inventories the city's available water resources, a process that recorded 1,729 acres of mapped wetlands in Northampton. This figure captures only those wetlands that have been mapped and recorded as official data points, so there are several hundreds of acres that have not yet been documented and mapped. For this reason, the city estimates that there is a total of 3,000 acres of wetlands in Northampton.

Beaver Dams

Beaver activity has been increasing over the past decade. 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

The city's aquifer in Florence, and two public wells, provide approximately two percent of the Northampton's water supply, although in an emergency this source could provide up to 15 percent. Currently, the city relies on its surface water supplies and the loss of these supplies would result in a water shortage. Part of Hatfield's aquifer is in the Broad Brook area of Northampton, and neighboring Easthampton's aquifer is located in the West Farms area of Northampton. In 1988, the city of Northampton recognized the importance of its groundwater sources and established a Water Supply Protection District. This ordinance contains regulations that limit development in critical aquifer recharge and surface water watershed areas.

Floodways

Water levels in Northampton's rivers, streams, and wetlands rise and fall seasonally and during high rainfall events. High water levels are typical in spring, due to snowmelt and ground thaw. This is the period when flood hazards are normally expected. Low water levels occur in summer due to high evaporation and plant uptake (transpiration). At any time, heavy rainfall may create conditions that raise water levels in rivers and streams above bank full stage, which then overflow adjacent lands.

Floodways include the watercourses (rivers and streams) and adjacent relatively low-lying areas subject to periodic flooding (the 100-year flood zone and 500-year flood zone). These adjoining lands are flood hazard zones and they vary in their predicted flood frequency. The 100-year flood zone has a one in 100 statistical probability (or one percent chance) of being flooded in a single year; while the 500-year flood zone has a one in 500 statistical probability (or 0.2 percent chance) of being flooded in a single year. Northampton has both narrow floodways that line the boundaries of the City's brooks and a long, looping floodplain that encompasses the entire arc of the Connecticut River. All of the land that is susceptible to the periodic flooding that can surge out of the Connecticut River is either farmland or forestland. Development in the floodplain would expose residents or businesses to all of the risks that come from flooding. Northampton's floodways are corridors that pass flowing water downstream, eventually into the Connecticut River.

The National Flood Insurance Program has produced maps that identify floodways across America. The following areas have been designated as floodways in Northampton:

- (1) Mill River

- (2) Mill River Diversion
- (3) Basset Brook
- (4) Parsons Brook
- (5) Broad Brook
- (6) Marble Brook
- (7) Connecticut River

Forests

Forty-nine percent of Northampton is forested. These forests provide an abundance of timber, opportunities for recreation, wildlife habitat, the benefits of climate moderation, and the protection of water quality. The forest and intermixed agricultural land also provide a visually pleasant landscape for residents and visitors too. The City's forests are mainly closed-canopied and middle-aged, having a great diversity of species, but no diversity of horizontal or vertical structural.

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 City of Northampton.

Floods

The average annual precipitation for Northampton is 45.57² inches. There are three major types of storms that bring precipitation to Northampton. 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).

² CNN-Best Places to Retire, 2005

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.

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 Cities in Hampshire County. A tornado touched down in Leeds in June of 2000³. This tornado was ranked F1 (Moderate Tornado) on the Fujita Scale of Tornado Intensity. 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 close to 9 tornadoes in Hampshire 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 lightening. Crown fires move quickly by jumping along the tops of trees. A crown fire may spread rapidly, especially under windy conditions. While wildland fires have not been a significant problem in Northampton, 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.

³ National Climactic Data Center

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

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

There were 36 outside and other fires in Northampton in 2004.

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.⁶ 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.⁷

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

⁶ Northeast States Emergency Consortium Web site: www.nesec.org/hazards/earthquakes.cfm.

⁷ Federal Emergency Management Agency Web site: www.fema.gov/hazards/earthquakes/quake.shtm.

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
Total Number of Earthquakes within the New England states between 1568 and 1989 = 1,239.		

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. However, the new regulations have not been issued, so the DCR is still conducting inspections, but only of dams classified as high hazard.

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.

Northampton has several dams located within its borders, and fifteen of them are listed as locations that pose some degree of risk to the City. Two dams are

low risk structures, five dams are high risk structures and six dams are significant risk structures. The names and hazard levels of the individual structures are:

Table 3-3

1. Clear Falls Pool Dam	Low
2. Vaznis Farm Pond Dam	Low
3. Howards Ice Pond Dam	Low
4. Fitzgerald Lake Dam	Low
5. Chartpac Dam	Significant
6. Mill River Dam	Significant
7. Florence Ice Pond Dam	Significant
8. Upper Reservoir Dam – Robert Meadows Brook	Significant
9. Lower Roberts Meadow Dam	Significant
10. Roberts Meadow Middle Dam	Significant
11. Mill River Diversion Dam	High
12. Vistron Pro Corporation Dam	High
13. Country Club Dam	High
14. Button Shop #2 Dam	High
15. Button Shop #1 Dam	High

Man-made Hazards – Hazardous Materials

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 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 Northampton 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 City of Northampton that would potentially be affected by the hazard. The following scale was used:

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

Location of Occurrence	Percentage of City Impacted
<i>Large</i>	More than 50% of the City affected
<i>Medium</i>	10 to 50% of the City affected
<i>Small</i>	Less than 10% of the City 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, in part, on local knowledge of past experiences with each type of hazard. The size and impacts of a natural hazard can be unpredictable however; many of the mitigation strategies currently in place and many of those proposed for implementation can be applied to the expected natural hazards, regardless of their unpredictability.

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

TYPE OF HAZARD	FREQUENCY OF OCCURRENCE	LOCATION OF OCCURRENCE	IMPACT	HAZARD RISK INDEX RATING
Flooding	High	Medium	Limited	2
Severe Snowstorms/Ice Storms	High	Large	Minor	3
Severe Thunderstorms (microbursts) which cause wind damage	Low	Small	Critical	2
Hurricanes	Low	Large	Critical	2
Tornadoes	Very Low- Mountain Street Reservoir 1970	Medium	Critical	4
Wildfire/Brushfire	Low	Small	Minor	4
Earthquakes	Very Low	Large	Critical	4
Man-made Hazards: Hazardous	Low	Large	Critical	2

Materials				
Dike Failure/Dam Failure	Very Low	Large	Catastrophic	2

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

Detailed Hazard Profile for Northampton

This section will describe the location, extent, previous occurrences, and probability of future events for hazards that were identified in Northampton

Flooding

Location

The 100-year flood zone covers mostly narrow bands of level floodplain land along the Mill River, the Mill River Diversion, Basset Brook, Parsons Brook, Broad Brook and the Connecticut River. In several areas, the flood zone widens out to encompass farmland, some residential land, and industrial lands.

Extent

There are approximately 4,150 acres of land within the FEMA mapped 100-year floodplain and 82 acres of land within the 500-year floodplain within the City of Northampton. According to the community Information System (CIS) of FEMA, there were 90 1-4 family structures and zero "other" structures located within the Special Flood Hazard Area (SFHA) in Northampton as of July 20, 2005, the most current records in the CIS for the City of Northampton. Utilizing the City's median home value of \$275,000, a preliminary damage assessment was generated. For the estimated number of people living in the floodplain, an average household size of 2.14 people was used.

Previous Occurrences

In the past 100 years, fourteen flooding events have caused damage in Northampton. These are, in chronological order:

1. 5/13/2006– Heavy rainfall caused the Mill River to flood; \$5,000
2. 9/16/1999 – Tropical Storm Floyd; flooding to the Mill River Floodplain; \$900,000
3. 3/31/87/ - 4/7/87 – Connecticut River Floodplain; \$126,000
4. 5/28/64 – 6/5/84 – 50-year flood; Connecticut River Floodplain; \$377,000
5. 6/6/82 – 50 to 100 year food; Mill River Floodplain; \$104,000
6. 3/15/77 – 10-year flood; Connecticut River Floodplain; \$112,000
7. 4/6/60 – 10-year flood; Connecticut River Floodplain; \$38,000
8. 10/15/55 – 50 to 100-year flood; Mill River Floodplain; \$48,000
9. 3/29/53 – 10-year flood; Connecticut River Floodplain; \$40,000
10. 6/3/52 – 10-year flood; Connecticut River Floodplain; \$38,000
11. 1/1/49 – 10-year flood; Connecticut River Floodplain; \$37,000

- 12. 3/23/48 – 10-year flood; Connecticut River Floodplain; \$32,000
- 13. 9/22/38 – 100-year flood; Connecticut River Floodplain; \$81,500
- 14. 3/13/36 – 100-year flood; Connecticut River Floodplain; \$200,000

Probability of Future Events

Based upon previous data, it seems likely that there is a thirteen percent chance of minor or severe flooding occurring every year in Northampton. This is partly a function of the presence of the Connecticut River and the Mill River, both of which contain significant floodplain acreage in Northampton. The area within the 100-year flood plain still has a one (1) percent chance of a severe flood in any given year.

Snowstorms

Location

The entire City of Northampton is susceptible to snowstorms.

Extent

The most severe snow Northampton can expect in a one, two, or three day period is between twelve and twenty-four inches. At worst, the constraints this places on the City highway department, a significant portion of City 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 Northampton, but the committee has agreed to keep records on future severe winter storm events.⁸

Probability of Future Events

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

⁸ **National Environmental Satellite, Data, and Information Service (NESDIS)**

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 Floyd, a weak category 2 hurricane, in November 1999. 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 and tropical storm landfalls, the frequency of tropical systems to hit the Massachusetts coastline is an average of once out of every six years.

Northampton's inland location along the Connecticut River 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 Northampton will be flooding of the Connecticut and Mill Rivers. 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 City's transportation infrastructure and evacuation routes could also be impacted, as Route 5 and Interstate 91 are within the floodplain for the Connecticut River.

Previous Occurrences

According to the Northeast States Emergency Consortium (NESEC), Northampton has been hit by a tropical Depression since records have been kept (roughly 150 years). This means that Northampton has experienced severe tropical weather in the past and is likely to again as time passes.

However, let it be noted that Northampton's location—adjacent to the Connecticut River and the Mill River—makes it susceptible to rainfall from communities that are located upriver.

Probability of Future Events

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

Tornadoes/Microbursts

Location

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

Extent

The potential for locally catastrophic damage is a factor in any tornado event. In Northampton, a tornado that hit the city's eastern section, where 95% of the population lives, would leave much more damage than a tornado with a travel path that ran along the city's forested uplands, where little settlement has occurred. Most buildings in the City of Northampton 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, and 85% of the city's housing was constructed prior to this date.

Previous Occurrences

Between 1950 and 2004, three tornadoes have touched down in Northampton; of the three, a category F1, F2 and F3 tornado were represented. No records contained information about damage, but the Tornado was documented in southeastern Northampton.

Probability of Future Events

Based upon the available historical record, as well as Northampton's location in a high-density cluster of state-wide tornado activity, it is reasonable to estimate that there is a medium-high frequency of tornado occurrence in Northampton (a 5% - 10% chance in any given year).

Wildfires/Brushfires

Location

While Northampton is a city with a dense, well-defined downtown, it still contains several thousand acres of largely undeveloped space. The rural-urban interface is most pronounced in those sections of City that are experiencing development, most notably Florence and Leeds.

Extent

Forested areas in Northampton cover many of the city's outlying areas, which can be remote and difficult for emergency crews to access. In Northampton approximately 49 percent of the City's total land area is in forest, or about 11,237 acres, and is therefore at risk of fire. In drought conditions, a brushfire or wildfire would be a matter of concern. A large wildfire could damage 49 percent of the City's land mass, including vital watershed lands, 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.

Previous Occurrences

There are no records of wildfires or burned acreage available for Northampton, but the 2005 Massachusetts *Fire Incident Reporting System* recorded 44 "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 Northampton.

Probability of Future Events

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

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 Ann, 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 Northampton would be affected with some portions more impacted than others, depending on the magnitude of the earthquake and the underlying population density.

Previous Occurrences

Three earthquakes have struck Northampton, one occurred in 1884 on December 4th, another occurred in 1893 on March 14th, and the most recent earthquake occurred in 2002.

Probability of Future Events

Based upon existing records, there is a low frequency of earthquakes in Northampton with a between a 1% and 2% chance of an earthquake occurring in any given year.

Dam Failure

Location

The City of Northampton has 15 dams on public and private land. Refer to the Hazard Mitigation Map (Appendix E) for their locations.

Extent

Dams in Massachusetts are assessed according to their risk to life and property. Dams with a *Low Hazard* rating may cause minimal property damage 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:
 {NOTE: Why repeat this table from earlier in the report instead of simply referencing back to table 3-3?}

1. Clear Falls Pool Dam	Low
2. Vaznis Farm Pond Dam	Low
3. Howards Ice Pond Dam	Low
4. Fitzgerald Lake Dam	Low
5. Chartpac Dam	Significant
6. Mill River Dam	Significant
7. Florence Ice Pond Dam	Significant
8. Upper Reservoir Dam – Robert Meadows Brook	Significant
9. Lower Roberts Meadow Dam	Significant
10. Roberts Meadow Middle Dam	Significant
11. Mill River Diversion Dam	High
12. Vistron Pro Corporation Dam	High
13. Country Club Dam	High
14. Button Shop #2 Dam	High
15. Button Shop #1 Dam	High

The Mill River has a total of eight dams on it, four high and four significant hazard dams, and the Northampton Pre-Disaster Mitigation Committee expressed concern that a failure of this system would remove critical infrastructure, such as sewer and water lines, from the city’s roster of core services.

Previous Occurrences

To date, there have been no records of dam failures in Northampton.

Probability of Future Events

As Northampton’s high hazard dams age, and if maintenance is deferred, the likelihood of a dam bursting will increase, but, currently the frequency of dam

failures is very low with a less than one percent chance of a dam bursting in any given year.

Drought

Location

A drought would impact all of Northampton. Water-intensive uses such as agriculture and industries would be more impacted than other sectors of the city.

Extent

Currently, the City of Northampton's Public Drinking Water Supply serves 28,840 residents. Ninety-eight percent of the city's drinking water comes from surface water supplies at the Roberts Meadow Reservoir, while two percent comes from wells located in the Florence Section of Northampton. The wells could meet a maximum of 15% of the city's drinking water supply on a short-term emergency basis. The severity of a drought would determine the scale of the event.

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 Northampton, 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 Northampton's smaller population and the water richness of Western Massachusetts, communities like Northampton would not be as severely impacted as some communities in Eastern Massachusetts.

Man-Made Hazards

Location

Northampton has several facilities in City that could produce damage from

man-made chemical explosions, leaks or spills. Please refer to the Northampton Natural Hazard map to see where these uses are distributed.

Address	Organization
Industrial Drive	Coca-Cola North America -
Damon Road	The Lane Construction Corporation
Industrial Dr.	Saint Gobain Ceramic Materials
West street	Smith College
Hatfield street	Construction service
Hockanum road	Northampton wastewater treatment
Glendale road	Northampton leachate treatment
King street	King street substation #5
N. King St.	Wal-mart store #2901
Locust street	Cooley-Dickinson hospital
Industrial Ave.	Transit express, inc.
River road	Chartpak, inc.
Masonic St	Verizon Northampton co (ma823707)
Round hill road	Clarke school for the deaf

Extent

There is no reliable indicator of the extent of a man-made event in Northampton.

Previous Occurrences

There have been no previous occurrences in Northampton.

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 City of Northampton. 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 Northampton, 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 City of Northampton, including exempt structures such as schools and churches, is \$ 3,534,473,816 as of 2006. The median value of a home in Northampton is \$275,000 according to the Warren Group.

Past and Potential Hazards

Flooding (100-year base flood): High Risk

In this section, a vulnerability assessment was prepared to evaluate the potential impact that flooding could have on the portions of Northampton 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 4,150 acres of land within the FEMA mapped 100-year floodplain and 82 acres of land within the 500-year floodplain within the City of Northampton. According to the Community Information System (CIS) of FEMA, there were 90 1-4 family structures and ZERO "other" structures located within the Special Flood Hazard Area (SFHA) in Northampton as of July 20, 2005, the most current records in the GIS for the City of Northampton. Utilizing the City's median home value of \$275,000, a preliminary damage assessment was generated. For the estimated number of people living in the floodplain, an average household size of 2.14 people was used.

A total of 90 structures are located within the SFHA in Northampton, totaling approximately \$24,750,000 of damage, and 193 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.

Within the area set aside as Northampton's Floodplain, the following critical facilities are at risk:

- EPA Tier II Facility on Island Road in the Oxbow Lake area
- Group Home/Assisted Living Facility within the Mill River's 500-year floodplain on Paquette Street
- Power facilities located on West Street
- The Northampton Airport—useful when air lifts might be necessary—is located in the 100-year floodplain
- Fair Grounds—potential gathering spot for thousands of people and livestock during the Three County Fair—are located in the 100 year floodplain.
- Sections of Route 10 can be submerged in a 100-year flood, cutting off southbound access
- Waterlines and sewer lines are mounted on the city's bridges—a flood that knocked out a bridge could result in loss of services for residential populations
- The City's wastewater treatment facility is located on at a very low; flooding would knock out the wastewater treatment operations.
- Much of Downtown is technically outside of the floodplain, but only because of flood control dikes. If the dikes failed, approximately 1/3 of Downtown would be at risk of flooding.

Localized Flooding

During the Natural Hazard Mitigation Committee's meetings, several points in City were identified as areas that flood frequently but are outside of the community's Flood Insurance Rate Map boundaries. These areas are, roughly:

- The Intersection of State Street / Stoddard Street / Perkins Avenue to Route 5 & 10. This neighborhood is medium density residential. Approximately eighteen could be affected by a flood incident. 100% damage to 100% of the structures, estimated cost of repairing or replacing to be \$4,860,000.
- The area surrounding Riverside Drive, Nutting Avenue, Ormond Street, Federal Street. Approximately sixty-eight structures could be affected by a flood incident. At 100% damage to 100% of the structures, the estimated cost of repairing or replacing would be \$18,360,000.
- Pomeroy Terrace/Eastern Avenue. This a low-density residential / light commercial section of City that could flood from a collapsed drainage pipe. Approximately 15 structures could be affected, and at 100%

damage to 100% of the structures, the estimated cost would be \$4,050,000.

Severe Snowstorms/Ice Storms: Medium-High 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. Northampton'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 City wide due to snow, ice and extreme cold.
- 1969 heavy snow - several 3 feet events.
- 1988 temperature below 0 degrees for a month (Nov.-Dec.).
- Elderly are affected by extreme weather.
- The long-term fatigue of DPW employees from managing a severe winter storm can result in delayed response to street maintenance
- Ice, wind and snow can cause power outages
- Automobile traffic will become more dangerous in a severe winter event.

Hurricanes/Severe Thunderstorms: High Risk

Northampton's location in Western Massachusetts reduces the risk of extremely high winds that are associated with hurricanes. The City has experienced small blocks of downed timber and uprooting of trees onto structures. Hurricanes can and do create flooding. Estimated wind damage to 5% of the structures with 10% damage to each structure is \$17,672,476. Estimated flood damage to 10% of the structures with 20% damage to each structure is \$70,689,476. Cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included.

- Connecticut River corridor at risk.
- 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: Low Risk

Risk of tornadoes is considered to be high relatively in Hampshire County. Most buildings in the City of Northampton 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 85% of the housing in Northampton was built before 1970. Estimated damages to 10% of structures with 20% damages \$70,689,476. Estimated cost does not include building contents, land values or damages to utilities.

- One tornado recorded in Northampton since 1950s.
- River corridors and hill tops susceptible.
- 9 incidents of tornado activity (F1 or less) occurred in Hampshire County between 1951—2006.

Wildfires/Brush Fires: Low Risk

As timber harvesting is reduced, and wood roads close, and debris builds up on the ground, the potential for wildfire increases City-wide. Northampton has a professional Fire Department, and there have not been any major forest fires in Northampton. Northampton and New England are in Low Danger of wildfires because of the high amount of precipitation the region receives.

Earthquakes: Low Risk

Moderate potential for serious damage is a factor in village portions of City and along the Connecticut River shoreline. In Northampton, structures are mostly of wood frame construction; estimated loss of 20% to City assessed valuation has been placed at \$706,894,763. Costs of repairing or replacing roads, bridges, power lines, telephone lines, or the contents of the structures are not included.

- Small earthquakes have been recorded in the region, but no damage has resulted
- Low risk to City.

Dam/Dike Failure: High Risk

The Massachusetts Emergency Management Agency (MEMA) identifies fifteen (15) dams in Northampton. Table 3-3 identifies the dams within the City as well as whether they are classified as low, significant, or high hazard. Of the fifteen dams in Northampton five 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. Four dams on the Mill River and one dam at Roberts Meadow Brook 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. Four dams on the Mill River are 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. In addition,

approximately 1/3 of Downtown could be at risk of flooding if the flood control dikes surrounding Downtown ever failed.

Drought: Low Risk

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 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

Northampton 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 5, 10, 9, and 66 are a concern. There are twenty-one (21) sites in the Northampton identified by the U.S. EPA as Tier II Hazardous Material sites. These sites are:

{Again, why does this table repeat an earlier table, can't there just be a cross reference?}

Address	Organization
Industrial Drive	Coca-Cola North America -
Damon road	The lane construction corporation
Industrial dr.	Saint Gobain ceramic materials
West street	Smith College
Hatfield street	Construction service
Hockanum road	Northampton wastewater treatment
Glendale road	Northampton leachate treatment
King street	King street substation #5
N. King St.	Wal-mart store #2901
Locust street	Cooley-Dickinson hospital
Industrial Ave.	Transit express, inc.
River road	Chartpak, inc.
Masonic St	Verizon Northampton co (ma823707)
Round hill road	Clarke school for the deaf

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.

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

The Critical Facilities List for the City of Northampton has been identified utilizing Northampton's Comprehensive Emergency Management Plan, combined with critical infrastructure mapping undertaken by PVPC under contract with the WRHSAC. Northampton's Natural 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 Northampton. 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 City 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**
Northampton Police Department – Center Street
- 2. Fire Station**
Northampton Fire Station – Carlon Road

3. **Police Station**
Northampton Police Station – Center Street
4. **Highway Garage**
City Municipal Garage – Locust Street
5. **Water Department**
Northampton Department of Public Works – Locust Street
Northampton Water Department – Prospect Street
6. **Emergency Fuel Stations**
Northampton Department of Public Works – Locust Street
7. **Emergency Electrical Power Facility**
Generators at :
Northampton High School
John F. Kennedy Middle School
Northampton VA Medical Center
Cooley Dickinson
Smith College Campus School
Hampden County House of Correction
Emergency Operations Center
Northampton Police Department
Northampton Fire Department
Northampton Department of Public Works
Northampton Waste Water Treatment Plant

8. Emergency Shelters

SHELTER NAME & ADDRESS	Capacity @40 sq. ft / person	Restrictions
Smith Voc & Agricultural High 80 Locust Street	2000	
Northampton High 380 Elm Street	2500	
John F Kennedy Middle School 100 Bridge Rd, Florence	2500	

SHELTER NAME & ADDRESS	Capacity @40 sq. ft / person	Restrictions
Jackson Street School 120 Jackson Street	1000	
Robert K Finn School 498 Ryan Rd	800	
Leeds Elementary 20 Florence Street	800	
Bridge Street 2 Parsons Street	700	
Northampton VA Medical Ctr. 421 North Main St	1500	Medical Facility
Cooley Dickinson Hospital, Inc. 30 Locust Street	300	Medical Facility
Memorial Hall 212 Main St.	1100	
Hampden County House of Correction 627 Randall Rd.	400	Prisoners only
Smith College Campus School 126 West St	1400	

9. Transfer Station and City Dump

Northampton Recycling Center – Locust Street
Northampton Landfill – Burts Pit Road

10. Utilities

Northampton Wastewater Treatment Plant – Hockanum Road

11. Helicopter Landing Sites

Northampton Airport – Old Ferry Road
Cooley Dickinson Helicopter Pad – Hospital Road

12. Primary Evacuation Routes¹⁰

- Interstate 91
- MA Route 5
- MA Route 10
- MA Route 9
- MA Route 66
- MA Route 5 & 10

13. Bridges Located on Evacuation Routes –

- MA Route 10, Earle Street
- MA Route 9, Calvin Coolidge Bridge
- Old Ferry Road Bridge
- Hockanum Road Bridge
- Interstate 91 – Exit 18
- Island Road Bridge
- South Street Mill River Bridge
- West Street Bridge
- Clement Street Bridge
- Florence Pond Road Bridge
- Oxbow Road Bridge
- Meadow Street Bridge
- Dimmock Street Bridge
- Reservoir Road Bridge
- Leeds Main Street Bridge
- Spring Street Bridge
- Audubon Road Bridge over Mill River
- Chesterfield Road Bridges

Category 2 – Non Emergency Response Facilities

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

1. Water Supply

- Roberts Meadow Reservoir

¹⁰ Evacuation Routes are not formally designated. These are the major roads leading into and out of Northampton, but the Committee expressed reservations about formally designating any evacuation routes, primarily because doing so would not take into consideration the locations to which Northampton's residents would be evacuating. Mayor Higgins expressed the need for regional coordination to make evacuation procedures seamless across jurisdictional borders.

Upper Reservoir

Minor water supplies are obtained from the Florence Wells

2. Sewer Infrastructure (Pump Stations) ¹¹

Northampton Wastewater Treatment Plant – Hockanum Road—the flood control pumps, fairly old and showing signs of wear, are especially vulnerable to failure and, if they failed, could create severe damage to both the plant and the surrounding low lying neighborhood.

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. Hospitals

Cooley Dickinson Hospital – Elm Street

2. Special Needs Population

Individuals without a reliable form of private evacuation

Smith College – 2,500 students living on campus, several without transportation

Elderly – Significant population in DownCity Areas

3. Elderly Housing/Assisted Living

Walter Salvo House – Conz Street

Frank J. Cahill – Fruit Street

Harold J. Forsander – High Street

Jones Tobin Manor – Maple Street

Joseph McDonald House – Old South Street

Calvin Coolidge Nursing Home – Elm Street

4. Recreation Areas

Look Park – Route 9

Childs Park – Route 9

¹¹ The Northampton DPW maintains a list for official purposes, but will not compromise this list in a public plan.

Arcanum Field – Bridge Road, Florence
Maines Field – Riverside Drive, Florence
Musante Beach – Reservoir Road, Florence
Sheldon Field – Route 9
Vetarans Field – West Street
Norwottuck – Damon Road

5. Schools

Northampton High School – Elm Street
Smith Vocational and Agricultural High School – Locust Street
John F Kennedy Middle School - Bridge Road
Jackson Street School – Jackson Street
Bridge Street School – Bridge Street
Leeds School – Florence Street
Ryan Road School – Ryan Road
The Florence Learning Center – Pine Street

6. Churches

Blessed Sacrament Church – Elm St
College Church – Pomeroy Terrace
Congregation B’Nai Israel – Prospect Street
Edwards Church – Main Street
First Church-Christ Scientist – 79 Masonic Street
First Churches – 129 Main Street
Kingdom Hall – Jehovah’s Witness – Bridge Street
Sacred Heart Church – King Street
St. John’s Episcopal Church – Elm Street
St. Mary’s Catholic Church – Elm Street
Unitarian Society – Main Street

7. Historic Buildings/Sites

Northampton VA Medical Center – North Main Street
Graves Avenue – 8—22 Graves Avenue
Memorial Hall – Main Street
First Congregational Church – Main Street
West Farms Church – West Farms Street
Hampshire County Court House – Gothic Street
Fort Hill Historic District
Elm Street Historic District
Sylvester Graham House – Pleasant Street
Calvin Coolidge House – Massasoit Street
Northampton DownCity Historic District
Hotel Northampton – King Street
Unitarian Church – Main Street
The Manse – Prospect Street

8. Employment Centers

Smith College – Elm Street
Cooley Dickinson – Elm Street
Kolmorgen – MA Routes 5 & 10
VA Medical Center – Route 9

9. Camps

Hampshire Educational Collaborative Camp Hodgkins – Riverbank Road

10. Mobile Home Parks

None in Northampton

Critical Facilities and Evacuation Routes Potentially Affected by Hazard Areas

Hazard Type	Hazard Area	Critical Facilities Affected	Evacuation Routes Affected
Flooding	Mill River Connecticut River	Should the levy system fail, the entire downCity would be flooded, including emergency operations from the police station	Route 10 in extreme conditions, Route 5; Route 66; Route 9.
Severe Snowstorms/Ice Storms	Entire City	Cooley Dickinson-possible power outage Nursing Homes-Rock Ridge	Route 10 in extreme conditions, Route 5; Route 66; Route 9.
Severe Thunderstorms (microbursts) which cause wind damage	Pine Brook Curve-2000 Burts Pitt Road-2002	Site Specific	Site Specific
Hurricanes	Mill River Connecticut River	Should the levy system fail, the entire downCity would be flooded, including emergency operations from the police station	Route 10 in extreme conditions, Route 5; Route 66; Route 9.

Tornadoes	Entire City	Site Specific	Site Specific
Wildfire/Brushfire	Spring Street Ryan Road Chesterfield Road	Watershed Lands	Site Specific
Earthquakes	Entire City	Emergency operations; residential and commercial structures; emergency shelters; waste management and treatment plants	Route 91 in extreme conditions, Route 5; Route 66; Route 9.
Man-made Hazards: Hazardous Materials	DPW Water Treatment Facility Wastewater Treatment Plant Northampton Industrial Park Train Tracks	DownCity Schools Churches and Synagogues	Interstate 91
Dike Failure	West Street Mill River Flood Control	DownCity- Hampden Avenue and South Pleasant Old Mill River Riverbed	Route 5

(Critical Facilities Map Located In Back of Plan)

5 – CURRENT MITIGATION STRATEGIES

[See Existing Mitigation Strategies Table in the Northampton Flood and Natural Hazard Mitigation Plan]

Flooding

The Critical Facilities, Infrastructure, 1999 Land Use & Natural Hazards Map for the City of Northampton 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 Mill River, the Mill River Diversion, Basset Brook, Parsons Brook, Broad Brook and the Connecticut River. In several areas, the flood zone widens out to encompass farmland, some residential land, industrial lands.

The major floods recorded in Northampton 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 city's existing policies and practices related to natural hazards and identify potential gaps in protection.

Management Plans

The Comprehensive Emergency Management (CEM) Plan for Northampton 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 Northampton 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.

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

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

- o Place EOC personnel on standby during stage of flood ‘watch’ and monitor NWS/New England River Forecast Center reports.
- o Ensure that public warning systems are working properly and broadcast any information that is needed at this time.
- o Review mutual aid agreements.
- o Monitor levels of local bodies of water.
- o Arrange for all evacuation and sheltering procedures to be ready for activation when needed.
- o Carry out, or assist in carrying out, needed flood-proofing measures such as sand bag placement, etc.
- o Regulate operation of flood control works such as flood gates.
- o Notify all Emergency Management related groups that will assist with flood response activities to be ready in case of flood ‘warning’.

Evacuation Options

The majority of land subject to the 100-year floodplain in City—located along Connecticut River (East of Bridge Street, along I-91, East of South Street Rte 10), Broad Brook, Marble Brook, Meadow Brook and Clark Brook (along Reservoir Road), unnamed stream along Loudville Road, Parsons Brook, Bassett Brook, unnamed stream south of Westhampton Road—is forest, abandoned pasture, pasture, cropland, dense urban and residential areas. Emergency management personnel should assess existing floodplain and dam failure data to determine an appropriate evacuation plan.

Possible Mass Care Shelters that could be utilized in the event of a flood

NAME	ADDRESS
A). Smith Voc & Agricultural High	80 Locust Street
B). Northampton High	380 Elm Street
C). John F Kennedy Middle School	100 Bridge Rd, Florence

NAME	ADDRESS
D). Jackson Street School	120 Jackson Street
E). Robert K Finn School	498 Ryan Rd
F). Leeds Elementary	20 Florence Street
G). Bridge Street	2 Parsons Street
H). Northampton VA Medical Ctr.	421 North Main St
I). Cooley Dickinson Hospital, Inc.	30 Locust Street
J). Memorial Hall	212 Main St.
K). Hampden County House of Correction	627 Randall Rd.
L). Smith College Campus School	126 West St

In addition, Northampton has 20 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 the following flood control structures in Northampton: Northampton Connecticut and Mill River Flood Control Dikes, constructed by the U.S. Army Corps of Engineers.

Land Use Regulations that Mitigate Impacts from Flooding¹²

The City of Northampton 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

Northampton’s most recent draft of its Subdivision Rules and Regulations which govern the subdivision of land were adopted for the purpose of “protecting the safety, convenience and welfare of the inhabitants of Northampton by regulating the laying out and construction of ways in subdivisions providing

¹² All bulleted items and direct quotes in the Northampton Local Natural Hazards Mitigation Plan are taken from the City of Northampton’s Zoning Ordinance and subdivision regulations. Other references to those documents contained herein are paraphrases of the same.

access to the several lots there [and]...for securing safety in the case of fire, flood, panic, and other emergencies” The Subdivision Rules and Regulations contain several provisions that mitigate the potential for, and impact of, flooding.

There is a range of regulatory techniques available to prevent flood damage in Northampton. These include the following (For a detailed excerpt of relevant sections, please refer to Appendix F):

- ☞ When a Definitive Plan is submitted, proponents must delineate natural waterways and floodways.
- ☞ All subdivision must comply with the Massachusetts’ Wetlands Protection Act (Chapter 131, Section 40) and retain all wetlands and flood lands if the Conservation Commission determines that the WPA applies to the proposed subdivision.
- ☞ The Development Impact Statement must detail the impacts of the proposed development on water and sewer loading capacities (relevant when assessing the city’s ability to manage waste disposal and water supplies in a flooding event).
- ☞ When permitting the subdivision, the planning board must ensure that the regulations of the Water Supply Protection District are met, when the development is located within the WSP. This works to retain flood and rainwater storage capacity in Northampton’s critical waterways.
- ☞ Stormwater drainage and infiltration systems must be designed to withstand 1, 2, 10 and 100 year storms in Northampton
- ☞ When a plan is developed and submitted to the planning board, all definitive plans must indicate, clearly, any floodplain lands and demonstrate compliance with the City’s Floodplain District.
- ☞ The City of Northampton requires that all utility distribution systems be located underground. In the event of a flood, this would prevent damage to critical utility lines.

Northampton Zoning Ordinance

The City of Northampton has established a set of ordinances designed in part to “lessen congestion in the streets; to conserve health; to secure safety from fire, flood, panic, and other dangers” The Zoning Ordinance include several provisions that mitigate the potential for flooding, including (for a detailed excerpt of relevant portions please refer to Appendix G):

- ☞ Any body of water or wet area that is proposed for filling and is proposed to receive 500 cubic yards of fill, or where the proposed area

exceeds 10,000 s.f., must receive permission from the Conservation Commission and must: a) not be located within the watershed protection district, b) be executed within the context of existing plans, c) sufficiently document the impacts on downstream locations, d) be designed not to impair surface drainage or increase erosion, e) be designed to minimize off-site accumulation of fill materials, f) must not impair any septic disposal systems, and g) no filling shall cause water or other materials to intrude upon a neighboring property without the express permission of the neighbor.

- ☞ The site plan review process shall: have all stormwater systems approved, floodplains and water bodies must be delineated, an erosion control plan that prevents infill of water bodies must be approved, not result in water damage to surrounding properties, not result in an increase in surface water runoff from 1, 2 or 10 year storm events in the Central Business District.
- ☞ The Special Conservancy zoning district has been created in Northampton to maintain the natural and safe flow of floodwaters, and to protect persons and property by ensuring that development does not interfere with flood storage capacity.
- ☞ The Watershed Protection District prevents the construction of residencies and the addition of fill; these preserves the natural hydrology of the city's watershed lands and provides storage areas for rain waters.
- ☞ The Farms, Forest and Rivers Overlay District (FFR) encourages the preservation of open space and caps impervious surface area at 25% of the total lot size. The FFR works to maintain open space and rainwater storage areas and, as such, makes the City less susceptible to damage from flooding.
- ☞ The Water Supply Protection District prohibits the use of toxic chemicals and restricts the excavation land within those lands that are critical to the city's drinking water supplies. This works to maintain natural hydrology.
- ☞ The Open Space Residential Development (OSRD) bylaw requires that 50% of a new subdivision (when ordinance is used) be preserved as open space. This preserves open space and can slow and store rain waters.

- ☞ The Planned Unit Development accomplishes the same open space goals as the OSRD bylaw, but creates different construction densities than the OSRD.

River and Stream Protection

The City of Northampton follows the standards established by the Wetlands Protection Act, which protects water bodies and wetlands through the city Conservation Commission. The City also has instituted its Wetlands Ordinance and Zoning Watershed Protection District, an overlay district that provides restrictions on use categories, the use of septic tanks and leach fields, as well as on the impacting of the flood storage capacity of the land. The City also has a Water Supply Protection District, which prohibits the use of septic tanks within the city's aquifer protection district.

National Flood Insurance Program

The City of Northampton participates in the National Flood Insurance Program. As of 2006, there were 86 structures located within Northampton's flood prone areas for a total of \$15,156,000 worth of insurance. Northampton is 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 City 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.

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

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Potential Changes
<p>Subdivision Rules and Regulations</p>	<p>Definitive plan requires delineating natural waterways and floodways.</p> <p>Requires a Development Impact Statement (DIS) detailing the impact on hydrology and water supplies.</p> <p>The subdivision regulations must comply with zoning protections for natural features.</p> <p>Subdivision drainage must be designed to withstand 1, 2 10 and 100 year storms.</p>	<p>Entire City.</p>	<p>Somewhat effective for mitigating or preventing localized flooding of roads and other infrastructure.</p> <p>Somewhat effective for controlling impacts from stormwater runoff.</p> <p>Somewhat effective for controlling impacts from</p>	<p>None.</p>

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Potential Changes
	Utilities must be buried.		stormwater runoff. Prevents flood damage to infrastructure	
Zoning Ordinances: Site Plan Review Special Conservancy	<p>Requires the site plan to show erosion control, drainage facilities, stormwater runoff, no net change to water supply</p> <p>Preserves the floodplain through restricting development—Planning Board and Conservation Commission approval for construction—while allowing</p>	<p>Entire City.</p> <p>Area designated on Zoning Map</p>	<p>Somewhat effective for controlling surface runoff and erosion problems.</p> <p>Somewhat effective for controlling surface runoff</p>	<p>None.</p> <p>None.</p> <p>None.</p>

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Potential Changes
<p>Watershed Protection District</p> <p>Farm, Forest and Rivers Overlay District</p> <p>Water Supply Protection District</p>	<p>conservation by right.</p> <p>Preserves and protects streams and natural drainage through requiring a special permit for construction and filling of land.</p> <p>Protects vulnerable, sensitive and important ecosystems through requiring that all construction be sited to minimize a project’s footprint on the land; allows clustering and sets a 25% maximum footprint for infrastructure.</p> <p>Preserves primary and secondary recharge areas through preventing the use of hazardous chemicals— either through strict conditions or outright prohibitions</p>	<p>Area designated on Zoning Map</p> <p>Area designated on Zoning Map</p> <p>Area designated on Zoning Map</p>	<p>and erosion problems.</p> <p>Somewhat effective for minimizing impacts of development on flood levels within flood plain.</p> <p>Somewhat effective at restricting toxics and development</p>	<p>None.</p> <p>None.</p>

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Potential Changes
OSRD	Allows development while conserving valuable open space.	Entire City.	Effective at maintaining flood storage land.	Consider adding more specific impacts to address including topographic change, removal of cover vegetation, risk of erosion or siltation and increased storm water runoff.
Wetlands Ordinance	Protects wetlands, including floodplains, rivers and wetlands	All wetlands and floodplains	Effective at limiting development that would harm these resources	
Northampton Open Space and Recreation Plan	Inventories natural features and promotes natural resource preservation in the City, including areas in the floodplain; such as wetlands, aquifer recharge areas, farms and open space, rivers, streams and brooks.	Entire City.	Effective in identifying sensitive resource areas, including floodplains. Encourages	Consider implementing the Five-Year Action Plan strategies, particularly those dealing with protection of forests, farmland and floodplain forests.

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Potential Changes
City of Northampton Open Space and Recreation Plan (continued)			forestland and farmland protection, which will help conserve the City's flood storage capacity.	
Participation in the National Flood Insurance Program	As of 2006, there were 86 homeowners with flood insurance policies.	Areas identified by the FEMA maps.	Somewhat effective, provided that the City remains enrolled in the National Flood Insurance Program.	The City should maintain CRS status
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	Develop a Beaver Management Strategy in cooperation with the Northampton Board of Health.

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Potential Changes
			activity.	

Severe Snowstorms/Ice Storms

Winter Storms are the most common and most familiar of Bay State hazards which affect large geographical areas. The majority of blizzards and ice storms in the Commonwealth cause more massive inconvenience than they do serious property damage, injuries, or deaths. However, periodically, a storm will occur which is a true disaster, and necessitates intense, large-scale emergency response.

A winter storm is very challenging to Emergency Management personnel because, even though it has usually been forecast, there is no certain way of predicting its length, size, or severity. For these reasons, it is imperative that local communities have clear and strict policies governing school and business closings, road use, parking, and other factors that could affect the management of a serious snowstorm. It is also crucial that all snow management equipment, supplies, and personnel be in place and ready to respond to a winter storm emergency.

Management Plans

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

Mitigation

- 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 Northampton lists the following generic preparedness and response measures for severe winter storms:

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

- 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. However, the Subdivision Rules and Regulations do set grade limits on driveways and address frontage variances for flag lots to ensure that roads and driveways will be passable in the winter.

- ☞ The City of Northampton Subdivision Rules and Regulations set grade limits on streets that are included in an Section 7:01 Streets and Ways and as part of Section 7: 22 Underground Utility Systems, which, although not specified as weather hazard mitigation, can serve to minimize accident potential and power loss from severe winter storms (for a detailed excerpt, please refer to Appendix F).

- ☞ The planning board can issue special permits for flag lots, provided no more than three of those lots have contiguous street frontage (for a detailed excerpt, see Appendix G).

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 snowloads. Northampton has a full-time, professional building inspector on its staff.

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

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Potential Changes
Subdivision Regulations – Design Standards for Roads Standards for Flag Lots	Standards include street grade regulations (five to eight percent maximum). Requires that snow management strategy be a clear part of the conditions to permit a flag lot.	Entire City.	Effective.	None.
Subdivision Regulations – Utilities (electric and telephone)	The City requires all utilities for new subdivisions to be underground.	Entire City.	Somewhat effective for ensuring that utility service is uninterrupted by severe storms in new areas of residential development.	Work with utility companies to underground existing utility lines in locations where repetitive outages occur.

State Building Code	Northampton has adopted the Massachusetts State Building Code.	Entire City.	Effective.	None.
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Hurricanes

Of all the natural disasters that could potentially impact Northampton, 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).¹³ 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. During the last 100 years, 20 hurricanes have passed within 125 miles of Boston and the City of Northampton can expect a hurricane to strike near it once every six years. The Northampton Hazard Mitigation Committee identified the following area as being most vulnerable to the hazards associated with hurricanes: downtown Northampton

Northampton's telecommunications facilities bylaw, restrictions on development, and State Building Code regulations, as listed below, are equally applicable to wind events such as hurricanes and tornadoes.

Management Plans

The CEM Plan for Northampton 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 Northampton continues to be 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.
- Maintain plans for managing all hurricane emergency response activities.

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

¹³ Comprehensive Emergency Management Plan for the City of Northampton, 2003

- 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.
- Refer to the **Resource Manual's** Transportation Inventory for information regarding transportation providers.
- Clear debris.
- Inspect damaged buildings, bridges, etc. for structural integrity.
- Test and purify water.
- Coordinate re-entry of evacuees.
- Address public health and sanitation issues.
- Conduct damage assessment.
- Establish disaster recovery centers to provide information and assistance to victims.
- Apply for state and federal disaster relief funds, if appropriate.

Evacuation Options

According to the Northampton CEM plan, local officials have stated that the following facilities have been listed as the appropriate evacuation shelters in the event of a total evacuation:

<i>Facility</i>	<i>Address</i>
Northampton High	380 Elm Street
Florence Community Center	140 Pine St.
John F Kennedy Middle School	100 Bridge Rd, Florence
Leeds Elementary	20 Florence Street
Bridge Street	2 Parsons Street
Smith College Campus School	126 West St
Robert K Finn School	498 Ryan Rd
Jackson Street School	120 Jackson Street

Zoning

- ☞ The Telecommunications Facilities Zoning Ordinance requires that the setback from a telecommunications tower from adjacent property lines must be at least twice the height of the tower. This requirement prevents telecommunications facilities from falling and damaging neighboring properties (For a detailed description, see Appendix G).

Restrictions on Development

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

Mobile Homes

According to the Northampton Zoning Ordinance, mobile homes are not an allowed use. However, all regulations and legal protections given to victims of fires or other natural disasters must be followed, and such regulations are located in M.G.L. Chapter 40A.

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 City of Northampton employs a full-time building inspector for all inspection duties and responsibilities.

Tornadoes

Worcester County and areas just to its west, including portions of Hampshire County, have been dubbed the “tornado alley” of the state. 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.¹⁴

Like earthquakes, the location of tornado impact is totally unpredictable; however a tornado’s approach does provide a short time, (minutes or less), to take shelter in a basement, inner room of a building, deep ditch, or some such location. Tornadoes are fierce phenomena which generate wind funnels of up to 200 MPH or more, and occur in Massachusetts usually during June, July, and August.

Management Plans

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

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

¹⁴ www.ibhs.org.

- 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.
- Continue debris clearance and restoration of utilities.
- Restore utility services.
- Conduct damage assessment of public and private property.
- Provide security to structures that are uninhabited.
- Provide short and long-term food, water, clothing, shelter, medical care and other necessary assistance to victims.
- Coordinate re-entry of evacuees.
- Public health monitoring of long-term hazards.
- Establish disaster recovery centers for victims.
- Apply for state and federal disaster relief funds.
- Assist in conducting and/or coordinating overall long-term rehabilitation and reconstruction of area.

Evacuation Plans

There is no shelter for tornado victims identified in the Northampton CEM Plan, but several shelters are identified for all purposes.

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

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Potential Changes
Zoning regulations for Tele-communications Facilities	<p>No facility shall exceed 220 feet in height as measured from the mean finished grade at facility base.</p> <p>No tower exclusive of any attachments, shall be erected nearer to any property line than a distance equal to twice the vertical height</p>	Entire City.	Effective.	Consider adding safety and prevention of wind-related damage as a stated purpose.
Subdivision Regulations – Utilities (electric and telephone)	The City requires all utilities for new subdivisions to be underground.	Entire City.	Somewhat effective for ensuring that utility service is uninterrupted by severe storms in new areas of	Work with utility companies to underground new utility lines in general and existing utility lines in locations where repetitive outages occur.

			residential development.	
Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Potential Changes
Zoning Regulations regarding new mobile homes	Mobile homes are not an allowed use in all districts.	Entire City.	Does not address the potential for wind-related damage to mobile homes.	None.
State Building Code	The City of Northampton has adopted the Massachusetts State Building Code.	Entire City.	Effective.	None.
Debris Management Plan	A debris management plan could be developed. ¹⁵	Entire City.	Effective.	Consider participation in the creation of a Regional Debris Management Plan.

²⁶ 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>.

Shelters	The Following shelters have been designated for Northampton's residents: Smith Vocational & Agricultural High School, Northampton High School, John F. Kennedy Middle School, Jackson Street School, Robert K. Finn School, Leeds Elementary, Bridge Street School, Northampton VA Medical Center, Cooley Dickinson Hospital, Memorial Hall, Hampden County House of Corrections and the Smith College Campus.	Entire City.	Somewhat effective.	None.
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Wildfires/Brushfires

Hampshire and Hampden Counties have approximately 469,587 acres of forested land, which accounts for 63 percent of total land area. Forest fires are therefore a potentially significant issue. In Northampton approximately 49 percent of the City's total land area is in forest, or about 11,237 acres, and is therefore at risk of fire. In 2004, there were 114 fires reported in Northampton. Of this number, 54 fires occurred in buildings, 24 occurred in vehicles and 36 occurred out-of-doors.

Management Plans

The Northampton CEM Plan does not include any specific information on wildfires.

Regulatory Measures

Burn Permits: The City of Northampton does allow open burning under the guidelines of the Department of Environmental Protection. Open Burning is authorized from January 15 to May 1. Burning is permitted between the hours of 10 a.m. and 4 p.m. The Officer in Charge of the Fire Department will determine if burning will be allowed at the beginning of the shift and can suspend burning if weather conditions change.

Subdivision Review: The procedures for the submission of preliminary and definitive subdivision plans requires that the fire department be an active participant in the review of proposed subdivision plans. This involves verifying that proficient water supplies exist and that access routes to and from a given subdivision adequately meet public safety needs.

Public Education/Outreach: The Northampton Fire Department maintains a public outreach program that targets children and seniors with the intention of spreading information about fire safety within these two populations. Furthermore, the City has a safety inspection program that works to ensure that fire safety standards are being met.

Restrictions on Development

There are currently no restrictions on development that are based on the need to mitigate the hazards of wildfires/brushfires.

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

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Potential Changes
Burn Permits	Residents are permitted to obtain burn permits over the phone. State police personnel provide information on safe burn practices.	Entire City.	Effective.	None.
Subdivision Review: Fire Safety	The Fire Department is involved in the review of subdivision plans. The City of Northampton has extensive public water supplies and all residents are within the City's fire prevention operations.	Entire City. Entire City.	Effective. Would be effective in providing for an increase in fire suppression capacity.	None.
Public	The Fire Department has an ongoing	Entire City.	Effective.	None.

Education/Outreach	educational program in the schools.			
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Earthquakes

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

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

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 Northampton 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 Northampton 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 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. See the **Resource Manual** for Mass Care Shelters.
- It is assumed that all special needs facilities could be impacted to some extent by earthquake effects therefore preparedness measures should be in place to address the needs of all special needs facilities listed in the resource manual section of this plan.
- Most likely the entire population of the community will be affected by a seismic event. Estimate the maximum peak population affected, considering peak tourism, special event populations and work hours.
- 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. See Master Warning List in the **Resource Manual** section of this plan for some or all-warning methods that would be utilized for earthquake emergencies.
- 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.
- Restoration of utility services.
- Decontamination of water.
- Debris clearance.
- Damage assessment of public and private property.
- Demolition of irreparable structures.
- Assisting victims with the provision of short and long-term food, water, clothing, housing, medical care, etc.

- Coordination of re-entry of evacuees.
- Public health monitoring of lingering long-term hazards.
- Addressing of legal and insurance matters.
- Application for state and federal disaster relief funds.
- Overall long-term rehabilitation and reconstruction of affected area.

Evacuation Options

The Northampton CEM lists eleven shelters for victims of earthquakes. They are:

NAME	ADDRESS
A). Smith Voc & Agricultural High	80 Locust Street
B). Northampton High	380 Elm Street
C). John F Kennedy Middle School	100 Bridge Rd, Florence
D). Jackson Street School	120 Jackson Street
E). Robert K Finn School	498 Ryan Rd
F). Leeds Elementary	20 Florence Street
G). Bridge Street	2 Parsons Street
H). Northampton VA Medical Ctr.	421 North Main St
I). Cooley Dickinson Hospital, Inc.	30 Locust Street
J). Memorial Hall	212 Main St.
K). Hampden County House of Correction	627 Randall Rd.
L). Smith College Campus School	126 West St

The maximum peak population affected by an earthquake is estimated at 28,000 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, 73.5 percent of the housing in Northampton 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 beyond that in the building code.

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

Type of Existing or Proposed Protection	Description	Area Covered	Effectiveness	Potential Changes
State Building Code	The City of Northampton has adopted the 6 th Edition of the State Building Code.	Entire City 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.
Shelters	Shelters have been identified for victims of earthquakes in Northampton.	Entire City.	Effective.	Consider identifying shelters for all other natural disasters in Northampton, not just earthquakes.

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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 Northampton 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
1. Activate EOC
 2. Activate all communication networks
 - a. Establish communications with Command Post
 On a 24-hour basis.
 3. Release public information
 4. Notify
 - a. MEMA Region Headquarters
 - b. American Red Cross
 - c. Downstream communities
 5. Review Plans for evacuation and sheltering
 - a. Evacuation
 - (1) Routes
 - (2) Notification
 - b. Sheltering
 - (1) Availability and capacity
 - (2) Food, supplies and equipment
 - (3) Shelter owners and managers

(4) Other communities (if out of City sheltering is required)

6. 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

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

Management Plans and Regulatory Measures

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

1. Develop and conduct public education programs concerning dam hazards.
2. Maintain up-to-date plans to deal with threat and actual occurrence of dam over-spill or failure.
3. Emergency Management and other local government agencies should familiarize themselves with technical data and other information pertinent to the dams which impact **Northampton**. This should include determining the probable extent and seriousness of the effect to downstream areas.
4. Dams should be inspected periodically and monitored regularly.
5. Repairs should be attended to promptly.
6. As much as is possible burdens on faulty dams should be lessened through stream re-channeling.
7. Identify dam owners.
8. Determine minimum notification time for down stream areas.

The Northampton 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.
- Refer to the **Resource Manual's** Transportation Inventory for information regarding transportation providers.

Evacuation Options

The Northampton CEM Plan identifies the Chartpac Dam, Mill River Dam, Florence Ice Pond Dam, Upper Reservoir Dam – Robert Meadows Brook, Lower Roberts Meadow Dam, Roberts Meadow Middle Dam as six local High Hazard dams with the greatest potential impact on persons and property in City. However, City officials view the Upper Reservoir Dam as low hazard dam. The Northampton CEM Plan does not note any potential for dam hazards emanating from dams upstream of the City. In the event of the catastrophic failure of municipal drinking supplies, the impact on persons and property would be significant.

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 years and dams that are rated as Medium/Significant Hazards are inspected every five years. High Hazard dams must be inspected every two years.

Zoning

There is no mention made regarding the construction of new dams in Northampton.

Restrictions on Development

There are no City 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.

**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 City.	Effective. Ensures dams are adequately designed.	None.
Dam Inspections	DCR has an inspection schedule that is based on the hazard rating of the dam (low, medium, high hazard).	Entire City.	No one is responsible for making sure this happens.	<p>Develop strategy for making sure land owners fulfill obligations.</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 City.	None.	None.

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6 – INCORPORATION

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

- ☞ *Northampton Comprehensive Emergency Management Plan* (particularly the Critical Infrastructure Section) – the Critical Infrastructure section was used to identify those infrastructure components in Northampton that have been identified as crucial to the function of the Northampton; also, this resource was used to identify special needs populations as well as potential emergency shortcomings.
- ☞ *Northampton Open Space and Recreation Plan* – this Plan was used to identify the natural context within which the Northampton 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 City’s mitigation efforts would be sensitive to the surrounding environment. During the OSRP update, the Northampton 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 un-developed, 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.
- ☞ *Northampton Community Development Plan*—this Plan was used to identify any action items that might prove successful, based on previous planning efforts.
- ☞ *Northampton Zoning Ordinance* - The City’s Zoning was used to gather identify those actions that the City 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 City’s HMP was consistent with the State’s Plan.

- ☞ The *Flood and Natural Hazard Mitigation Plan for the City of Northampton* (2003) was used to gather information on those actions and activities that the City is already undertaking in regards to pre-disaster mitigation for the City's greatest threat, flooding. This included statistical incorporating statistical research, existing mitigation measures, and project rankings for Northampton.
- ☞ The *Northampton Sustainability Plan* was developed in 2007. When this plan is updated, actions from the PDM plan that promote a sustainable Northampton will be incorporated into the plan update.

7 – FUTURE MITIGATION STRATEGIES

Goal Statements and Action Items

As part of the natural hazards mitigation planning process that was undertaken by the Northampton Natural Hazards Planning Committee, existing gaps in protection and possible deficiencies were identified and discussed. The committee developed 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, City 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 hazard. For example, updating the Subdivision Regulations to require new utility lines be placed underground will prevent property damage and loss of service in the event of high winds (tornado or hurricane) or severe snow and ice storms.

As this plan is implemented, all meetings of reviewing and overseeing boards will be public and advertised.

General Mitigation Action Items

Goal Statement: To mobilize Northampton's municipal resources for the purpose of reducing the likelihood of damage to life and property from all natural hazards that Northampton might experience.

Action Item: Create an executive committee to function as the City's Disaster Planning Committee.

Responsible Department/Board: Emergency Management Director,
Mayor's Office, City Council

Proposed Completion Date: 2008

Action Item: Review current agreements with suppliers of essential services, such as fuel vendors and pharmacies, to ensure a plan is in place to ensure that short-term supply interruptions are avoidable

Responsible Department/Board: Emergency Management Director
Proposed Completion Date: 2008

Action Item: Inventory supplies at existing shelters and develop a needs list and storage requirements. Establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.

Responsible Department/Board: Emergency Management Planning Committee, School Facilities Manager
Proposed Completion Date: 2007

Action Item: Examine current notification system including feasibility of Reverse 911.¹⁶ Develop a preliminary project proposal and cost estimate.

Responsible Department/Board: City Council, Mayor's Office
Proposed Completion Date: 2007

Action Item: Before a disaster occurs, retrofit secondary government buildings with transfer switch and generator hook-ups to provide buildings identified as back-up locations for government with hardware that will be necessary to accommodate auxiliary generators.

Responsible Department/Board: Emergency Management Director, Department of Public Works, Fire Department, Police Department
Proposed Completion Date: 2009

¹⁶ In essence, Reverse 911 is a Windows compatible software program, which uses GIS and database technology to create call lists of phone numbers within a specified geographical area and provide prerecorded messages to the residents at those numbers. Call lists can be created ahead of time or as emergency or other situations arise. The system is voluntary and it is a simple matter to remove those residents who do not wish to participate. Cost of the system varies depending on a number of factors. The City of Green Tree, Pennsylvania was able to subsidize their purchase of a Reverse 911 system through a \$10,000 Community Development Block Grant.

Action Item: Before a disaster occurs, retrofit secondary government buildings with data ports, computer hookups and radio equipment hook-ups to provide buildings identified as back-up locations for government with hardware that will be necessary to manage a disaster.

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

Proposed Completion Date: 2009

Action Item: Update Northampton's Pre-Disaster Mitigation Plan every five years.

Responsible Department/Board: Emergency Management Director, Department of Public Works, Fire Department, Police Department, Office of Planning and Development, City Council

Proposed Completion Date: Ongoing

Flooding

Overall, Northampton'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 City'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 Northampton 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: In regards to the Northampton Open Space and Recreation Plan, implement the Five-Year Action Plan strategies, particularly those dealing with protection of forests and farmland. This mitigates flooding damage through providing the city with a natural buffer that would work to absorb floodwaters and rainwater while

preventing development from increasing impervious surface area—large areas of impervious surfaces have been documented to worsen storm surge cycles and accelerate the flow of water.

Responsible Department/Board: Conservation Commission, Office of Planning and Development, Planning Board, and the City Council, Mayor’s Office
Proposed Completion Date: Ongoing

Action Item: Replacement of flood control pump engines to increase response capacity to flooding events.

Responsible Department/Board: City Council, Mayor’s Office, Department of Public Works, Emergency Management Director
Proposed Completion Date: 2009

Action Item: Identify funding sources for acquiring undeveloped properties within flood zones throughout City, especially those identified in previous planning studies.

Responsible Department/Board: City Council, Mayor’s Office, Planning and Development
Proposed Completion Date: ongoing

Action Item: Identify culverts that are poorly managed by homeowners associations and replace them to mitigate the risks associated with localized flooding as a result of malfunctioning stormwater systems.

Responsible Department/Board: City Council, Mayor’s Office, Department of Public Works, Planning and Development
Proposed Completion Date: 2009

Action Item: Install trash racks on undersized culverts.

Responsible Department/Board: City Council, Mayor’s Office, Department of Public Works
Proposed Completion Date: 2010

Action Item: Identify funding for upgrading and repairing undersized stormwater drainage system near the Route 9 underpass in DownCity Northampton.

Responsible Department/Board: City Council, Mayor's Office, Department of Public Works, Planning and Development

Proposed Completion Date: 2011

Action Item: Develop a Beaver Management Strategy.

Responsible Department/Board: Conservation Commission, Department of Public Works, Board of Health

Proposed Completion Date: 2008

Action Item: Install real-time rain gauges to allow City officials to gather data for generating trends for changing river levels and predicting which of the major basins in Northampton will be likely to flood, depending on weather patterns.

Responsible Department/Board: Department of Public Works

Proposed Completion Date: 2008

Severe Snow Storms/Ice Storms

Goal Statement: Take actions that reduce the impact of Severe Snow and Ice Storms on Northampton. Northampton's location in New England makes severe winter storms frequent, but the City 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: Purchase land for storing snow when it is removed from Downtown Northampton and Florence to mitigate the problems associated with restricted traffic that occur in the city's main centers.

Responsible Department/Board: City Council, Mayor's Office, Department of Public Works

Proposed Completion Date: 2008.

Hurricanes and Tornadoes

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

Goal Statement: To mitigate the impacts of high-wind events in Northampton 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: Maintain channel behind the Fire Department that is designed to drain the Barrett Street Marsh and prevent flooding of the Fire Department.

Responsible Department/Board: Emergency Management Director, DPW, Fire Department

Proposed Completion Date: Ongoing

Action Item: Education to homeowners well in advance of a hurricane on how to secure a home to prevent damage (i.e. securing propane tanks, fissile material).

Responsible Department/Board: Emergency Management Director, DPW, Fire Department

Proposed Completion Date: Ongoing

Action Item: Education to homeowners and public well in advance of a tornado on how to identify a tornado and seek shelter.

Responsible Department/Board: Emergency Management Director, DPW, Fire Department

Proposed Completion Date: Ongoing

Wildfires/Brushfires

Goal Statement: To mitigate the impacts of large wildfires on Northampton 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: Revise zoning regulations to require sprinkler systems and water storage in houses that are being constructed away from city water supplies.

Responsible Department/Board: Fire Department, Planning and Zoning, City Council, Mayor's Office

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 City of Northampton 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: Designate the newly-constructed (2007) senior center as the city's earthquake shelter and notify residents of the presence of a stable, earthquake resistant building in downtown as an option for shelter to lessen the devastating social impacts of a powerful earthquake. Note, however, that the senior center would be vulnerable for flooding if the flood control dikes around Downtown failed (more likely after an earthquake), and should not be used as an earthquake shelter during times of Connecticut River flood.

Responsible Department/Board: Building Inspector, Emergency Management Director

Proposed Completion Date: 2008

Dam Failure

Goal Statement: To mitigate the threat that Northampton's aging dams pose to the City of Northampton 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: Continual dam safety inspections program in partnership with private and public dam owners.
Responsible Department/Board: Emergency Management Director, Department of Public Works
Proposed Completion Date: Ongoing

Action Item: Map dam inundation zones to identify areas where dam breaches would result in loss of life and damage to property.
Responsible Department/Board: Emergency Management Director, Department of Public Works, Office of Planning and Development
Proposed Completion Date: 2012

Man-Made Hazards/Hazardous Materials

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

Action Item: Electronic monitoring and tracking software for EPA Tier II locations to ensure all locations have been properly registered.
Responsible Department/Board: Emergency Management Director
Proposed Completion Date: 2009

Prioritized Implementation Schedule

Summary of Critical Evaluation

The Northampton 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 Northampton 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 Northampton 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
Inventory supplies at existing shelters and develop a needs list, then establish a needs list with local or neighboring vendors for supplying shelters	Emergency Management Planning Committee, School Facilities Manager	2007	City Staff/Volunteers	N/A	Medium
Develop a Preliminary Project Proposal and Cost Estimate for Updating Current 911 System including Feasibility of Reverse 911	City Council, Mayor's Office	2007	City Staff/Volunteers	N/A	Very High
Electronic monitoring and tracking software for EPA Tier II Locations	Emergency Management Director	2007	City Staff/Volunteers	N/A	High
Review current agreements with suppliers of fuel and pharmaceuticals to ensure adequate provision of short-term supplies	EMD	2008	City Staff/Volunteers	N/A	Medium
Create a Northampton Disaster Planning Committee	Emergency Management Director, Mayor's Office, City Council	2008	City Staff/Volunteers	N/A	High
Purchase land for a new location in Northampton for storing snow when it is removed from Downtown Northampton and Florence	City Council, Mayor's Office, Department of Public Works	2008	City Staff, Capital Improvement Plan	<\$200,000	High
Develop a beaver management strategy	Conservation Commission, Department of Public Works, Board of Health	2008	City Staff	NA	High
Install real-time rain gauges to develop a system for studying water flows and predicting which river basin is going to flood in Northampton	Department of Public Works	2008	City Staff, PDM	< \$25,000	High
Retrofit existing back-up government buildings to accommodate external generators	Emergency Management Director, Department of Public Works, Fire Department, Police	2009	City Staff, PDM Grant	<250,000	Medium

	Department				
Retrofit existing back-up government buildings to accommodate external generators	Emergency Management Director, Department of Public Works, Fire Department, Police Department	2009	City Staff, PDM Grant	<250,000	Medium
Replacement of flood control pump engines	City Council, Mayor's Office, Department of Public Works	2009	City Staff	N/A	High
Upgrade flood control system to replace wooden battens with aluminum battens	City Council, Mayor's Office, Department of Public Works	2009	City Staff, PDM Grant Funds	N/A	High
Map Inundation Zones to identify areas where dam breaches would result in a loss of life and damage to property	EMD, DPW, Office of Planning and Development	2012	City Staff, PDM Grant Funds	N/A	Medium
Purchase electronic monitoring and tracking software for EPA Tier II locations and to ensure proper registration	EMD	2009	City Staff/Volunteers, MEMA,PDM	N/A	Medium
Develop an outreach program to ensure that homeowners' associations are maintaining culverts and floodwater storage areas and get them replaced	City Council, Mayor's Office, Department of Public Works, Planning and Development	2009	City Staff/Volunteers	To be Determined	Medium
Apply for HMGP funds for installing trash racks on undersized culverts	City Council, Mayor's Office, Department of Public Works	2010	City Staff, HMGP	To be Determined	High
Revision of subdivision regulations to require sprinkler systems and water storage in houses that are not connected to city water lines	Fire Department, Office of Planning and Development, City Council, Mayor's Office	2010	City Staff/Volunteers	N/A	Low
Identify funding for upgrading and repairing undersized stormwater drainage system near Route 9 underpass in Downtown Northampton.	City Council, Mayor's Office, Department of Public Works, Planning and Development	2011	City Staff, HMGP	N/A	Medium
Update Northampton's Hazard Mitigation Plan every Five Years	Emergency Management Director, Office of Planning and Development, Department of Public Works, Fire Department, Police Department, City Council	Ongoing	City Staff	\$5,000-\$15,000	Low
Acquire undeveloped properties within flood zones	City Council, Mayor's Office, Office of Planning and Development, Conservation Commission	Ongoing	City Staff, PDM Grant Funds, Private Land Trusts	\$50,000 per acre	Low

Implement Open Space and Recreation Plan to preserve open space and prevent development from occurring in hazard areas	Conservation Commission, Office of Planning and Development, City Council, Mayor's Office	Ongoing	City Staff, PDM Grant Funds, Private Land Trusts	\$100,000 per acre	Medium
Maintain channel behind Fire Department to prevent marsh from flooding the Fire Department	Conservation Commission, Fire Department, DPW	Ongoing	City Staff	N/A	Medium
Designate senior center as Earthquake shelter because it is designed to meet current state Building Codes	Building Inspector, EMD, Red Cross	Ongoing	City Staff	N/A	Low
Education to Homeowners on how to identify a tornado; Advance education to Homeowners on preparing for a Hurricane	Emergency Management Director, DPW, Fire Department	Ongoing	City Staff, Capital Budget	N/A	Low
Acquiring undeveloped parcels located within flood zones	City Council, Mayor's Office, Office of Planning and Development, Conservation Commission	Ongoing	CPA, Urban Self-help Grants, APR Program	N/A	Medium
Implement five-year action plan for Northampton's Open Space and Recreation Plan	Conservation Commission, Office of Planning and Development, City Council, Mayor's Office	Ongoing	Community Preservation Act, Urban Self-Help Grants, APR Program	N/A	High

8 – PLAN ADOPTION & IMPLEMENTATION

Plan Adoption

Upon completion, copies of the Draft Local Hazards Mitigation Plan for the City of Northampton were distributed to the City boards for their review and comment. A public meeting was held by the Northampton City Council to present the draft copy of the Northampton Local Natural Hazards Mitigation Plan to City officials and residents and to request comments from this committee and the general public. The Natural Hazards Mitigation Plan was formally approved by the City Council 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 Northampton Local Natural Hazards Mitigation Plan will begin following its formal adoption by the Northampton City Council and approval by MEMA and FEMA. Specific City 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 Northampton Natural Hazards Planning Committee will oversee the implementation of the plan.

Plan Monitoring and Evaluation

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

The Northampton Natural Hazards 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 City departments and/or revise the goals and objectives contained in the plan. The committee will review and

update the plan every year, beginning in the fall of 2008. The meetings of the committee will be organized and facilitated by the Emergency Management Director.

CERTIFICATE OF ADOPTION
CITY OF NORTHAMPTON, MASSACHUSETTS
CITY COUNCIL
A RESOLUTION ADOPTING THE NORTHAMPTON
HAZARD MITIGATION PLAN

WHEREAS, the City of Northampton established a Committee to prepare the Northampton Hazard Mitigation plan; and

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

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

WHEREAS, a duly-noticed public hearing was held by the Northampton City Council on _____, 2007 to formally approve and adopt the Northampton Hazard Mitigation Plan.

NOW, THEREFORE BE IT RESOLVED that the Northampton City Council adopts the Northampton Hazard Mitigation Plan.

ADOPTED AND SIGNED this _____, 2007.

Michael Bardelsey, Chair, Northampton City Council

James Dostal, At-Large, Northampton City Council

Maureen Carney, Ward 1, Northampton City Council

Paul Spector, Ward 2, Northampton City Council

Marilyn Richards, Ward 3, Northampton City Council

David Narkewicz, Ward 4, Northampton City Council

David A. Murphy, Ward 5, Northampton City Council

Marianne LaBarge, Ward 6, Northampton City Council

Raymond LaBarge, Ward 7, Northampton City Council

ATTEST

CERTIFICATE OF ADOPTION
CITY OF NORTHAMPTON, MASSACHUSETTS
MAYOR
A RESOLUTION ADOPTING THE NORTHAMPTON
HAZARD MITIGATION PLAN

WHEREAS, the City of Northampton established a Committee to prepare the Northampton Hazard Mitigation plan; and

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

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

WHEREAS, a duly-noticed public hearing was held by the Northampton City Council on _____, 2007 to formally approve and adopt the Northampton Hazard Mitigation Plan.

NOW, THEREFORE BE IT RESOLVED that the Mayor of Northampton adopts the Northampton Hazard Mitigation Plan.

ADOPTED AND SIGNED this _____, 2007.

The Honorable Mayor Mary Clare Higgins

ATTEST

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/disaster/	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/otd.html	Space-based sensor of lightning strikes
LLNL Geologic & Atmospheric Hazards	http://wwwep.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)

Northampton Hazard Mitigation Planning Committee Meeting #1

AGENDA

October 19, 2006

1:00 p.m.

Northampton Department of Public Works

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

Northampton Hazard Mitigation Planning Committee

Meeting #2

AGENDA

December 1, 2006

2:00 p.m.

Location: Northampton Public Safety Complex

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

3) Question and Answer Period

4) Set Goals for Next Meeting

Northampton Hazard Mitigation Planning Committee

Meeting #3

AGENDA

January 1, 2007

10:00 p.m.

Northampton Public Safety Complex

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

Northampton Hazard Mitigation Planning Committee

Meeting #4

AGENDA

March 5, 2007

10:00 p.m.

Northampton Public Safety Complex

- 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**

Northampton Hazard Mitigation Planning Committee

Meeting #5

AGENDA

April 18, 2007

10:00 p.m.

Northampton Public Safety Complex

- 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 *Northampton Hazard Mitigation Plan***

 - 4) Discuss Next Steps for the *Northampton Hazard Mitigation Plan* including FEMA/MEMA Review and Adoption by the City Council.**

 - 5) Question and Answer Period**
-

Northampton

Agenda

October 26 2007

Pre-Disaster Mitigation Plan Review

9:30 a.m.

Northampton Fire Department

- 1) Committee Sign-in
- 2) Pre-Disaster Mitigation Planning Process Update
- 3) Remaining Tasks for PVPC to Complete
 - a. Detailed profiling of hazards
 - b. Incorporation of PDM Plan with other documents
- 4) Remaining Tasks for PDM Committee to complete with PVPC
 - a. Public notices for public comment session
 - b. Public comment session
 - c. Section on identifying future parties to involve
 - d. Discussion of development and risks posed from ALL hazards, not just floods
 - e. Specific goal statements for each hazard
 - f. Elimination of actions that are not mitigation actions, (i.e. disaster kits, which are response oriented)
 - g. Actions that are mitigation actions and not response
 - h. Section on "Plan Monitoring" with clearly designated responsibilities among City officials for tracking success with action steps
 - i. Approval by City Council
- 5) Incorporate public comment period, and develop action steps at that meeting

Appendix C

(Documentation of Public Notices)

PRESS RELEASE

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

FOR IMMEDIATE RELEASE
September 12, 2007

Public Input Sought on Pre-Disaster Mitigation Plans

The Pioneer Valley Planning Commission has completed final working drafts of pre-disaster mitigation plans for thirteen communities in the region: Agawam, Chester, Chesterfield, Easthampton, Hadley, Hampden, Hatfield, Holland, Holyoke, Ludlow, Monson, Northampton, 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 pre-disaster mitigation plans are being developed with assistance from the Pioneer Valley Planning Commission with funding provided by the Massachusetts Emergency Management Agency.

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The Republican.

'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
CC	City Council
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)

Submission of the Definitive Plan

- Section 6.03 Definitive [Plan] Contents Requires the proponent, in part, to identify:

7. Location of natural waterways and water bodies within and adjacent to the subdivision.

- 8. Major site features, such as existing stone walls, fences, buildings, large trees, rock ridges and ledge, swamps, flood plains, historic features, and wooded areas. The plan shall identify which of the above shall remain undisturbed.

Wetlands Protection Act applicability

11. Wetlands Protection. In accordance with Massachusetts General Laws Chapter 131, Section 40 and the Northampton Wetlands Protection Ordinance, no person shall remove, fill, dredge, or alter any bank, beach, dune, flat, marsh or swamp bordering on any existing creek, river, stream, pond, lake or any land under said waters or subject to flooding without receiving a negative determination of applicability or an order or conditions from the local Conservation Commission and/or Department of Environmental Quality Engineering.

Failure of the Conservation Commission to report to the Planning Board within thirty (30) days after receipt of a Definitive Plan shall not exempt the proposed plan from wetland regulations established pursuant to the M.G.L. Chapter 131, Section 40 and local ordinances.

Development Impact Statement

Section 6.04 Additional Subdivision Requirements

6. Development Impact Statement. The developer shall submit an analysis of the impact of the proposed development by a qualified professional on (a) schools; (b) traffic; (c) water; (d) sewer; (e) municipal services such as public works, police, fire, libraries, recreation, etc. The standards used in calculating impacts should be carefully documented and fully referenced (see Appendix B). Each of the sections of said analysis (traffic, water, sewer, etc.) shall be

presented as a separate document so that it can be forwarded by the Planning Board to the appropriate City department for review. The purpose of said analysis is to assist the City in assessing the cumulative impact of development of the City. Regardless of the above,

Water Supply Protection District Regulations

Water Supply Protection District. Any portion of a proposed subdivision which lies within the limits of the City's Water Supply Protection District shall conform to the requirements of said district as stated in the appropriate sections of the Northampton Code of Ordinances.

Stormwater Drainage

- Section 8.19 Drainage [in part]:
- 3. Drainage systems, including detention, retention, and infiltration, must be designed to prevent any increase in peak flows for the one (1) or two (2), ten (10), and one-hundred (100) year Soil Conservation Service design storms. TR-55 (or TR-20 with all inputs and outputs shown) should be used for calculating drainage systems. In addition, drainage systems should include water quality/settling basins that detain the stormwater draining off the site in a 4/10 inch rain storm for an average of at least six hours. (Amended April 11, 1991)¹⁷

5. Where feasible, stormwater should be directed to enter the nearest open stream channel. Stormwater shall not be permitted to cross any roadway upon the surface but must be piped underground. Stormwater runoff shall not be permitted to flow upon the road surface for a longer distance than three hundred (300) feet before it enters the underground system. Catch basins shall be located on both sides of the roadway on continuous grades at intervals of not more than three hundred (300) feet, at all sags in the roadway, and near the corners of the roadway at intersecting streets.

Definitive Plan and Floodplain Regulations

Section 6.03.12. Definitive Contents, Floodplain District. All subdivision proposals and other proposed new development shall be reviewed to determine whether such proposals will be reasonably safe from flooding. If any part of a subdivision proposal or other new development is located within the City's Special Conservancy District and Watershed Protection Overlay District established under the Zoning Ordinance, it shall be reviewed to assure that:

- a. the proposal is designed consistent with the need to minimize flood damage;

¹⁷ The Central Business District and Main Street

b. all public utilities and facilities, such as sewer, gas, electrical, and water systems shall be located and constructed to minimize or eliminate flood damage;

c. adequate drainage systems shall be provided to reduce exposure to flood hazards; and

d. base flood elevation (the level of the 100-year flood) data shall be provided for proposals greater than five acres for that portion within the Special Conservancy or Watershed Protection Overlay Districts.

e. see applicable section of the Northampton Zoning Ordinance.

Appendix G

(Zoning Bylaw Excerpts)

FLOODING

Section 10.3 Filling Any Water or Wet Area

For the filling in of any pond, lake, swamp, or other existing body of water or wet area where such filling is not covered by Section 13 or Section 14; and where such filling in requires an amount of fill equivalent to five hundred (500) cubic yards or more, or where the area to be filled in exceeds ten thousand (10,000) square feet and only subject to the eventual approval by the Northampton Conservation Commission under the applicable provisions of Massachusetts Wetlands Protection, the following conditions apply...

10.4.F. Filling of land area which falls within the superimposed Watershed Protection District is illegal.

10.4.G. The planned filling in of any land area shall be consistent with any recreation, conservation and open space plan as prepared by the City Planning Board.

10.4.H. Documentation shall be submitted as to the effect of such filling-in activities on drainage, both within the immediate area and sufficiently far downstream, as required by Planning Board.

10.4.I. Provisions shall be made such that the filling in of any land area shall not impair surface drainage, constitute an erosion hazard nor act as a source of sedimentation to any adjacent land or watercourse.

10.4.J. Provisions shall be made such that the filling in of any land area does not impair the safe and efficient operation of any on-site sewage disposal or drainage facilities nor those located on adjacent properties.

10.4.K. Provisions shall be made to reduce the area and duration of exposure of fill material(s) and to reduce the velocity of run-off, both during and after the completion of the filling-in activity in order to minimize the potential of soil erosion and siltation problems.

10.4.L. Provisions shall be made for the adequate control of dust during filling-in operations.

10.4.M. All disturbed fill areas shall be promptly seeded or sodded with a suitable ground cover and supplemented with other suitable plantings as soon as the season permits.

10.4.N. No final slopes shall exceed a slope of more than one (1) foot vertical in two (2) feet horizontal.

10.4.O. No filling in of land shall cause or permit any soil, earth, sand, gravel, rock, stone loam, or other fill material, or water or liquid to be deposited upon or to roll, flow or work upon or over the premises of another without the express consent of the owner of such premises so affected; nor shall any filling in of land cause or permit any soil, earth, sand, gravel, rock, stone loam, or other fill material or water or liquid to be deposited, or to roll, flow, or wash upon or over any public street, street improvement, road, sewer, storm drain, water course, or right-of-way, or public property.

10.4.P. Such other conditions as may be deemed necessary and reasonable shall be imposed by the Planning Board in order to prevent damage to public or private property or any sewer, storm drain, or watercourse, or to prevent the filling in of land from being conducted in a manner hazardous to life or property, or in a manner likely to create a nuisance. (Amended 10/6/94)

Site-Plan Review

Section 11.0. Site Plan Review.

Section 11.1 Purpose. The purpose of this section is to provide a comprehensive review procedure for construction projects which will have significant impacts on the City, herein defined, to ensure compliance with the goals and objectives of the City, and the provisions of the Zoning Ordinance, to minimize adverse impacts of such development, and to promote development which is harmonious with surrounding areas; in particular to assure proper drainage, safe access, safe and efficient vehicular and pedestrian movement, adequate parking and loading spaces, public convenience and safety and adequate consideration of abutting land owners. (Amended 5/16/91)

The application for Site Plan Approval shall be accompanied by a site plan, drawings and supporting documentation in a form specified by rules and regulations which shall show, among other data, the following:

11.5.2. Site plan(s) at a scale of 1" = 40' (or greater) showing the following:

11.5.2.E. Existing and proposed topography at two foot contour intervals, showing wetlands, streams, surface water bodies, drainage swales, floodplains, and unique natural= land features (for intermediate projects the permit granting authority may accept generalized topography instead of requiring contour lines);

11.5.2.G. Location and description of all stormwater drainage facilities, (including stormwater detention facilities, water quality structures, drainage calculations where applicable, and drainage easements), public and private utilities, sewage disposal facilities, and water supply;

11.5.2.K. An erosion control plan (for major projects only) and any other measures taken to protect natural resources and water supplies.

Section 11.6: Approval Criteria

11.6.1The requested use protects adjoining premises against seriously detrimental uses. If applicable, this shall include provision for surface water drainage, sound and sight buffers and preservation of views, light, and air; and

11.6.4. The requested use will not overload, and will mitigate adverse impacts on, the City's resources including the effect on the City's water supply and distribution system, sanitary and storm sewage collection and treatment systems, fire protection, streets and schools.

11.6.C. Major projects, except in the Central Business District must be designed so there is no increase in peak flows from the one (1) or two (2) and ten (10) year Soil Conservation Service design storm from pre-development conditions (the condition at the time a site plan approval is requested) and so that the runoff from a 4/10 inch rain storm (first flush) is detained on site for an average of six hours. These requirements shall not apply if the project will discharge into a City storm drain system that the Planning Board finds can accommodate the expected discharge with no adverse impacts. In addition, catch basins shall incorporate sumps of a minimum of three (3) feet and, if they will remain privately owned, a gas trap.

Section 13 Special Conservancy.

13.1 Purposes. 1. To protect the public health and safety, persons and property against the hazards of seasonal and periodic flooding;

2. To protect the entire community from individual choices of land use and development which require subsequent public expenditures for public works and disaster relief:

3. To provide that lands in the City of Northampton subject to seasonal or periodic flooding as described hereinafter, shall not be used for residential or other purposes in such a manner as to endanger the health or safety of the occupants thereof,

4. To assure the continuation of the natural flow pattern of the water courses within the City of Northampton in order to provide safe and adequate floodwater storage and conveyance capacity, to protect persons and property against the hazards of flood inundation, including damage from erosion and increased flood heights and velocities;

5. To protect, preserve and maintain the water table and water recharge areas with the City so as to preserve present and potential water supplies for the public health and safety of the residents of the City of Northampton;

6. To provide for the continued functioning of the river flood plain/wetlands as a natural system. The object and required is to avoid activities in the flood plain/wetlands which would interfere with natural food chains that support a myriad of living things recognizing that they serve mankind and all other life in assimilating waste, producing food, conserving water, and maintaining stability which has been called the balance of nature. Proper use of the flood plain/wetlands is considered to be such as would secure these benefits to all its users.

13.2. [Establishment of] The Special Conservancy District. [The District] shall generally cover the majority of the area contained within the flood plain of the Connecticut River, and is specifically that area show as "SC" on the Zoning Map of the City of Northampton.

Section 13.3 Land in the Special Conservancy District may be used for the purposes **permitted in the district as set forth in the Table of use Regulations**

Excerpted from Section 5.0, Table of Use Regulations:

Watershed Protection Overlay District

New structures or substantial improvements in WP

PB

Water Supply Protection (WSP) Overlay District

Business/Industrial activities	PB
Impervious Cover, greater than 15% with artificial recharge	PB
Site Alteration, structure or impervious surface within 200' of any watercourse which are tributaries to public water supply	PB
Residential	
One-family dwellings on pre-existing lot	PB
Home Office	A
Accessory structures & fences	A
Tag Sale	A
Horses and animals	A
Community and Recreational Facilities	
Historical association, society or non-profit	
Museum, incl. caretaker's residence	PB
Outdoor commercial recreational use	PB
Temporary Event with permit from City Council	A
Retail and Commercial Uses	
Agriculture, in all forms	A
Year-round greenhouse and farmstand	PB
Commercial Stable and/or kennel	PB
Junk cars, motor vehicle accessories, scrap metal	CC
Parking offsite and combined parking	PB
Parking access for non-residential uses across a residential lot	PB
Parking lot space reduction	PB
Miniature golf course, temporary carnival	PB
Utilities, Telecommunications, Municipal Facilities	
Facilities for essential services	PB
Heavy public use	CC
Municipal Facility	CC
Private utility, substation	PB
Small-scale hydroelectric	PB
Wholesale Transportation and Industrial Use	
Airport, and sales	PB
Heliport	PB
Processing and treating raw materials	PB
Removal of sand, gravel, quarry, raw materials	PB
Private Bridge, tunnel	CC

Railroad passenger terminal

PB

A – Allowed by-right

PB – Allowed by Special Permit from the Planning Board

CC – Allowed by Special Permit from the City Council

All other uses not listed in the table above are not allowed.

Section 14.0 Watershed Protection District.

Section 14.1. Purpose. The Purpose of this district is: **1)** To preserve and protect the streams and other watercourses in the City of Northampton and their adjoining lands; **2)** To protect the health and safety of persons and property against the hazards of flooding and contamination, as specified in Section 13.1; **3)** To preserve and maintain the ground water table for water supply purposes, and protection of adequate base flows of streams and rivers; **4)** To protect the community against the detrimental use and development of lands adjoining such watercourses; **5)** To conserve the watershed areas of the City of Northampton for the health, safety, and welfare of the public.

Section 14.2. The rules for this superimposed district shall be in addition to, rather than in place of, the rules for such other districts. The boundaries of the district shall be as shown in the Zoning Map of the City of Northampton. The boundary of the Watershed Protection District shall be interpreted as set forth in Section 3.6.:

Section 14.3 [Restrictions]. *Lands within the Watershed Supply Protection District are subject to the following restrictions:*

1. No structure intended for human occupancy or use on a permanent basis having water and sewerage facilities and no other building, wall, darn or structure shall be erected, constructed, substantially improved, or moved for any purpose unless a special permit from the Planning Board is issued.
2. The dumping or filling of any earth material in excess of 50 cubic yards within the Watershed Protection District is prohibited unless a special permit from the Planning Board is issued. (Amended 10/6/94).

Section 19.0 Farms, Forests and Rivers Overlay District (FFR)

Section 19.1 Purpose to protect sensitive open space and ecologically important features, to preserve the farms, forests and river corridors of Northampton, and to allow landowners the ability to develop their property in a manner that is sensitive to these unique resources.

Section 19.2 [Allowed] Uses in the Farms, Forests & Rivers Overlay (FFR):

Uses in the FFR are limited to any of the following:

Section 19.2.1 Agriculture, horticulture and floriculture uses, educational uses, and child care facilities which are allowed as-of-right by Northampton Zoning and the Zoning Act (MGL 40A);

Section 19.2.2. Development with a Special Permit issued under § 11.4 - Open Space Residential Development (Cluster) or § 11.5 -Planned Unit Development (PUD), provided however, that the Planning Board finds that the following conditions are met, to the maximum extent possible, before granting a Special Permit for a Cluster Development or PUD in the FFR District:

Section 19.2.2.A. If all or a portion of the protected open space is or could be used for farmland, all buildings, roads, drainage systems, utilities and other development shall be laid out in a manner to provide the least disturbance to actual or potential farm operations, to minimize potential conflicts between agricultural and non-agricultural uses, and shall be located on the soils least suitable for the production of crops.

Section 19.2.2.B. Open space shall be laid out to maintain views of agricultural lands and open space, and to maintain distant vistas across open space from both on and off the site.

Section 19.2.2.C. Development shall be integrated into the existing landscape through the use of building placement, landform treatment, and visually compatible existing or new screening. When possible, development should be placed within existing woodlands and not in open fields, to preserve views and minimize visual impact.

Section 19.2.2.D. No more than twenty-five percent (25%) of a parcel may be developed as building lots, roads, sewage disposal or drainage facilities, or other development and, where possible, all improvements shall be spatially concentrated to preserve the protected resources.

Section 19.2.2.E. All site improvements shall be laid out and constructed to minimize environmental and other impacts on protected resources

Water Supply Protection District

Section 16.0 Water Supply Protection District

Section 16.1 Purpose: To promote the health, safety and welfare of the community by protecting and preserving the public drinking water resources of Northampton from any use of land or structures which reduce the quality or quantity of its public drinking water resources.

Section 16.3 [Boundaries]: The intent of the Water Supply Protection District is to include lands lying within the primary and secondary recharge areas of groundwater aquifers which provide public water supply, as well as watersheds of public surface water supplies. Said lands are identified on the Northampton Zoning Map and the Northampton Aquifer Protection Area map.

Section 16.4 Prohibitive Uses

1. All uses which manufacture, process, store or dispose of hazardous materials or wastes as a principal activity, including, but not limited to, metal plating, chemical manufacturing, wood preserving and furniture stripping, auto body repair and dry cleaning, and including all facilities that generate, treat, store or dispose of hazardous wastes which are subject to M.G.L. c. 21C and 310 CMR 30.00 as amended, except very small quantity generators, as defined by 310 CMR 30.353 as may be amended.
2. Trucking or bus terminals, motor vehicle gasoline sales.
3. Car washes, except when located on public water/sewer systems and disposing of wastewater in said sewer system.
4. Sanitary landfills and open dumps, as defined in 310 CMR 19.01 as amended, automobile graveyards and junkyards, as defined in M.G.L. c. 140B, Section 1 as may be amended, solid wastes, and junk and salvage yards.
5. Business and industrial, but not agricultural, uses which involve the on-site disposal of process wastes from operations. However, animal feed lots exceeding ten animals are prohibited,
6. Disposal of liquid or leachable wastes, including: A. Within Northampton's municipal aquifer, the installation or enlargement of a subsurface water disposal system and any wastewater treatment works that discharges onto or below the land for any building or use. In other water supply protection areas subsurface

disposal must be in municipal sanitary sewer system where feasible; B. Hazardous or toxic wastes arising from agricultural operations; and C. Within Northampton's municipal aquifer, business or industrial uses which involve the on-site disposal of wastes from personal hygiene and food preparation for residents, patrons and employees. In other water supply protection areas, disposal must be in the municipal sanitary sewer system where feasible. (Amended 3/5/87) D. Land application and storage of sludge and seepage, as defined in 310 CMR 32.05, as amended. (Added 8/16/90)

7. Underground storage of oil, gasoline and all other petroleum products, excluding liquified petroleum gases, except within the watershed of the Roberts Hill Reservoir where such storage shall be permitted only if it meets all requirements for secondary containment specified in 310 CMR 30.693, and except when storage is incidental to emergency generators required by statute, rule or regulation, provided that such storage is either in a free standing container within a building or in a free standing container above ground level with protection adequate to contain a spill the size of the container's total storage capacity.

8. Underground transmission of oil, gasoline or other petroleum products, excluding liquified petroleum gases.

9. Storage of sodium chloride (road salt), calcium chloride, chemically treated abrasives or other chemicals used for the removal of snow or ice on roads, unless such storage does not exceed 50 gallons and is within a structure designed to prevent the generation of contaminated run-off and, within the aquifer area of the water supply protection district, the off-site stockpiling and disposal of snow or ice containing sodium chloride, calcium chloride, chemically treated abrasives or other chemicals used for the removal of snow or ice on roads which has been removed from highways and streets (other than by plowing to the edge of the street).

10. Outdoor storage of pesticides or herbicides, including those defined in M.G.L. c. 132B, Section 2 as may be amended, the storage of commercial fertilizers and soil conditioners, as defined in M.G.L. c.128, Section 64 as may be amended, and the stockpiling of animal manures, unless such storage is within a building or structure with an impermeable cover and liner designed to prevent the generation of contaminated run-off or leachate and accidental release onto or below the land surface.

11. The use of septic system cleaners which contain toxic chemicals including, but not limited to, methylene chloride and 1-1-1 trichlorethane.

12. Medical, testing and research laboratories that dispose of biological or chemical wastes. (Amended 8/16/90 and 10/6/94)

16.4 Restrictive Uses

1. Excavation for removal of earth, sand, gravel and other soils shall not extend closer than five (5) feet above the annual high groundwater table, as determined by the Northampton Board of Health based on information submitted by the applicant. This section shall not apply to uses incidental to permitted uses, including, but not limited to, providing for the installation or maintenance of structural foundations, freshwater ponds, or utility conduits providing, however, that a Special Permit is obtained from the Planning Board in accordance with Section 16.7 whenever any excavation occurs within three (3) feet of the annual high groundwater table. The burden of proof is on the applicant to demonstrate the depth to annual high groundwater. In addition to information provided by the applicant, the permit granting authority can rely on the Soil Conservation Service soil mapping and estimates provided by the Board of Health's Agent, the Conservation Commission, and the Office of Planning and Development and any other maps, studies, or technical information the permit granting authority may deem relevant.

2. The use of sodium chloride for ice control shall be minimized, consistent with public highway safety requirements.

3. Commercial fertilizers, pesticides, herbicides, or other leachable materials shall not be used in amounts which result in groundwater contamination.

4. Permitted above ground storage tanks for oil, gasoline or other petroleum products (in accordance with Section 16.4[g]) shall be placed within a building with an impermeable basement or placed on a diked, impermeable surface to prevent spills or leaks from reaching groundwater. (Amended 8/16/90 and 10/6/94)

Section 10.5. Open Space Residential Development.

For residential development in a clustered concept (a concept whereby the residences are clustered on a portion of the lot, thereby leaving more of the parcel undeveloped and in open space), the purpose of which is to: a) preserve the rural character of the community by maximizing and preserving expanses of open space in their natural state; b) provide a buffer between developments, and; c) serve a functional relationship to each of the lots in the development) in

those districts for which such an option is allowed by the Table of Use Regulations, the following rules and conditions shall apply...

Applicability of Section 10.5. The tract for which an Open Space Residential Development is proposed shall be in a single ownership or control at the time of application, and shall be comprised of at least four (4) contiguous acres, except in UR-C and UR-B it shall be at least three (3) acres.

Each single-family, two-family and three-family structure shall be located on its own individual lot, except that for the purpose of this section one-family, two-family and three-family structures maybe considered Cityhouses if they are either row houses attached side-to-side (not on top of each other), or if all homes are located on a single lot under common ownership. Multiple Cityhouses and multi-family structures may be located on one lot under common ownership. If multiple structures are placed on a single lot, there must be adequate provisions for internal circulation, including circulation of pedestrians and emergency and maintenance vehicles, and for the on-going maintenance of the circulation system. The total number of units shall be determined by sub-section 5 below.

When the rear or side yard of an individual lot in the development, including a Zero Lot Line lot, abuts a lot not in that development, then said rear yard and side yard building setbacks shall be equal to those required for a non-clustered lot in that Zoning District.

5. A. The maximum number of dwelling units in the development shall be computed by multiplying the total tract area, less proposed roadways and ninety (90) percent of wetlands and floodplains, by the density shown below for the appropriate zone:

RR 1.1 dwelling units per acre

SR 1.5 dwelling units per acre

URA 2.2 dwelling units per acre

URB 4.4 dwelling units per acre

URC 4.4 dwelling units per acre

WSP 0.54 dwelling units per acre, regardless of the underlying district

All Districts 0.54 dwelling units per acre if lots or development have both an on site water supply (well) and an on-site sewage disposal system (septic tank), regardless of the underlying district.

B. The above densities are increased by up to fifteen (15) percent if [provisions are made for including affordable housing units].

7. Of the total tract area, at least fifty (50) percent shall be set aside as Common Open Space with no buildings allowed except for bathrooms required to serve the common open space. Of the fifty (50) percent set aside for open space, no more than twenty-five (25) percent shall be wetlands or floodplains (as defined in M.G.L. Chapter 131, Section 40, the Wetlands Protection Act, 310 CMR, and the Northampton Wetlands Protection Ordinance) nor have a slope of over eight (8) percent, except as permitted in paragraphs 8 and 9 below, nor include any part of a detention/retention pond designed to hold water for up to a ten year storm) shall be set aside as Common Open Space with no buildings allowed except for bathrooms required to serve the common space.

11. Such Common Open Space as required by this section and by the Planned Unit Development of this Ordinance shall be placed under a Conservation Restriction in accordance with the provisions of M. G. L. Chapter 184, § 31-33 as amended. Such common land shall be either deeded to the City at no cost (but only with the consent of both the Planning Board and the City Council and the Conservation Commission or Recreation Commission, as appropriate) or shall be conveyed to a private non-profit corporation, the principal purpose of which is conservation or preservation of open space or to an organization or legal entity established for the purpose of owning and maintaining such common land. Such organization shall be created by covenants running with the land, and such covenants shall be included with the submitted development plan and shall be subject to approval by the City Solicitor. Said covenants must be re-recorded every thirty years.

Section 10.6 Planned Unit Development (PUD)

Definition: Planned Unit Developments are mixed residential, business, and institutional developments with extensive open space.

Applicability: PUDs may be allowed with a Special Permit from the Planning Board in accordance with all of the requirements and conditions of § 10.5 (Open Space Residential Development--Clusters) and § 11.0 (Site Plan Approval), with the following modifications to § 10.5 and the additional conditions:

8. The maximum number of dwelling units in the development shall be computed by multiplying the total tract area, less proposed roadways and eighty (80) percent of wetlands and floodplains, by the density shown below for the appropriate zone:

RR - 1.1 dwelling units per acre, unless WSP

SR - 1.5 dwelling units per acre, unless WSP

URA - 2.2 dwelling units per acre, unless WSP

URB - 6.0 dwelling units per acre, unless WSP

URC - 11.0 dwelling units per acre, unless WSP

HB - 7.00 dwelling units per acre, unless WSP

BP - 1.5 dwelling units per acre, unless WSP

ST - 5.00 dwelling units per acre, unless WSP

WSP - 0.54 dwelling units per acre, regardless of the underlying district

For residential districts only, each thousand square feet of non-residential gross floor area shall count as one unit, for the purposes of calculating the maximum number of units allowed (below). No density credit shall be computed for lands for non-road public facilities or improvements to existing roads where such lands are to be sold to the City. Credit may be computed where such lands are donated without cost.

9. In non-residential districts the common open space requirement is reduced to twenty (20) percent, with the open space requirement otherwise calculated the same way as for residential districts.

10. The net residential density within the residentially developed area of a Planned Unit

Development shall not exceed thirty (30) dwelling units per acre.

WINTER STORMS

Flag Lots

Section 6.13 Flag Lots

The Planning Board may issue a Special Permit allowing for the reduction of the frontage requirements for lots in the RR and SR Districts, when such lot is to be used solely for single-family residential purposes, provided said lot has:

5. for the subdivision of any single lot or contiguous lots under common ownership, in existence at the time of adoption of this Ordinance or subsequent thereto, there may be no more than three Flag Lots having abutting, contiguous street frontage. Said contiguous Flag Lots under common ownership shall share one common curb-cut and driveway access. Appropriate easements shall be delineated on the Plot Plan and on the deeds to the lots, including a clear provision for the responsibility for the maintenance of the common driveway, common utilities (if any) and snow removal, running with the land. Said easements shall:

A. become part of all of the deeds, and

B. be recorded at the Hampshire County Registry of Deeds or Land Court, as applicable (proof of recording shall be submitted to the Building Commissioner prior to the issuance of any Building Permits).

HURRICANES AND WIND

Section 10.9. Telecommunication Facilities.

Section 10.9. [Purpose]. The City of Northampton wants to encourage telecommunications and wireless services while minimizing adverse visual effects of these telecommunication facilities through careful design, siting, and vegetative screening and maximizing use of any new or existing towers, building and structures to reduce the number of towers needed

Section 10.9.6.1. Conditions. The following conditions apply:

1. Towers designed for one telecommunication provider shall be limited to 130 feet. Towers designed for co-located facilities shall be allowed an additional 20 feet for each additional provider up to a maximum of 220 feet. These height limits shall not apply to towers for or partially for government or emergency telecommunications, to the extent such height is needed to serve government or emergency telecommunication use.

2. In residential districts, a tower must be setback from all property lines at least twice the distance equal to its height. In other districts, a tower must be setback from all property lines at least the distance equal to its height. The Permit Granting Authority, however, shall allow a shorter setback if the shorter setback provides adequate safety and aesthetics and the manufacturer or qualified licensed designer certifies that the tower is designed to collapse on itself or otherwise collapse safely and within the property controlled by the applicant in the event of failure. The Authority may allow lesser setbacks necessary to allow the use of an existing structure.